Umwelt Bundes Amt

Für Mensch und Umwelt

Field Trials to Assess Metallic Materials In Contact with Drinking Water

O. von Franqué, **früher Labor für Korrosionsschutztechnik,**
(formerly with the Laboratory of Corrosion Technology)
Märkische Fachhochschule Iserlohn

E. Meyer, **Umweltbundesamt, Berlin**
(Federal Environmental Agency, Berlin)

W. Sauter, **Umweltbundesamt, Dienstgebäude Langen**
(Federal Environmental Agency, Langen Branch)

English translation by M.N.L. Seaman

January, 1999

Table of Contents

Summary

Leaching of heavy metals from the materials of fittings, valves, tap valves etc. into the drinking water has gained in interest and importance in recent years. This has been promoted by two regulations in the latest EU Council Directive, which narrows the permissible concentration range of certain elements and unequivocally states that the water quality specified by the Directive must be met at the consumer's tap. These two points are forcing the regulatory agencies and the industry to study the leaching of heavy metals from domestic distribution systems more closely than has been the case in the past.

Regulators are confronted with the problem that leaching of heavy metals from the materials employed in drinking water distribution systems depends on the composition of the water, as well as on the residence period (stagnation time) of the water and the age of the plumbing, i.e. leaching is not constant over time. The EU Directive sidesteps the problem by limiting the concentrations of some elements not on the basis of an individual sample, but for a sample "representative of the weekly average value ingested by consumers". The regulation on water sampling procedures is presently being elaborated, and it must be written by the time the new EU Directive is implemented by national law in the year 2000 - in Germany, by an amendment of the Ordinance on Drinking Water (*Trinkwasserverordnung*).

This study investigates the influence of the residence period and of the age of the distribution system on heavy metal concentrations. The tests were conducted from 1994 to 1998, and the preliminary results contributed to DIN 50 931-1, published in 1999. This standard describes a testing procedure and a method to compute the average that can be used by regulatory agencies in future specifications.

The investigations were conducted on test rigs with several parallel lines of pipework that consisted of pipes or tubular fittings made of the material to be tested and connected by tubes. The fittings in these test series were made of three Cu-Zn alloys (brass) and two Cu-Sn-Zn alloys (gun metal). Water passed through the sections of tubing in the test rigs, following a set pattern of alternating periods of stagnation and flow.

Four experimental facilities at various locations were operated for the duration of one year. Because past experience has shown that heavy metal leaching from copper alloys depends mostly on the carbon dioxide content of the water, the local water was adjusted to various acidities (given as $K_{B\ 8.2}$ according to DIN 38409-7), from 0.15 mmol L^{-1} to 4 mmol L^{-1}, resulting in four to five test waters at each location.

Water samples were taken at determined intervals and analyzed for the elements As, Cd, Cr, Cu, Fe, Mo, Ni, Pb, Sb, Sn and Zn. The significance of the results was controlled by repeating the sampling procedure twice at weekly intervals in two locations at the end of the test series. The significance was found to be adequate for the purpose of the experiment.

The entire data set on the elements Pb, Cu, Zn and Ni in the five materials and the 19 test waters is given in the 125 pages of the Appendix. The maximum values of the other elements are given in tables and discussed. They always lay within ranges viewed as non-critical.

The influence of residence periods, age of the distribution systems, water parameters and composition of the material on the leaching of elements from the alloys, is discussed.

Some of the elements are not found in the water samples in the proportions present in the alloy. Therefore, the conclusions drawn from the results obtained with one alloy cannot be applied to other alloys. Furthermore, we discuss the computation of a mean (M(T) according to DIN 50 931-1 (with a testing period T of the test rig), showing that it is adequate for describing long-term trends of heavy metal leaching into the water. These data may serve as a basis for future specifications in regulations and standards.

The results have shown once more that any assessment needs to consider the temporal trends in concentration and their dependence on residence periods and operation time of the distribution system. Single measurements and even single M(T) values will almost always lead to erroneous conclusions and must therefore not be employed in specifications and comparisons.

The leaching of heavy metals from the materials of fittings increases with increasing duration of the residence period, and rarely attains a uniform level under the given conditions (maximum residence period of 16 h). The long-term decline in heavy metal release with increasing age of the fittings may be described by the change over time of the M(T) values, as well as by the change in the values at 4 h and 8 h residence, but it appears more appropriate to use the means M(T), because they compensate for possible irregularities.

The investigations have confirmed that the passage of metal ions from the alloys into the water depends on the carbon dioxide content of the water. However, this is insufficient for prognostication of the leaching of metals. It has become obvious that additional factors exist, particularly in waters of higher salinity. Further tests with different parameters will be needed to describe these influences.

Preliminary note

The field trials described in this study were conducted from 1994 to 1998 at four different locations in Germany. Preliminary results were published in 1996 and 1997 [1, 2, 3]. They served as a basis of DIN 50 931 -1 [4], among others. It became known in the course of the study that comprehensive investigations on the leaching of lead from materials employed in drinking water distribution systems were being conducted in the USA, but that these concerned lead exclusively [5]. Simultaneously with our study, the European Commission DG XII awarded a contract on the same topic based on a call of 15 December 1995, concomitant to the elaboration of new regulations [31].

1. Purpose and objectives of the study

1.1 Framework

All of the materials presently employed in domestic distribution systems release greater or lesser quantities of substances into the water. It is principally impossible to avoid these natural processes, but the concentrations must be kept down to levels that are non-hazardous to the consumer. Therefore, appropriate guidelines, laws and ordinances specify values that must be attained to meet drinking water quality [6, 7, 8, 9]. These values may either represent strict mandatory limits, targets to be met if possible, or averages [e.g. 10, 11] computed by various procedures.

In this context, the present study deals with the leaching of heavy metals from plumbing materials, focusing on the materials in domestic fittings, valves, tap valves etc.

This topic has gained in importance in recent years, particularly because the latest EU Directive on the quality of water intended for human consumption [9] states in Article 7 that the specified limits must be attained at the tap from which the consumer usually draws the water for drinking and the preparation of food. This specific definition now forces regulatory agencies to focus on any substance that might ultimately enter the water along the way to the tap. This includes substances which might additionally be taken up by the water along the stretch from the water meter to the tap, i.e. in the domestic plumbing. Apart from plastics and the special problems associated with them, this basically concerns heavy metal ions entering the water due to corrosion processes in metal fixtures. The fixtures include pipes, which represent the main source of copper and zinc ions in the water, and fittings etc. that may release various elements into the water, depending on their composition.

The concentrations of ions entering the water because of corrosion depend on the composition of the water, age of the distribution system, and the length of time during which the water remains in contact with the material prior to consumption [12]. This means that the concentration determined in an individual sample is not constant in time. Analyses show that the concentrations of ions released into the water by the materials of the fixtures varies greatly in the course of a single day, as well as in the course of the service life. Therefore, heavy metal levels cannot be assessed on the basis of individual samples [12]. This applies to the evaluation of water quality, as well as to the assessment of materials.

This needs to be taken into account when specifying any type of concentration limit. To demand that a given limit should never be surpassed would necessarily exclude dependable materials and technologies in which maximum levels sometimes surpass the specified value. On the other hand, avoiding the problem by basing regulations on very liberal values could endanger consumers by subjecting them to inacceptable levels of long-term exposure. This difficulty is resolved by using averages. Their computation requires a great number of determinations, which is tedious, but reflects overall exposure.

A procedure for the computation of an average is given in DIN 50 931 - 1 [4]. It prescribes that eight samples be taken in an experimental facility or domestic distribution system following a set pattern during the course of the day, and the sampling procedure is to be repeated after determined testing periods. The resulting values represent the overall leaching of substances into the drinking water, thus being adequate for investigations on the total load or on issues regarding the prevention of corrosion. An assessment of consumer exposure requires additional investigations, however, because only 3% of the potable water used in a household is actually consumed for cooking and drinking.

The EU Directive [9] takes this into account by requiring that water samples for the analysis of heavy metals be "obtained by an adequate sampling method at the tap and taken so as to be representative of a weekly average value ingested by consumers". The Directive does not specify what constitutes "adequate" sampling. This is to be elaborated by a working group, but Member States will be permitted to apply alternative sampling procedures if they demonstrate that these are compatible to the method proposed in the guideline. The present study is designed to contribute to this aspect.

In specifying investigation procedures, it is necessary to distinguish clearly between different objectives. An extensive sampling program, for instance, may provide information on the average exposure of consumers [11,13]. Brief tests of individual objects may be useful as licensing tests for fittings etc., or as screening tests for materials [14,15,16]. Neither methodological approach, however, fulfills the requirement of specifying concentration limits to protect individual consumers during a lifetime of water consumption from one source. This could only be attained with ridiculously low limits. Therefore, it makes more sense to base specific limits on an analysis of the variations with time.

1.2 Temporal variations in metal concentrations

It is impossible to assess metal concentrations in the water at the tap with one single determination. It is always necessary to consider periodic changes in concentration, i.e. fluctuations in the course of the day, as well as changes during the service life of the plumbing need to be known. The former will depend on the residence period (stagnation time) of the water, and the latter depends on various corrosion processes such as the formation of a surface layer. The knowledge of periodic fluctuations is required regardless of whether the focus is on monitoring, on the assessment of a material, or on comparing the behavior of different materials. Comparisons in particular may be seriously flawed if they are based on single values or individual sampling occasions.

The need to consider variations with time in the concentration of metal ions in the water does not preclude defined sampling schemes, e.g. by specifying a residence period prior to sampling and the taking of only one sample. Data from such samples can be used to conclude whether a specified average is met, if the variation with time is known.

Metallic materials for use in pipework and fittings have narrowly specified compositions that may additionally be subject to official quality tests. Leaching of heavy metals from a given material into the water does not depend on the composition of the material. The composition of the water is usually constant in time. In this case, with a defined material and constant water quality, leaching of heavy metals will depend almost exclusively on the age of the plumbing and on the residence period of the water. This makes it possible to follow the same procedure used in pipework materials (copper and galvanized steel) where sampling has been abandoned entirely in favor of defining permissible ranges of use of a material or group of materials, depending on the composition of the water. The permissible range of uses of copper and galvanized steel pipes is specified in the Ordinance on Drinking Water

(*Trinkwasserverordnung*) [8] in combination with DIN 50 930 [12] according to the $K_{B\ 8.2}$ value. The same procedure has been proposed for the materials of fittings etc.[2, 3], and this obviously requires a knowledge of the variations in heavy metal leaching with time. Apparently, however, it will not be easy to quantify the effects of water composition on the basis of a single parameter. It will probably become necessary to determine the effects separately for each water or group of waters having a different composition.

Nevertheless, this procedure presents the advantage that water utilities will only need to conduct such an investigation once, as long as the composition of the water does not change significantly.

An accessible data set on variations with time will hopefully be compiled in the future, making it possible to draw generalized conclusions and determine broader ranges of permissible use. The present data are designed to create a methodological basis, and at the same time to describe in the case of some waters the variations in heavy metal leaching with time which are a prerequisite for assessment.

1.3 Evaluation of test data with regard to the weekly average value according to the EU Directive

As stated above, the EU Directive prescribes that samples represent "the weekly average value ingested by consumers". The only way to determine this accurately is by a composite proportional sampling method [18, 19]. The computation of an average from variations of the concentration with time is only possible when validated data are available on consumption behavior, or on the relation of a composite proportional sample to the changes of the concentration with time. Studies to gain this type of data are under way.

There are two cases, however, where data on the variations with time make it possible to draw conclusions with regard to the mixed weekly sample. When most of the individual values or the daily average M (T) (according to DIN 50931-1) are <u>greater</u> than the limits specified in the EU Directive, then the material in question must be viewed as inadequate for this water. On the other hand, if all of the values and the daily average are <u>less</u> than the limits in the EU Directive, then the material is considered adequate for this type of water regardless of consumer behavior, because any mixed sample will necessarily have values lower than the specified limits.

Consumer behavior will, however, always have to be taken into account when the daily average is lower, but some of the fluctuatiuons are higher than the limits. It will only be possible to estimate the importance of this aspect once the studies now in progress are completed.

In the case of materials used in pipework, data obtained with the experimental setup described here may be extrapolated directly to other distribution systems made of the same material; this does not apply to the materials of fittings etc., which only make up a small section in a domestic distribution system. This is the same in test rigs, but the results obtained with them cannot be extrapolated, because the proportion of fittings may vary considerably between different domestic distribution systems. Therefore, experimental data need to be multiplied by a correction factor before they are applied in practice [17].

1.4 Determination of ranges of permissible use of materials

With respect to any material coming into contact with drinking water, the selection of adequate materials and enaction of adequate provisions must always ensure that the water is not unduly impaired. Because plumbings have a life span of 50 to 100 years and their replacement incurs expenditures several times higher than the cost of the material, it is absolutely impermissible to control in retrospect whether they actually adhere to the legal limits. It is impossible or impractical to demand ulterior replacement of a distribution system that oversteps the limits. The problems resulting from the past use of lead plumbing show how difficult it is.

However, every material leaches substances into the water to some amount. The problem cannot be resolved by abandoning certain materials, because the selection of materials for use in plumbings for drinking water is already limited, compared to other technological sectors. It is necessary to maintain the largest possible selection of materials, because they need to fulfill technical criteria in addition to those concerning water quality.

Approaches toward the regulation of the traditional materials - copper, galvanized steel and non-ferrous alloys - have only been developed in recent years. At the same time, progress in the production of plastic materials has been accompanied by the development of testing and licensing procedures that ensure that the impairment of drinking water is held within acceptable limits.

The leaching of substances from plastics depends mostly on the composition of the material and on its production process, and is independent of water quality. Therefore, it is possible to formulate requirements that are controllable by a testing procedure and take into account the expected operating conditions as well as knowledge on the changes in behavior of the materials with time. Materials having passed the test can then be put into use regardless of the chemical composition of the water.

The situation is much more complex in the case of metals, because of the effects of water chemistry. Since these materials react with the water and the substances it carries, testing the behavior of a material in one type of water does not permit conclusions on its behavior in other types of water. One practicable approach is to determine ranges of chemical water quality in which a given material may be used. In this concept, a certain range of water quality parameters is defined, within which a given material demonstrably does not unduly affect water composition.

Implementation of this concept requires either practical experience or comprehensive tests. Field trials conducted with drinking water in the framework of the Research and Development Program on "Corrosion and Protection Against Corrosion" funded by Germany's Federal Ministry of Research and Technology from 1974 to 1993 (*Forschungs- und Entwicklungsprogramm "Korrosion und Korrosionsschutz" des Bundesministeriums für Forschung und Technologie der Bundesrepublik Deutschland*; FEKKS) [20, 21], for instance have served to define in DIN 50930 the permissible ranges of use of galvanized steel and copper pipework. The present study is a continuation of those trials with the materials used in fittings, but it needs to be resumed beyond the test series now completed.

The definition of obligatory ranges for the use of a material has the advantage of providing a reliable legal standard for clients and contractors. A plumber need not fear that his work will be judged faulty, even if some water samples are found to exceed the limits. The client as responsible operator of a building's plumbing in the sense of the EU Directive can rely on not becoming liable to legal complaints.

Models can be employed to explain the basic principles for determining the ranges for the use of materials. This necessarily requires simplifications, because the numerous variables and complex interactions engender a different situation for each consumer.

The release of substances by metallic materials in domestic plumbing for drinking water is determined by five groups of variables:

1. The material or combination of materials
2. The chemical properties of the drinking water
3. The age of the domestic distribution system
4. The design of the distribution system
5. The behavior pattern of the consumer

The values found in individual samples may therefore vary considerably, even by several orders of magnitude, at one and the same tap. Single samples are thus fundamentally inadequate for evaluations according to Art. 7 of the EU Directive, which provides that the sampling must be representative of the water consumed during the course of an entire year.

It is possible to enact steps to reduce the uptake of corrosion products, heavy metals in particular, with respect to every variable, except for the age of the plumbing.

Demands upon the purity of materials have increased, and alloying elements with detrimental effects on human health have been reduced in amount. The possibilities are limited by technological requirements, but further development will continue.

Manipulation of water quality to reduce corrosion in drinking water systems has a long tradition in the central water treatment plants of the distributors. Raising the pH is one standard method in the context of water chemistry that has proven adequate. This is provided for in the Ordinance on Drinking Water (*Trinkwasserverordnung*), which considers the behavior of the metals used in pipework.

The corrosion processes and formation of layers in domestic distribution systems generally result in decreasing heavy metal exposure of the consumers, as confirmed by the present study. This process cannot be controlled, but it can be taken into account when assessing the performance of materials, by taking into account health data on the heavy metals in question.

This aspect is also reflected, albeit incompletely, in the design of domestic distribution systems for drinking water. Applicable rules are given in DIN 1988 [28]. Because the requirements for distribution systems are sometimes contradictory, it is often necessary to find compromises. In determining pipe diameter, the requirement for small dimensions (to reduce the residence time of the water) is offset by the need to guarantee water supply without loss of head pressure or of comfort during periods of peak demand. Combining the supply pipes for the kitchen and bathroom, which is desirable from the standpoint of human health, limits architectural freedom, and a complete separation within a building of the pipework for firefighting from the pipework for drinking water represents a very costly necessity.

The consumers' habits essentially determine the quantities of substances they take up from the domestic plumbing. This has led to the well-known recommendation that water be allowed to flow for some time before it is drunk or used to prepare food. An analysis of the issue, however, shows that this is not an acceptable solution, except as a last resort when the plumbing consists of inadequate or obsolete materials.

Besides wasting water, a strict observance of the recommendation would require an inacceptable amount of time, and it could certainly not be made plausible to most consumers. Drinking water of impeccable quality must be available to the consumer upon demand. Along with the specific situation in a building, consumer habits (i.e. the times at which they draw water) determine the average residence periods. An average residence period is thus characteristic of a certain type of consumer.

This residence period may vary from a few minutes to several hours. In any group of consumers, the average individual residence period can be depicted as a distribution. To our knowledge, there is only one empirical determination of the distribution in the literature [19], and its applicability to consumption behavior and plumbing design in Germany remains to be verified.

It is important to distinguish between the average residence period for an individual consumer and that for a group of consumers. Due to their individual patterns of behavior, some consumers may repeatedly be exposed to water with long residence periods, while others will regularly consume water with a short residence period. These differences do not cancel each other out in the course of time, as shown by studies in which several consecutive samples were taken from households [29, 30].

The general distribution curve describing the frequency of certain average residence times in a segment of the population is given in Fig. 1.4.1.

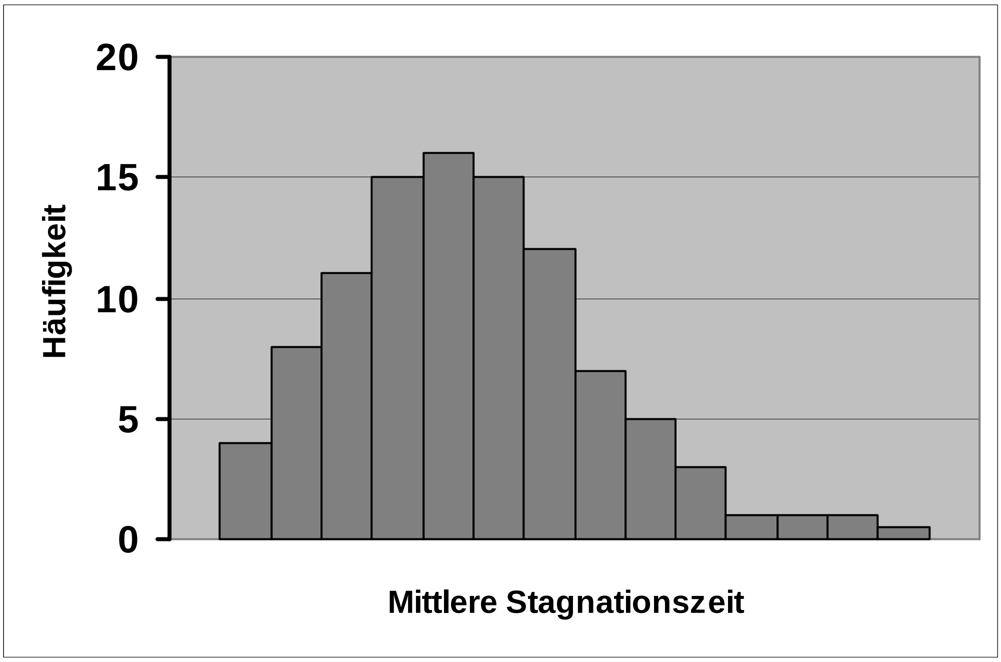


Fig. 1.4.1 Frequency distribution of average residence time.

The distribution begins at zero, because no consumer ever draws his water directly from the basement, and the water is therefore in contact with the plumbing during the time it flows to the tap. The curve presumably peaks between 30 minutes and one hour; this estimate is based on the relation between the volume of the pipework and the volume consumed, and it also follows from the evaluation of spontaneous samples taken during the Environmental Survey [13]. Persons that consume water having an average residence period of several hours are probably a rare exception. They can reasonably be expected to allow the water to flow for some time before consuming it.

A certain average residence period in the plumbing is implicitly assumed in every sampling procedure that is used to control adherence to the legal limits. Using such a sampling procedure to determine values that exceed the limits or to specify permissible ranges of use will necessarily ignore certain consumers with special consumption patterns. The choice of sampling procedure therefore ultimately represents a political decision.

In light of these considerations, permissible ranges of use can be defined on the basis of three variables or functions that need to be determined individually. They are the following:

1. The maximum concentrations of a parameter c_{max} observed in a certain period for a given material and a given water quality (see Fig. 1.4.2).

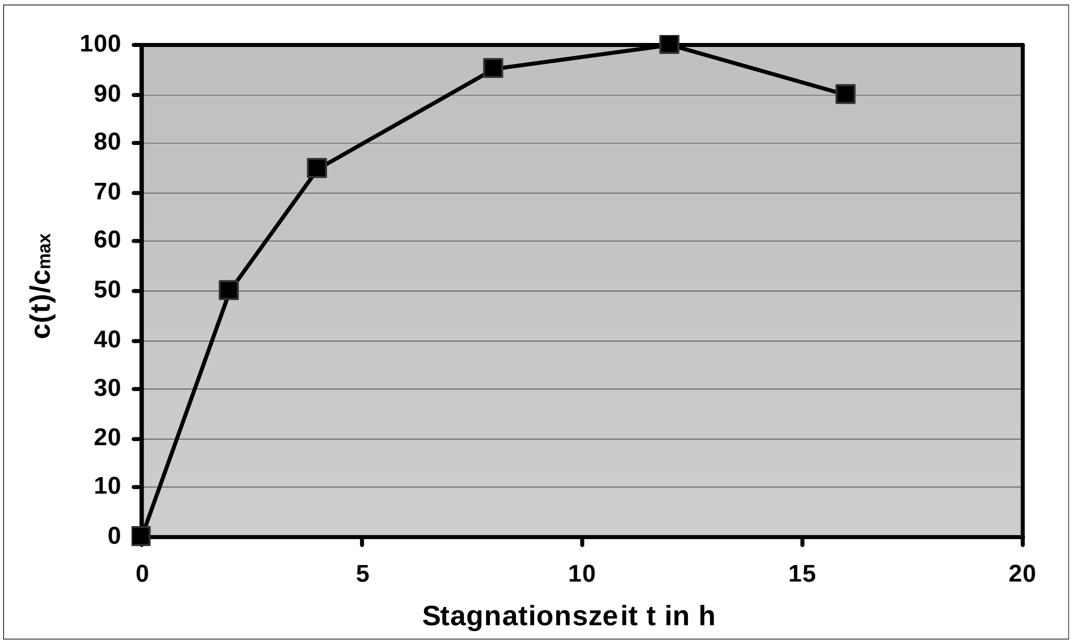


Fig. 1.4.2 Influence of the residence time on the concentration c(t) .

2. The influence of the residence period in the plumbing on the uptake of corrosion products, which can be described by a function f(t). The typical curve of this function f(t) is a nearly linear increase during the first two hours, followed by an approximation to the saturation value c_{max}.

3. The average residence period of the drinking water in the plumbing, until it is consumed by the consumer. This requires a definition of the maximum average residence period to which the legal limit applies.

The permissible ranges of use may be determined in different ways.

1. The maximum concentration (c_{max}) is set from the beginning at a value that is tolerable from the standpoint of human health. In this case the value must not be exceeded.
   - This step imposes the widest restrictions on a material; it protects the consumer against excessive ingestion, surpassing necessary protection levels.

2. The ranges of use are defined in such a way that the concentration will remain within the limits required by human health during specified residence periods. In this case the value for such a sample must never be exceeded. The residence period may be specified so that it encompasses the individual average residence periods of 95% to 98% of the population. In addition, the maximum possible concentration in a water of given composition must not surpass the average weekly value specified in the EU Directive [9] by a factor yet to be defined, between 2 and 3.
   - This definition imposes lesser restrictions on a material than the first case;
   - it provides adequate protection for the entire population, but for a small percentage of the population it accepts a reduced margin of safety to the concentrations which may be hazardous to human health.

3. The range of use is defined according to the limits specified for the average weekly value in the EU Directive, and based on a group of consumers supplied by a certain utility. Within the range of use, the concentrations of the substance in question are not permitted to exceed the limits after a stagnation period corresponding to the average residence period for the entire group.
   - This definition obviously imposes the smallest restrictions on a material;
   - it provides adequate protection for only half of the population in the area supplied by the utility, and the average ingestion of the substance in question will presumably exceed the limit in the other half of the population;
   - it must be assumed that the ingestion of the substance will in some individuals exceed the threshold hazardous to human health.

2. Methodology

The experiments were conducted at four different locations (Thalfang, Langen, Berlin and Würzburg) selected according to the composition of the water available from the public network (see Section 2.3). Test rigs were built at each of these locations, and the operation of a domestic distribution system was simulated for over a year.

2.1 Design and operation of the test rigs

2.1.1. Design of the test rigs

The experimental setup consisted of several parallel sections of pipe, from which samples were taken following a specified pattern. In the study on the pipework materials copper and stainless steel, each section consisted of 3 m of tubing of the material in question, with an inner diameter of 13 mm.

The experiments on materials for fittings etc. were equally conducted with 3 m sections of pipework, each with five fittings made of non-ferrous metals (see Fig. 2.1.1.) separated by four pieces of pipe 50 cm in length; each test section had 25 cm long pieces of pipe at either end, linked to conventional PVC pipes by 1/2-inch connecting pieces made of stainless steel.

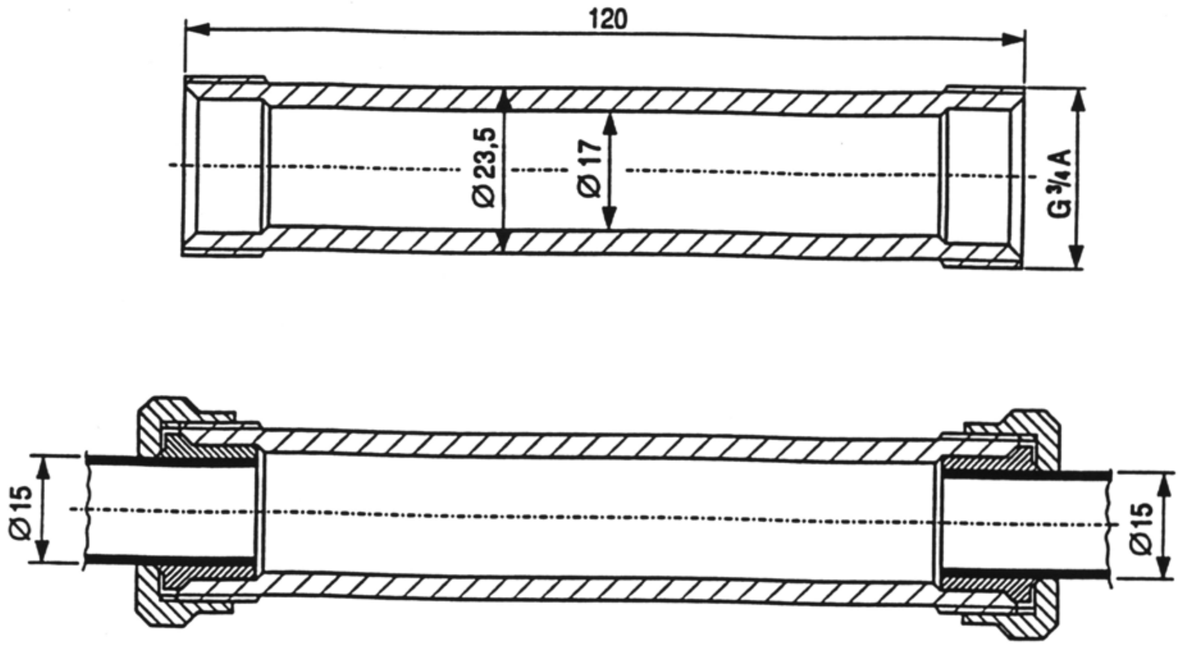


Fig. 2.1.1 Test pieces for testing the materials for fittings.

The design of the test pieces was based on the following considerations:

- The test piece had to be exposed to internal corrosion conditions similar to those in drinking water distribution systems.
- Its size had to be similar to that in domestic distribution systems; the inner diameter had to correspond to that of commonly used fittings.
- It had to be easily attachable to other materials, so that the rest of the experimental facility could be built with standard components.
- It had to be possible to manufacture the test pieces with the technology usually employed in the production of fittings.

The test pieces were specially manufactured for the experiments. They were 120 mm long and had an inner diameter of 17 mm with a 3/4-inch male thread at each end, as shown in Fig. 2.1.1. They were connected to a stainless steel pipe by a POM inner piece and a 3/4-inch screw cap. The inner surface in contact with the water was 100 mm long. Test pieces and connecting tubes were short-circuited by copper wire.

In the first facility in Langen, test pieces were connected by pipes made of either copper, stainless steel, or polyethylene [1]. Based on the results, only stainless steel pipes were employed in subsequent experiments (Langen, Thalfang, Berlin and

Würzburg). Plastic pipework would have been just as adequate, but stainless steel was preferred because of its better handling and stability. Where plastic pipes were used, the metal pieces were connected by copper wire with a cross-section of 15 mm^2.

Several of these sections of tubing were bundled into a test rig and supplied with one type of water through a PVC distributor fitted with a vent and three-way spigot. Three-way spigots were screwed onto the lower end of each section of tubing. One of the outlets was fitted with a magnetic valve through which the water was directed into the effluent during normal test rig operation. The second outlet served for sampling. Fig. 2.1.2 shows a diagram of one of the test rigs. Figures 2.1.3 and 2.1.4 show photographs of one of the experimental facilities.

Except for the actual test sections, all of the components (tubes, valves, distributors, screw caps, seals, etc.) were made of inert plastic materials (PVC, PE, POM).

The number of test pieces was chosen so that a considerable distance between the individual pieces would be maintained while permitting the placement of the greatest possible number of test pieces per experimental section. The relation of the inner surfaces of the fittings to those of the pipework thus necessarily deviated from the usual relation in various types of domestic distribution systems. The experimental results must therefore be adapted by applying adequate correction factors; this is discussed in [17].

The experimental design in the field trials described here was subsequently adopted in DIN 50 931 -1 [4]. These experiments are thus completely consistent with this standard.

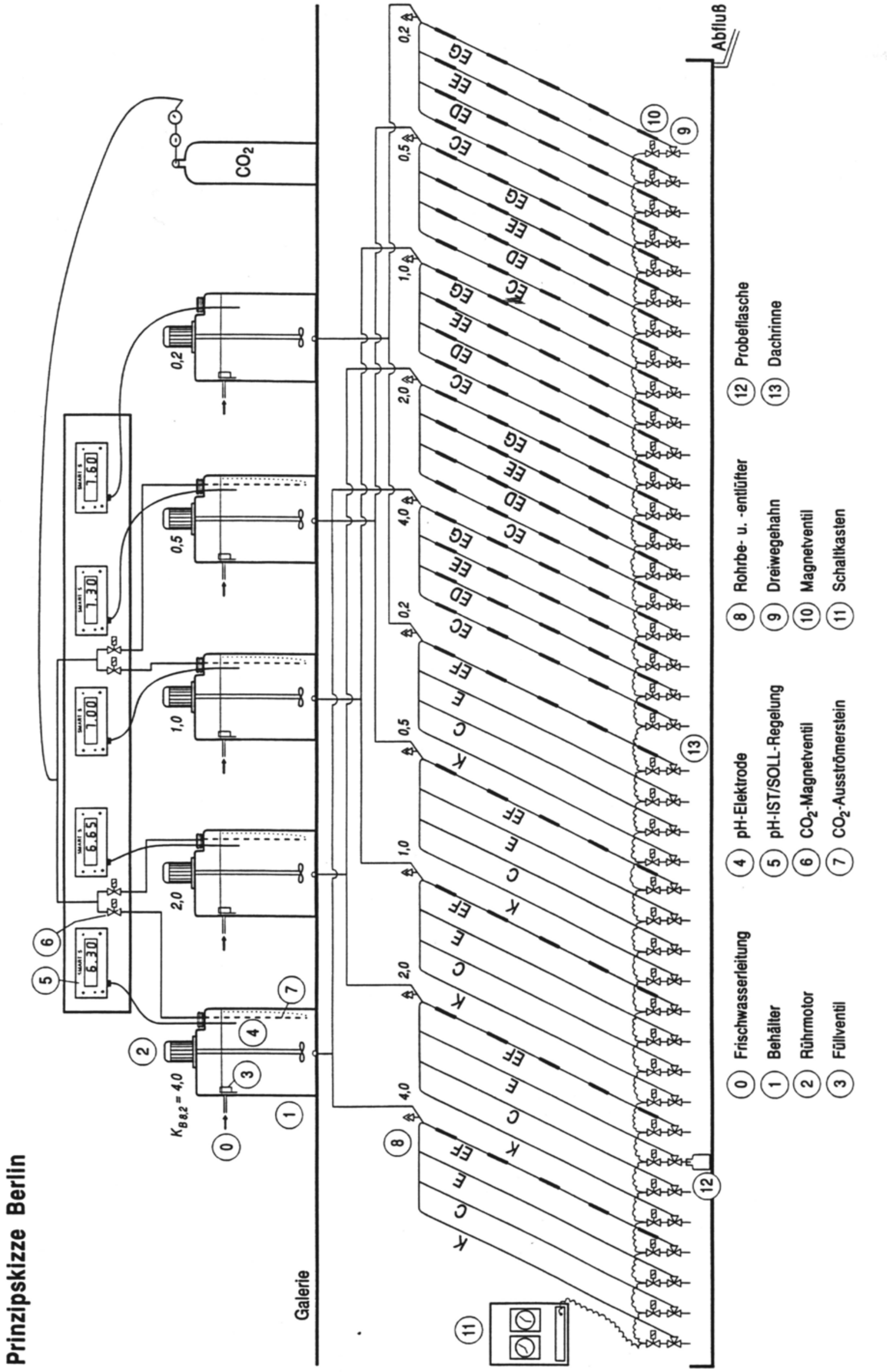


Fig. 2.1.2 Diagram of the test rig in Berlin.

Fig. 2.1.3 Front view of the experimental facility in Würzburg.

Fig. 2.1.4 Side view of the experimental facility in Würzburg.

2.1.2. Operation of the test rigs

The test waters were prepared in 500 liter mixing tanks with water from the public network. Details are given in Section 2.3. The waters were conducted into the test rigs by a natural head pressure of 0.5 bar, thereby eliminating any need for expensive pumps susceptible to malfunction.

The magnetic valves were regulated by timers to permit the flow of water through the test sections for 45 to 90 seconds every 15 minutes, exchanging a volume of about 2 l, or four times the volume of the test section. The flow velocity was 0.15 to 0.30 m/sec. This cycle was maintained during 16 hours at daytime, and the water stagnated in the pipes for 8 hours during the night.

This experimental procedure had proven adequate in earlier tests on the leaching of heavy metals from pipe materials [20, 21, 1]. It was adopted once more, in order to facilitate a comparison of the present results with those of the earlier test series. The standard DIN 50 931 - 1 later proposed a different procedure with variable stagnation periods during the daytime, while maintaining the nighttime stagnation period at 8 hours. The overall flushing rate is also similar (128 l compared to 145 l in DIN 50 931 - 1). We kept to our original procedure despite the new standard, for two principal reasons: the first was comparability to the earlier test series and within the new series, and the second was that a modification of the facilities would have entailed considerable labor and effort. In our opinion, in tests with materials that form surface layers, the mode of operation does not generate significant differences to other experimental approaches and distribution systems, as long as it includes repeated water exchange to renew the oxygen supply,as well as a daily stagnation period of adequate duration. The sampling procedure is described in detail in Section 2.4.

2.2 Materials employed in the tests

2.2.1 Pipework materials

The test pieces made of the materials for fittings etc. were connected with sections of stainless steel pipe conforming to DIN 17 455 material no. 1.4401 (corresponding to the present DIN EN10088).

At the same time, the facilities included sections consisting exclusively of copper and stainless steel pipe, operated in the same fashion. This program belonged to a different research project that will be reported elsewhere, and is only mentioned here for the sake of completeness.

2.2.2 Fitting materials

Five different materials for fittings etc. were used in manufacturing the test pieces, three copper-zinc alloys (brass) and two copper-zinc-tin alloys (gun metal).

The materials were selected taking into account the frequency of their use; in both groups of materials, brass and gun metal, alloys with different lead contents were selected to assess the possible influence of the alloy's lead content on the leaching of lead. The test also included a Cu-Zn alloy of dezincification resistant brass now included in the standards. The purpose was to examine how additives designed to reduce a certain type of corrosion might affect the leaching of heavy metals.

Table 2.2.1. gives the DIN-EN standard designations of the alloys, and the abbreviated codes used in the present tests, to facilitate interpretation of the Appendix and of the data in the WaBoLu database. Table 2.2.2. gives the tolerance ranges for the composition of the materials in the DIN-EN standard, and Table 2.2.3. gives the actual composition of the materials employed. All of the test pieces originated from the same batch of alloy.

Table 2.2.1. Code abbreviations and standard designations of the alloys tested

	Code	EN standard	Designation according to EN standard	EN material no.
CuZn alloys (brass)	C	DIN EN 12164 April 1998	CuZn40Pb2	CW 612 N
	D	DIN EN 12164 April 1998	CuZn39Pb3	CW 614 N
	E	DIN EN 12164 April 1998	CuZn36Pb2As	CW 602 N
CuSnZn alloys (gun metal)	F	prEN 1982	CuSn5Zn5Pb5-C	CC 491 K
	G	*	CuSn5Zn5Pb2-C	CC 491 K

* This is a low-lead gun metal alloy that has not yet been standardized; the designation and EN material no. were formed according to EN standards.

Table 2.2.2. Percentage mass composition specified in the DIN-EN standard

EN designation	Pb	Ni	Cu	Zn	Sn	Cd	As	Sb
CuZn40Pb2	1.6 - 2.5	max. 0.3	59 - 60	remainder	max. 0.3	*	*	*
CuZn39Pb3	2.5 - 3.5	max. 0.3	57 - 59	remainder	max. 0.3	*	*	*
CuZn36Pb2As	1.7 - 2.8	max. 0.3	61 - 63	remainder	max. 0.1	*	0.02 - 0.15	*
CuSn5Zn5Pb5-C **CuSn5Zn5Pb2-C**	4.0 - 6.0	Max. 2.0	83 - 87	4.0 - 6.0	4.0 - 6.0	< 0.06	< 0.06	< 0.06

* In the standard, these elements are listed under the heading "others", the sum of which is specified to be less than 0.2%. The standard also specifies limits for Al, Fe, Mn in CuZn alloys, and for Al, Fe, P, S, Si in CuSn alloys.

Table 2.2.3. Percentage mass composition of the test materials

Code	EN designation	Pb	Ni	Cu	Zn	Sn	Cd	As	Sb
C	**CuZn40Pb2**	2.1	0.003	59.8	39.1	0.01	0.002	<0.01	0.008
D	**CuZn39Pb3**	2.7	0.06	57.5	38.4	0.18	0.003	0.006	0.009
E	**CuZn36Pb2As**	1.8	0.02	61.4	35.8	0.05	0.001	0.14	0.002
F	**CuSn5Zn5Pb5-C**	4.7	1.1	85.6	4.5	4.7	<0.001	0.012	0.12
G	**CuSn5Zn5Pb2-C**	2.0	1.7	84.9	8.1	2.6	<0.001	0.007	0.17

2.3 Types of water used in the tests

Past experience has shown that the leaching of heavy metals from copper alloys depends mostly on the carbon dioxide content of the water; therefore replicate tests were conducted with waters of different acidity levels ($K_{B\ 8.2}$). To this end, the waters taken from the local networks were adjusted to four or five different pH levels by injecting carbon dioxide into the 500 l mixing tanks. The resulting waters were then conducted into the various test sections (Fig. 2.1.2).

The pH was monitored throughout the tests and adjusted when necessary. Comprehensive analyses were conducted every four weeks. Acidity levels were monitored regularly; the variations in all of the test waters are shown in Appendix A2. The original composition of the various waters used is shown in Table 2.3.1.

Table 2.3.1. Original composition of the test waters

		Thalfang Series 3	**Langen** Series 2	**Berlin** Series 4	**Würzburg** Series 5
Total hardness	mmol/L	0.35	1.90	2.60	6.54
Ca	mg/L	7	58	92	181
Mg	mg/L	4	11	8	49
Na	mg/L	2	14	41	17
K	mg/L	1	3	4	4
Cl	mg/L	4	27	56	68
NO_3	mg/L	4	26	4	41
SO_4	mg/L	7	57	89	263
HCO_3	mg/L	32	133	235	386
Conductivity (25°C)	µS/cm	86	470	730	1275
Temperature	°C	9	12	12	14
pH		7.82	7.92	7.50	7.10
pH ($CaCO_3$)		8.68	7.75	7.37	7.01
SI experimental		-0.86	0.17	0.14	0.08
$K_{B\ 8.2}$	mmol/L	0.04	0.05	0.32	1.17
$K_{S\ 4.3}$	mmol/L	0.52	2.19	3.85	6.33
O_2	mg/L	10.7	10.4	5.9	5.5
Si_{total}	mg/L	2.6	8.2	12.4	6.5
P_{total}	mg/L	<0.06	<0.06	<0.06	<0.06
o-PO_4	mg/L	<0.05	<0.05	0.10	0.05
Al	mg/L	0.08	<0.05	0.15	0.11

The waters in each of the experimental facilities (cf. Table 2.3.2.) were adjusted to the same acidity levels. These levels, $K_{B\ 8.2}$ = 0.5 and $K_{B\ 8.2}$ = 1 mol/m³, were selected according to the permissible ranges specified in DIN 50930 Parts 3 and 5. Acidities of 2 and 4 mol/m³ were also used to simulate critical test conditions that may occur in non de-acidified waters.

Additional test waters were used in three of the experimental facilities:

- At the facility in Thalfang, the water was used as it is distributed by the suppliy company, after complete de-acidification according to the provisions of the Ordinance on Drinking Water (*Trinkwasserveordnung*), at $K_{B\ 8.2}$ = 0,04 mol/m³.
- At the facility in Berlin, the water was also used as it is distributed by the utility, i.e. without supplementary carbon dioxide; this resulted in carbon dioxide losses reducing acidity to 0,2 mol/m³.
- In the distribution area of Würzburg, the water has an acidity of 1.2 mol/m³; a mixture of silicate and phosphate is added prior to its distribution, raising the level of silicate to 1 mg/l Si and of phosphate to 0.32 mg/l P, with 0.5 mg/l o-PO_4 (termed 1.2 + X). This water, which is distributed via the public network, was also included in the tests.

Table 2.3.2. Composition of the waters used in the test

Facility	**$K_{B\ 8.2}$ (mmol / L)**		**pH**		**$K_{S\ 4.3}$**	**DIC**
	Theoretical value	*Actual mean*	*Theoretical value*	*Actual mean*	**(mmol / L)**	**(mg / L)**
Thalfang	0.04	0.04	7.5	7.59	0.5	6
	0.5	0.45	6.4	6.44	0.5	12
	1.0	0.98	6.1	6.09	0.5	18
	2.0	2.02	5.8	5.77	0.5	30
	4.0	4.21	5.5	5.46	0.5	54
Langen	0.5	0.47	7.0	7.03	2.0	30
	1.0	1.10	6.7	6.68	2.0	36
	2.0	2.04	6.4	6.39	2.0	48
	4.0	4.08	6.1	6.09	2.0	72
Berlin	0.2	0.16	7.7	7.76	3.5	43
	0.5	0.47	7.2	7.28	3.5	48
	1.0	0.85	6.9	7.00	3.5	54
	2.0	1.94	6.6	6.62	3.5	66
	4.0	3.68	6.3	6.34	3.5	90
Würzburg	0.5	0.48	7.6	7.57	6.4	83
	1.0	1.16	7.1	7.11	6.4	91
	2.0	2.02	6.9	6.85	6.4	101
	4.0	4.06	6.6	6.57	6.4	125
	1.2 + X	1.15	7.1	7.11	6.4	91

2.4. Analysis of heavy metal concentrations in the water samples, and control of analytical accuracy

At the end of a stagnation period, the water was chemically analyzed in the following manner: Samples were taken after the stagnation periods required by the test protocol by completely emptying a test section into a 0.5 l PE bottle and the water sample was adjusted to pH = 1.0 by adding 4 ml of concentrated HNO_3. The samples were transported to Berlin within 3 weeks, immediately filled into other containers without further manipulation, and analyzed within 2 to 20 weeks. Repeated determinations were conducted to check for possible artefacts, showing that the duration of storage did not affect the heavy metal content of the samples.

The elements copper and zinc were determined by flame AAS (Instrument: Perkin-Elmer 1100 B) with a detection limit of 20 µg/L in both cases [22]. The heavy metals, which require lower detection limits, were analyzed by ICP-MS (Instrument: Plasmaquad 2, Fison Co.).

The plausibility of the measurements was checked regularly, and in the case of anomalous values the measurements were repeated, often with subsamples taken from the original bottles. In about two thirds of the cases, the second determination confirmed the first measurement; in one third of the cases, samples had obviously been mixed up, or plasma had been disturbed while changing argon bottles. The anomalous values are indicated in the Appendix; they were not taken into account in computing the average M(T). Anomalous values occurred most often in nickel determinations; this is presumably because the cone of the ICP-MS consists of stainless steel and nickel particles were struck out at irregular intervals.

The standard reference material used for internal quality control was NBS 1643, in addition to standards of various concentrations (1 µg/l; 5 µg/l; 10 µg/l; 50 µg/l; 100 µg/l) produced in the laboratory. The tables in Appendix A3 provide an overview of the elements determined by ICP-MS.

2.5 Sampling

Water samples for analysis of As, Cd, Cr, Cu, Fe, Mo, Ni, Pb, Sb, Sn and Zn were taken after operation periods of 1, 2, 3, 6, 12, 18, 24, 36 and 52 weeks. In addition, the regular flow pattern was interrupted for the purpose of sampling after stagnation periods of 0.5, 1, 2, 4, 8, and 16 hours. Between the stagnation periods for additional sampling, test sections were flushed for two minutes and operated for at least two hours in the usual cycle of 45 seconds of flow and 14 minutes of stagnation.

This procedure, which was employed from the beginning of the test series in 1994, differs from the provisions in DIN 50 931 - 1 which includes two additional sampling occasions after stagnation periods of 0.5 and 1 hour. In addition, the DIN standard provides for a set of stagnation periods that is different from our tests (see Section 2.1.). However, the standard contains an optional clause for deviating sampling patterns, as long as certain test conditions are fulfilled (Section 5.3 of DIN-50930 - 1). These conditions were met by our sampling procedure. The number of samples is two less in our test series, but this does not affect the significance of the results.

3. Results

3.1 Individual data

The elements As, Cd, Cr, Cu, Fe, Mo, Ni, Pb, Sb, Sn and Zn were determined in the water samples (see Section 2.4). Some of these elements are alloying elements, i.e. principal constituents of the material in question. Other (incidental) elements are also found in the alloys, due to the composition of the original metals used in the smelting of the alloy. An inclusion of such elements is technically unavoidable. In the technical standards, these elements are designated as "others", in contrast to the main constituents. Accordingly, we have termed them "other elements" or "unavoidable incidental elements". The results obtained for the alloying elements As, Cu, Ni, Pb and Zn for the five materials and 19 test waters are given in the Appendix. The values and the various factors determining their concentrations are discussed in Section 3.3 (other elements) and Section 4 (alloying elements).

The "unavoidable incidental" elements were not very conspicuous. Their concentrations were too low to permit determination of the influence of any particular factor. The peak values of these are given further below, however, for information of the reader.

The results of every single determination, including those not listed in the Appendix will be publicly accessible at the Institut für Wasser-, Boden- und Lufthygiene (Institute of Water, Soil and Air Hygiene) for a period of 5 years after the publication of this report.

Due to space limitations and for the sake of clarity, the data of the preliminary test series conducted in Langen are not included in the Appendix. The results were used to design the subsequent test series and to elaborate DIN 50 931 - 1, and have already been published [1, 2, 3]. This initial test series served to validate the experimental design and the usefulness of the measurements. To this end, a variety of pipework materials was employed to connect the test pieces. Since their evaluation showed that inert steel and plastic provided the most reliable test conditions, stainless steel (material 1.4401) was then selected to connect the test pieces in all of the test rigs.

The leaching of nickel from gun metal with increasing testing period, depicted in [3], was one of the few cases "in which the choice of connecting material results in significant differences". These differences were not confirmed in the subsequent tests on comparison of combinations with polyethylene (PE) and stainless steel (SS). This is illustrated in Fig. 3.1.1 in a comparison of the two test series conducted at Langen on both materials used in connecting pipes.

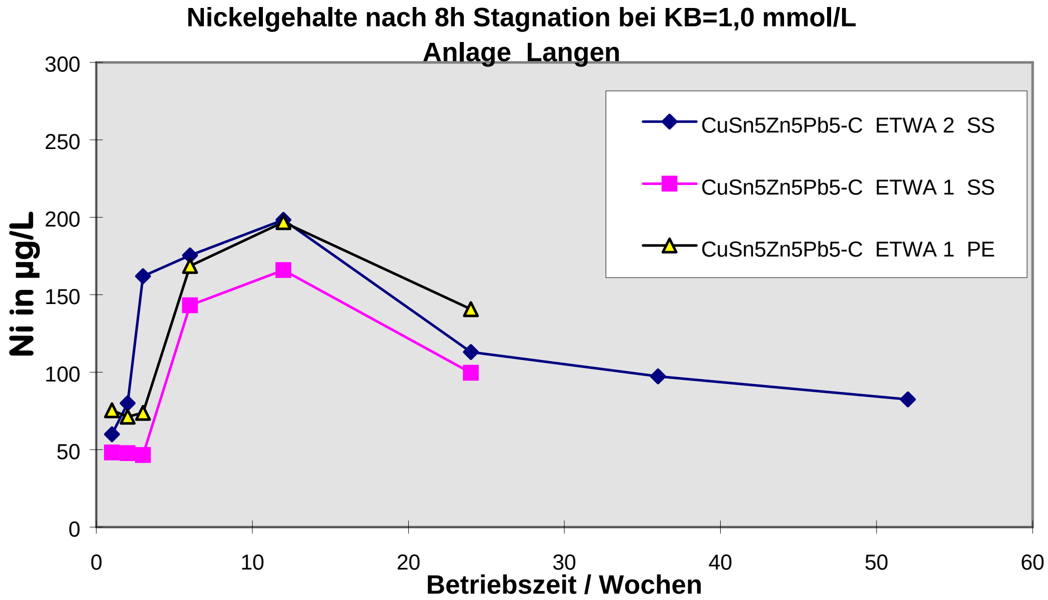


Fig. 3.1.1 Leaching of nickel from the alloy CuSn5Pb5-C in two test series(ETWA1;ETWA2) with connecting pipes made of different materials. 8 h residence period, acidity $K_{B\,8.2}$ = 1.0 mmol L^{-1}.
(SS = stainless steel PE = polyethylene)

Note: In a previous publication [3], the terms for the combinations of stainless steel / gun metal and copper / gun metal were unfortunately mixed up in Fig. 4. The values for the combination of gun metal with copper have been omitted in Fig. 3.1.1 for the sake of clarity.

3.2 Significance of the results

The precision and accuracy of the analytical determinations in individual samples has been discussed in Section 2.4., focusing on the precision of the methods used in determining the individual data points. Each single value, however, has been subject to various influences prior to sampling. The significance of the results depends on the influence these parameters have on the sample, and on the differences resulting from the experimental setup in the case of similarly adjusted parameters.

The determinations on heavy metal leaching mostly depend on the stagnation period in the pipe prior to sampling, on the overall age of the distribution system at the time of sampling, and on the composition of the water. These parameters can be fixed and monitored in an experimental facility. The influence of these parameters is discussed in detail in Chapter 4. In addition, there exists a variety of influences, subject to varying degrees of control, which may determine the magnitude of an individual measurement in the given test conditions. This is equally valid, if not more so, in the case of any sample taken at the consumer's. It is therefore imperative to understand that single samples do not permit reliable assessments in the context of the present topic. This is the reason why [4] and [9] propose the computation of averages, and why representative samples are desirable. From an overall perspective, however, the totality of individual values does permit reliable estimates that may serve to specify the ranges of permissible use. This is particularly the case in the analysis of trends, which can easily be estimated by combining the different measurements with the factors upon which they depend.

A consideration of all individual measurements from the perspective of the different variables yields the same result. The evaluation curves all display a certain regularity. This demonstrates that differences are averaged out by the use of five test pieces per experimental section. The evaluations also indicate that no great variability is to be expected between measurements within the same test series, i.e. when the variations in experimental condition are identical in all of the sections. But replicates with the same waters are also adequately reproducible, for instance in the case of the leaching of lead from gun metal in the preliminary test series and the actual series at the Langen facility (Fig. 3.2.1). Fig. 3.2.2 shows another example for the leaching of lead from CuZn40Pb2 in a case where even the connecting pipes were made of different materials.

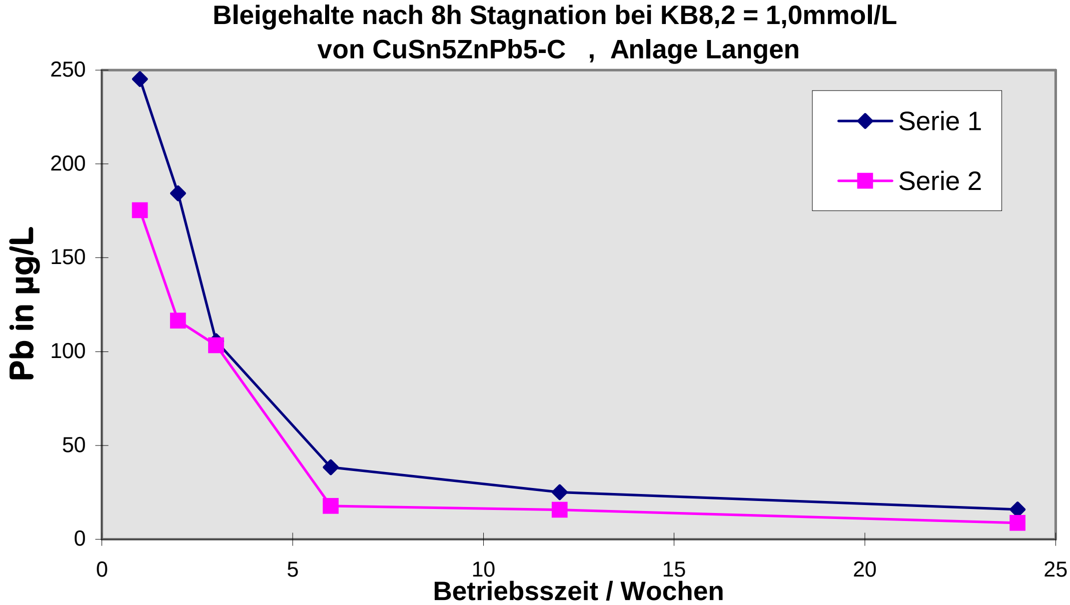


Fig. 3.2.1 Leaching of lead from gun metal after 8 h stagnation versus testing period of the facility. Combination with stainless steel. Acidity $K_{B\ 8.2} = 1$ mmol L^{-1}. Comparison of two different test series with the same type of water (Langen facility).

At the experimental facilities in Berlin and Würzburg, three additional series of samples were taken at one-week intervals after the termination of the trial period of one year. To obtain an overview of the situation, we attempted to roughly evaluate these values. To this end, the difference between the lowest and the highest values in each sample triad for weeks 52, 53 and 54 was computed and expressed as a percentage of the corresponding average. This procedure obviously has the shortcoming of resulting in very high percentages when concentrations are low, particularly near the detection limit, leading to an unwarranted low estimate of the significance of the data if the figures are regarded superficially. Nevertheless, they yield a surprisingly good evaluation measure, indicating a high validity of the results.

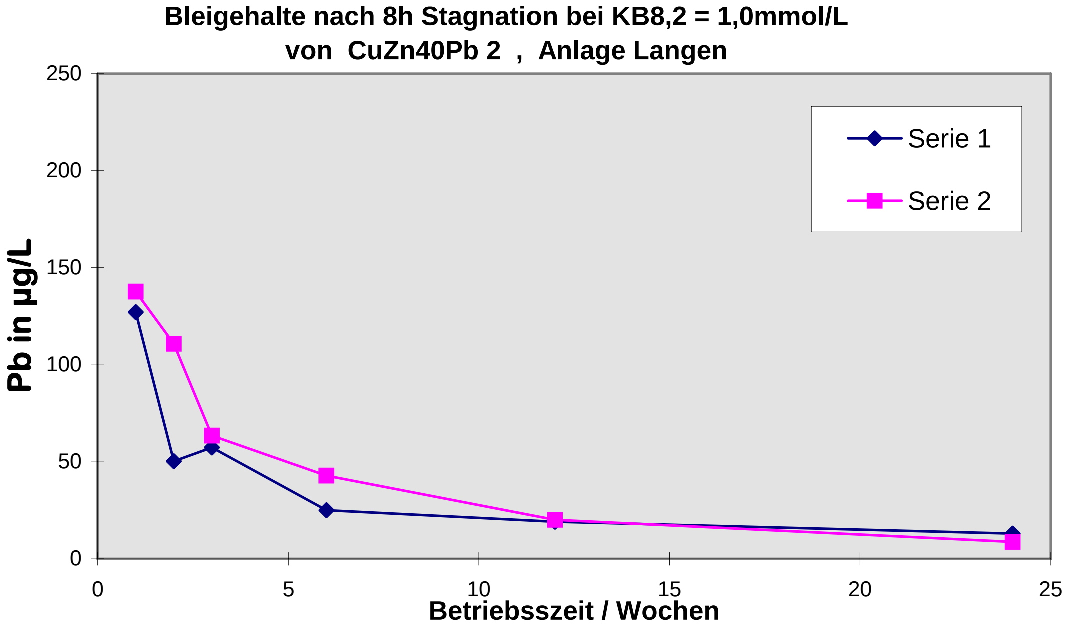


Fig. 3.2.2 Leaching of lead from brass CuZn40Pb2 after 8 h stagnation versus testing period of the facility.

Combination with hard-drawn copper (Serie 1) and stainless steel (Serie 2). Acidity $K_{B\ 8.2}$ = 1 mmol L^{-1}. Comparison of one material with different materials for the connecting pipes and of two different series with the same type of water (Langen facility).

As expected, higher percentages were obtained in the triads at stagnation periods of 0.5 and 1 hour. To obtain a general overview, the percentage value of each triad was classed into the categories 50.1 - 100%, 25.1 - 50%, 15.1 - 25% and 0 to 15%. Two further categories were formed by inadequate triads and by triads of lead with values between 1 µg L^{-1} and 2 µg L^{-1}, differing only by a value of 1 µg L^{-1}. The term "inadequate triads" does not refer to single values, but to the triad of samples itself, denoting triads with an obvious anomalous value yielding percentages of more than 100. The individual values can nevertheless be used for analysis of the trends (see further below). Some of the triads have values that are similar to those of the next highest or lowest stagnation period. In a few cases these may be due to mixups of samples; in most cases, however, it is probably due to the dynamics of the formation and turnover of surface layers, which occur at different rates in the various test sections. There are very few real anomalous values, i.e. values lying beyond all other values. These deviations are negligible, however, because the projected assessment of risk to human health is based upon the conditions at the end of the test period. This is different when the values are used to assess corrosion processes. In this case, further tests will be required and each alloy will have to be studied separately. With regard to the reliability of assessments of risk to human health, it is fortunate that the maximum values determined for the waters and alloys in both test series lie in the classes up to 25%, with few exceptions.

The distribution of triads is illustrated in Table 3.2.1., showing the proportion of triads lying in the classes 0-15% and 15.1-25% for stagnation periods of up to 1 hour, as well as for the remaining stagnation periods.

Table 3.2.1 Proportion of triads lying in the classes up to 25 %

	Residence periods of 0.5 h and 1 h	Residence periods of 2 h to 16 h	All residence periods
Pb*	49%	71.5%	67%
Ni**	47.5%	63%	58%
Cu	45%	72%	64%
Zn	29%	66.5%	57%

* In the case of Pb triad values of 1 - 3 µg L^{-1} were included.

** In the case of Ni only the triads for gun metal containing nickel were considered. An inclusion of the values for brass alloys would have resulted in a significant falsification of the picture.

Sampling was additionally repeated at the Berlin facility at weeks 56 and 58. These values confirm the previous results. An evaluation of the data set analogous to the one above for weeks 52, 53, 54, 56 and 58 obviously no longer makes sense, because the averages of the five measurements are smaller than the averages of the first three determinations in almost all cases, while the difference between the highest and lowest values increases at the same time. This shows that final equilibrium between the surface layer and the water is not attained even after a year. This result further confirms that the specification of non-hazardous limits requires an analysis of the temporal trends, or the computation of averages, e.g. as provided in DIN 50 931 - 1. The operation of several identical test sections for the purpose of a valid computation of averages is very labor-intensive, but on the basis of the present results it would in our opinion hardly improve the reliability of the assessment. If experimental effort is increased, it would be more useful to study a greater number of different water types.

3.3 Concentrations of other elements

We would like to deal with the unavoidable incidental elements before discussing the results on the alloying elements As, Cu, Ni, Pb and Zn. The elements analyzed in the water samples are listed in Table 3.3.1 in separate columns for alloying elements and other elements. The table also states where they are named in the Ordinance on Drinking Water (*Trinkwasserverordnung - TrinkwV*) and the legal limits given there. Some of the elements are deliberate constituents in some alloys only, and must therefore be regarded as incidental in those cases where they were not added deliberately.

The discussion of the unavoidable incidental elements ("others") is limited to their concentrations in the drinking water. In contrast, the alloying elements are discussed in Chapter 4 in the context of the various parameters.

Table 3.3.1 Alloying elements, other elements, and legal limits

Alloying element	**Other Element**	**Section in *TrinkwV***	**Item no.**	**Limit or target value** *TrinkwV*	EU Directive
As	As	Annex 1	1	10 µg L^{-1}	10 µg L^{-1}
Pb		Annex 1	2	40 µg L^{-1}	10 µg L^{-1} *
	Cd	Annex 1	3	5 µg L^{-1}	5 µg L^{-1}
	Cr	Annex 1	4	50 µg L^{-1}	50 µg L^{-1}
Ni	Ni	Annex 1	7	50 µg L^{-1}	20 µg L^{-1} *
	Sb	Annex 1	14	10 µg L^{-1}	5 µg L^{-1}
	Fe	Annex 4	14	200 µg L^{-1}	200 µg L^{-1}
Cu		Annex 7	1	3000 µg L^{-1}	2000 µg L^{-1} *
Zn		Annex 7	2	5000 µg L^{-1}	not applicable

* "The value applies to a sample of water intended for human consumption obtained by an adequate sampling method at the tap and taken so as to be representative of a weekly average value ingested by consumers".

The other elements were always present at very low concentrations. It must be kept in mind that the measurements include the background concentrations present in the original waters used for the preparation of the test waters.

3.3.1 Arsenic as an unavoidable incidental element

Alloy E is the only one to contain arsenic in small quantities as a deliberate additive designed to improve resistance to dezincification. In the other alloys it merely represents an incidental element, and the concentrations of arsenic in the water samples are correspondingly low, usually less than 1.0 µg L^{-1}. Table 3.3.2 shows the peak values, some of which probably represent anomalous data or contaminations from other sources.

Table 3.3.2 Maximum concentrations (in µg L^{-1}) of arsenic in water samples

Alloy	**Langen**	**Thalfang**	**Berlin**	**Würzburg**
C	3.3*	2.2	1.3***	1.8
D	1.5	4.6**	2.0	2.4
F	1.8	1.7	1.3	2.6
G	5.1	1.3	1.6	2.3

* All other determinations of the alloy at this facility were less than 1.0 µg L^{-1}.

** Except for one value of 2.0 µg L^{-1} all other determinations of the alloy at this facility were less than 1.0 µg L^{-1}.

*** Except for one value of 1.1 µg L^{-1} all other determinations of the alloy at this facility were less than 1.0 µg L^{-1}.

The arsenic contents of these alloys merit no further discussion, considering the legal limits and the low concentrations measured here, as well as the fact that only the absolute values are given here, and not the difference to the background concentrations.

3.3.2 Cadmium

Cadmium is an incidental element mostly unavoidable in the materials for fittings etc. because it accompanies zinc. The concentrations measured in the water samples are always lower than the limits specified in the Ordinance on Drinking *Water (Trinkwasserverordnung)*, but the margin is exhausted to 80% under the most severe test conditions. This requires critical discussion. Table 3.3.3 shows the maximum values per alloy and test series, as well as their dependence on testing period of the fittings, stagnation period and acidity. The next lowest value is noted in addition, in those cases where the peaks considerably surpass the usual values for an alloy in the given test series.

In Series 1 (ETWA 1) at the Langen facility a brass alloy (alloy B) was employed (but connected by copper pipes, instead of stainless steel), which had a composition almost identical to that of alloy C, except for the cadmium content, which was 0.010 mass % in the former. This alloy therefore released greater quantities of cadmium into the water, as shown in Fig. 3.3.1 for an 8-hour stagnation period. It therefore seems recommendable to reduce the limits for cadmium specified in DIN - EN 12164 (up to 0.2 mass % for "other" elements) in the interests of both consumers and manufacturers.

The table shows that relatively high cadmium levels occur almost exclusively after 16 h stagnation at a $K_{B\ 8.2}$ of 4 mmol L^{-1}. Because these values approach the legal limit, the trend over time of the concentrations after 8 h stagnation at $K_{B\ 8.2}$ = 4 mmol L^{-1} for the alloys C, D and E is shown in Fig. 3.3.1. It illustrates that the concentrations rise until the 36th week, subsequently falling considerably by the 52nd week. This confirms the statement [1, 2] that a test period of 24 weeks is insufficient for reliable assessments of cadmium.

Table 3.3.3 Maximum concentrations (in µg L^{-1}) of cadmium in water samples

	Berlin				Würzburg				Langen				Thalfang			
Alloy	**M**	**B**	**S**	**K**	**M**	**B**	**S**	**K**	**M**	**B**	**S**	**K**	**M**	**B**	**S**	**K**
C	3.8				3.0				3.5				0.9			
		2	16	4		6	16	4		36	16	4		6	16	4
D	3.4				3.1				3.8				1.1			
		3	16	4		12	16	4		36	16	4		52	16	4
E	0.3				3.0				2.7				0.2			
		6	16	2	**	6	4	4		2	16	1	••	18	16	4
					0.6	3	16	2	1.5	2	16	4	0.2	12	0.5	1
F	0.3				0.2				1.6				0.3			
		1	4	4		6	16	2		6	16	1		52	4	4
					0.2	12	16	4	0.7	6	16	0.5				
					0.2	3	16	1+P	0.9	24	16	4				
					0.2	36	16	1+P								
	*				***											
G	0.3								2.0				2.0			
		52	2	2	****					12	8	4		52	0.5	4
									1.7	6	0.5	2	0.6	3	2	1
									0.7	6	2	1	0.2	36	0.5	0.04
									•				0.2	18	16	4
													••			

* almost all other values were 0.0 or 0.1

** all other values were < 0.6

*** all other values were 0.0 or 0.1

**** all values were 0.0 or 0.1

• all other values were <0.3; generally 0.0

•• all other values were 0.0 or 0.1

Legend: M = Maximum concentrations in µg/L

B = Test period in weeks at the time of measurement

S = Stagnation period in hours at the time of measurement

K = Acidity ($K_{B\ 8.2}$) in the test water in which the value was measured

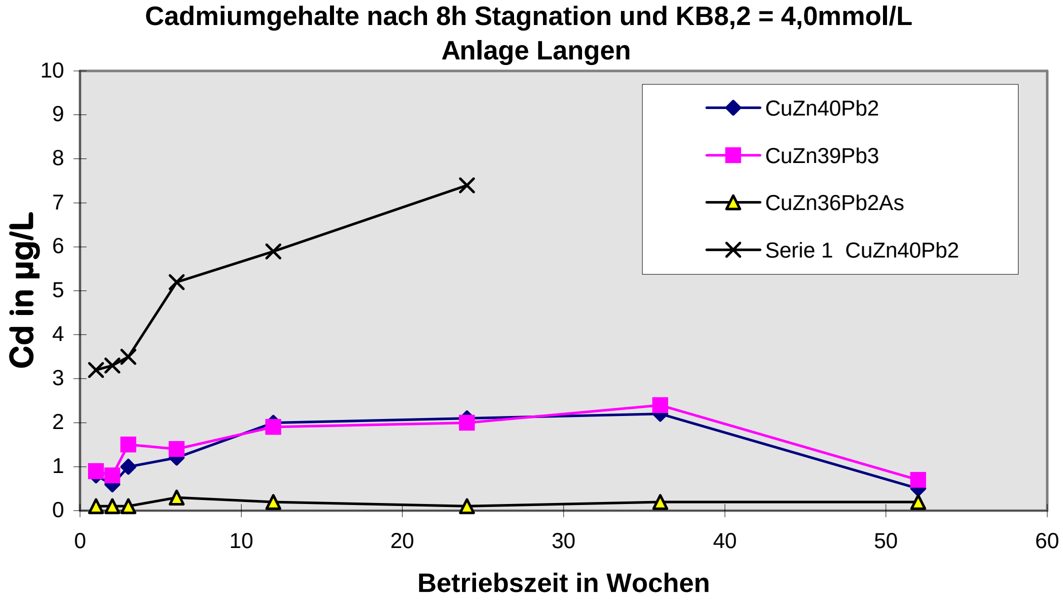


Fig. 3.3.1 Cadmium concentrations in the water samples of alloys C, D and E after 8 h stagnation versus testing period, acidity $K_{B\,8.2}$ = 4 mmol L^{-1}, Langen facility.

3.3.3 Chromium

Chromium is a component of the stainless steel of which the connecting pipes consisted, but it hardly leaches into the water [23]. It is practically absent from the materials for fittings. With rare exceptions, the water samples therefore contained less than 1 µg L^{-1} Cr. These values are given in Table 3.3.4, except for the determinations in the first week. The concentrations determined in replicate test sections consisting only of stainless steel tubing are given for comparison.

Table 3.3.4 shows that values above 1 µg L^{-1} are rare. In addition, values of up to 5.1 µg L^{-1} were found after one week of operation; this concerned four measurements in stainless steel test sections at the Berlin facility and three at the Würzburg facility, one measurement with alloy E at the Thalfang facility, two measurements each with alloy F at the Berlin and Würzburg facilities, and one measurement each with alloy G at Berlin and Würzburg.
There is an exceptional situation with alloy C at the Thalfang facility, in which concentrations between 1.0 and 1.5 µg L^{-1} were found during the first week at all $K_{B\,8.2}$ levels; it was not possible in retrospect to determine the particular reasons for this phenomenon. This is without consequence in the context of our study, however, because the values are well below the legal limit. Chromium is not a factor in the evaluation of the four materials for fittings.

Table 3.3.4 Chromium concentrations of more than 1.0 µg L^{-1} in water samples after test periods of more than one week

	Berlin			Würzburg			Langen			Thalfang		
Alloy	Cr µg/L	test period *weeks*	$K_{B8,2}$	Cr µg/L	Test period *weeks*	$K_{B8,2}$	Cr µg/L	test period *weeks*	$K_{B8,2}$	Cr µg/L	test period *weeks*	$K_{B8,2}$
stainless steel	5.7	36	2.0	5.7	36	2.0				1.0	52	0.5
	1.3	52	4.0	1.3	52	4.0				1.3	3	0.04
	1.0	36	2.0	1.0	36	2.0						
	1.1	2	4.0	1.1	2	4.0						
	2.5	52	4.0	2.5	52	4.0						
C	1.8	53	0.15	1.8	53	0.15				1.8	12	2.0
	1.3	2	4.0	1.3	2	4.0				1.2	12	4.0
D												
E	1.0	53	1.0	1.0	53	1.0	5.0	24	2.0	1.4	12	4.0
							1.0	24	4.0	1.0	18	4.0
F							13.1	24	4.0	2.4	12	0.04
G				3.4	53	0.5						

3.3.4 Nickel as an unavoidable incidental element

Nickel is an incidental element in CuZn alloys (brass), whereas it is a constituent of CuSnZn alloys and is discussed in more detail in this context further below. In both cases, peak values are always attained in samples taken after 16 h stagnation. In alloys C and E nickel concentrations were always below 10 µg L^{-1}, with the sole exception of one measurement of 49 µg L^{-1} at Langen after 12 weeks of operation. The relatively high concentrations for alloy D are somewhat surprising, even though it had the highest nickel content of all three brass alloys (see Table 2.2.3). To illustrate the situation, Table 3.3.5 shows the maximum concentrations along with the corresponding test periods and $K_{B\ 8.2}$ values. At all four facilities, the leaching of nickel from stainless steel pipework is less than the leaching from non-ferrous alloys. The leaching of nickel from gun metal, discussed further below, was greater by one or two orders of magnitude.

Table 3.3.5 Maximum concentrations of nickel (in µg L^{-1}) in test sections with CuZn alloys

	Berlin			Würzburg			Langen			Thalfang		
Alloy	max. value µg/L Ni	test period *weeks*	$K_{B8,2}$	max. value	test period *weeks*	$K_{B8,2}$	max. value	test period *weeks*	$K_{B8,2}$	max. value	test period *weeks*	$K_{B8,2}$
C	7	6	4.0	8	1	2.0	10	36	1.0	4	1	1.0
		12	4.0		2	4.0		1	4.0			
		6	2.0				*					
D	49	12	2.0	45	18	4.0	59	16	4.0	15	52	4.0
		12	4.0									
E	6	3	2.0	7	2	0.5	7	1	2.0	4	18	4.0
		2	1.2+ X		3	0.5					36	4.0
					3	1.0						
					1	2.0						
					3	4.0						

* one additional anomalous value of 49 µg L^{-1} at $K_{B\ 8.2}$ = 4 mmol L^{-1} after 12 weeks of operation.

3.3.5 Antimony

Antimony is an unavoidable incidental element in all alloys. Most values were very low, but a few attained more than 10 µg L^{-1}. Most of the high values occurred during the first few weeks of operation. The lowest values were found in test sections with alloy E, and the highest in sections with alloys F and G. These results are well correlated with the antimony contents of the alloys. The peak values always occurred in samples taken after a stagnation period of 16 hours, except in the case of alloy E, which always had extremely low antimony concentrations in the water. With two exceptions, the maximum values were found in test waters having a $K_{B\ 8.2}$ = 4 mmol L^{-1}. The exceptions were alloy E in Berlin (maximum in a test water with $K_{B\ 8.2}$ = 0,5) and alloy F in Würzburg (maximum in a test water with $K_{B\ 8.2}$ = 2). In the latter, however, the corresponding value for $K_{B\ 8.2}$ = 4 was very close to the peak, at 12.4 µg L^{-1}. The maximum concentrations are listed in Table 3.3.6.

Table 3.3.6 Maximum concentrations of antimony (in µg L^{-1}) in water samples by facility and alloy

Alloy	**Würzburg**	**Berlin**	**Langen**	**Thalfang**
C	6.3	13.3	4.6	2.6
D	2.5	3.7	2.8	1.5
E	0.3	0.9	1.0	0.2
F	1.4	5.3	10.2	11.9
G	10.0	18.7	15.4	19.7

3.3.6 Iron

Iron is not an alloying element of any of the alloys considered in this report, but it is an alloying element of stainless steel and was therefore determined for the sake of completeness. Its concentrations were the same as the background concentration in the water, however.

3.3.7 Molybdenum

Molybdenum is an alloying element of stainless steel, but not of the materials for fittings etc. Its concentration in the water samples was very regular, between 0 and up to 2 µg L^{-1}, with considerable differences between the different locations. On the other hand the values were independent of the test sections, regardless of their composition, and they did not depend on acidity, testing period or duration of the stagnation period. The molybdenum concentrations depended exclusively on the background concentration in the water.

4. Influence of various parameters upon the concentrations of alloying elements in the drinking water

In contrast to the discussion of the other elements in Section 3.3, the alloying elements will be discussed jointly in the context of their dependence on the various parameters.

4.1 Influence of the residence (stagnation) period

As repeatedly remarked before, concentrations in individual samples depend on the residence of the water within the test rigs or test sections (stagnation period). The evaluation procedure is therefore based upon computations of the averages of samples at different stagnation periods, as provided in DIN 50 931 - 1. The same, or a similar procedure must be considered when implementing the EU Directive [9], if an assesment is to be based on a representative sample. In principle, these methods will always require a variety of different stagnation periods. This is equally the case when taking a sample designed to be proportional to the consumer's water consumption, which implies such an array. For general considerations of the development of heavy metal concentrations, curves showing the influence of the stagnation period can easily be drawn from the data.

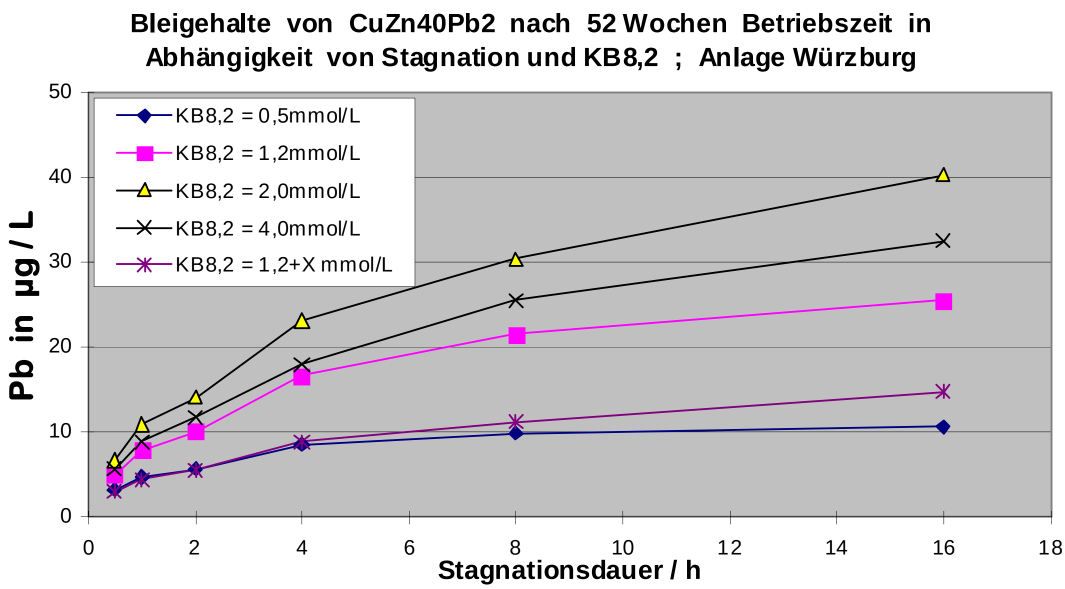


Fig. 4.1.1 Alloy C
Concentrations of lead after different residence periods on the 52nd week of operation. Würzburg facility, parameter $K_{B\ 8.2}$.

The concentrations increase with the duration of the stagnation period, as is expected from the mechanisms postulated. This assumption is confirmed by the data set of this study. Since we are dealing with substances that form a surface layer, we may expect an equilibrium to be attained between the surface layer and the heavy metal levels in the water after sufficiently long testing periods, becoming apparent by a flattening of the plots of concentration versus stagnation period. The analysis of the curves shows that equilibrium is only attained after a stagnation period of 16 hours in some of the cases with Cu and Pb. In most cases, a continuous increase in concentration is still evident at the longer stagnation periods. Figures 4.1.1 to 4.1.3 illustrate this relationship.

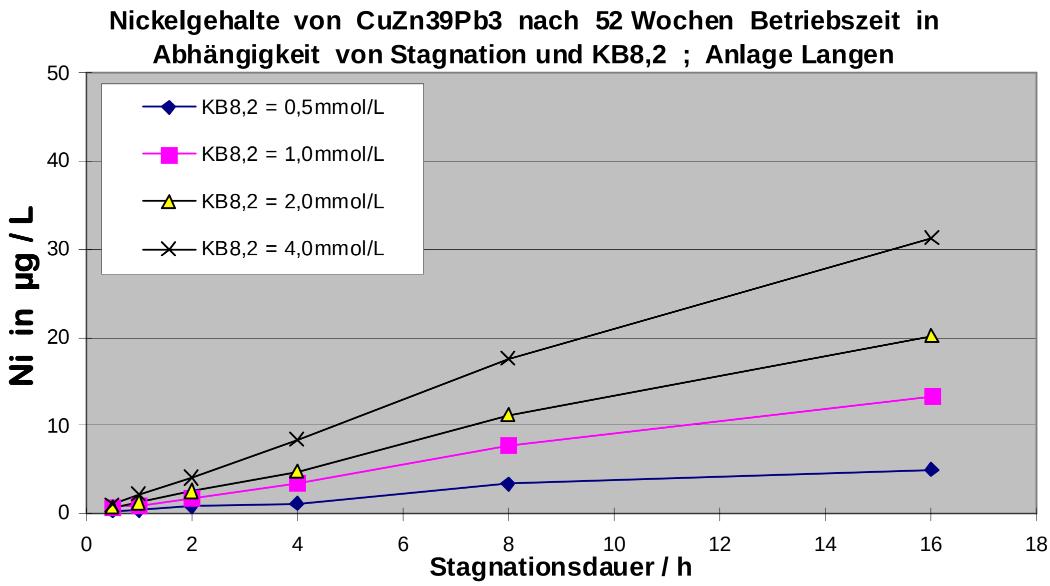


Fig. 4.1.2 Alloy D

Concentrations of nickel after different residence periods on the 52nd week of operation. Langen facility, parameter $K_{B\ 8.2}$.

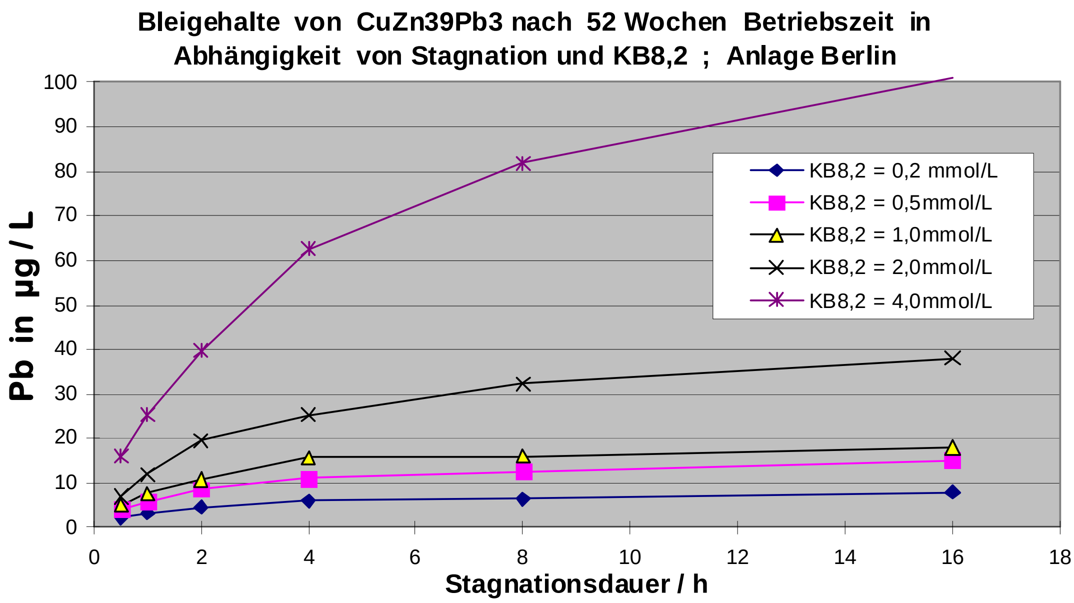


Fig. 4.1.3 Alloy D

Concentrations of lead after different residence periods on the 52nd week of operation. Berlin facility, parameter $K_{B\ 8.2}$.

Studies with copper sections have shown that curves of copper concentration versus residence period not only level off, but actually reach a maximum followed by a decline [1, 2, 3, 24]. This behavior is largely due to the depletion of oxygen during the corrosion process [24], but it was not observed in the tests with the materials for fittings etc. In most cases, the copper values level off, but without evident or apparent maxima. Fig. 4.1.4 provides an example, one of the features of which are strongly lowered oxygen concentrations (see Appendix A3).

This is irrelevant for the assessment of risks to human health, however, because Cu concentrations in domestic distribution systems depend mostly on leaching from copper pipework, which is much higher than the leaching from the fittings etc.

The curves shown in Figures 4.1.1 to 4.1.4 largely fulfill the expectations, namely that the concentrations are higher at high $K_{B\ 8.2}$ than at low $K_{B\ 8.2}$ values. This relation does not hold true for all such curves in our data set. The relationships sometimes change during the operation of a test facility, sometimes overlapping after a certain operation period. Fig. 4.1.5 shows an example of such a deviating sequence.

Deviations from the expected relationship mostly occur at higher $K_{B\ 8.2}$ levels. The analysis of all curves may roughly be summarized as follows:

- At Thalfang, the expected relation of the curves for $K_{B\ 8.2}$ = 0.5 mmol L^{-1}, 1.0 mmol L^{-1}, 2.0 mmol L^{-1} and 4.0 mmol L^{-1} holds true without exception;
- At Langen, the expected relation holds true, except for $K_{B\ 8.2}$ = 4,0 mmol L^{-1};
- At Berlin, the expected relation is only valid up to $K_{B\ 8.2}$ = 1,0 mmol L^{-1};
- At Würzburg, there are exceptions to the rule even at $K_{B\ 8.2}$ = 1,0 mmol L^{-1}.

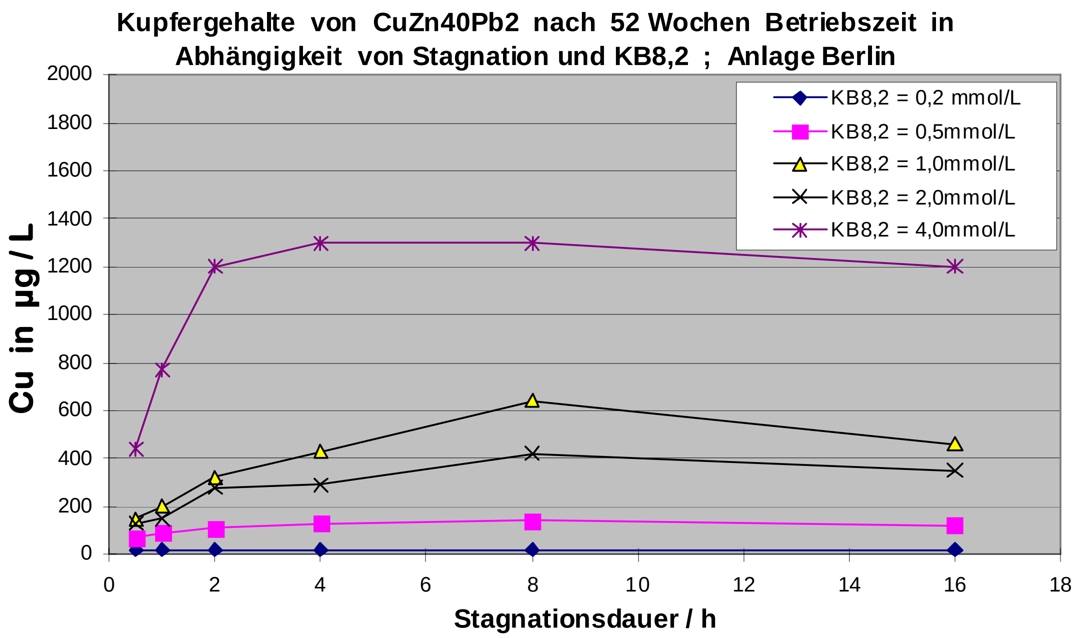


Fig. 4.1.4 Alloy C

Concentrations of copper after different residence periods on the 52nd week of operation. Berlin facility, parameter $K_{B\ 8.2}$.

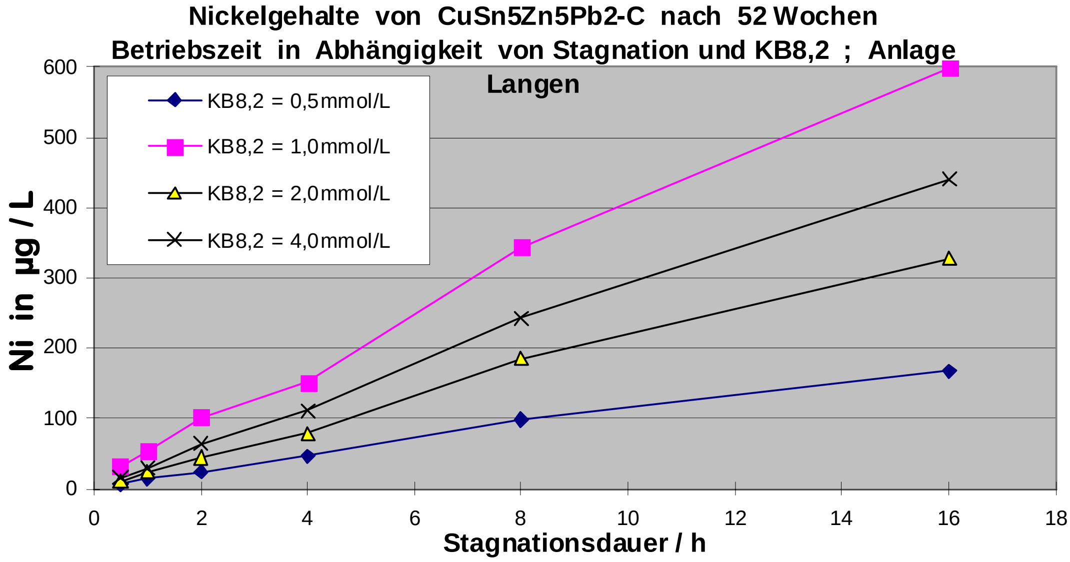


Fig. 4.1.5 Alloy G
Concentrations of nickel at different residence periods after 52 weeks of operation
Langen facility, parameter $K_{B\,8.2}$.

In this context, it needs to be pointed out that the condition of the surfaces at which leaching and precipitation processes take place is not constant throughout the entire operation period; rather, it changes in time, and this results in changes of the curves of the concentration versus residence period as well as concentration versus age of the distribution system or testing period of the test rigs respectively.

The original condition of the surface generally plays the principal role at the beginning of the service period. This is due to irregularities of the surface, production residues, etc., i.e. the manufacturing and installation history of the pieces, and it may result in considerable differences in heavy metal concentration between samples during the first few days or weeks. Our measurements show very clearly that data obtained during this period are useless for evaluation purposes. However, this does not invalidate our study, which focuses on the long term. In the case of short-term tests, the initial variability of the data require a uniformity of the materials sampled, or a conditioning of the fittings prior to the actual test.

After this initial period, surface layers form until a state of equilibrium between the surface layer and the release of metal ions into the water is reached. In a long-term perspective, the assessment of the risk to human health from heavy metal leaching can only be based upon this stage. Formation of the surface layer depends on various factors, such as the composition of the water (species and quantity of anions and cations), as well as their interactions with the various constituents in the alloy. It is not to be expected that the alloying elements will go into solution, or react with or enter the surface layer, at the same proportions in which they are contained in the alloy. This is discussed in Section 4.2.4 on the basis of the data. During corrosion, the various elements may well leach into the liquid phase or become part of the surface layer in proportions different from the composition of the alloy. This is known as selective corrosion. In fittings etc., this basically applies to dezincification of CuZn.

The final formation and composition of the surface layer thus depends on a variety of factors and events that may themselves depend on the age of the distribution system. This may result in changes of the sequences of the plots for the different acidities at certain points in time even if they are following the usual patterns for most of the testing period.

This holds particularly for the effects of the testing period, which provided a few clear examples of these processes, which are discussed in the next section. But it also applies to the pattern of the effects of different residence periods, which is why the phenomenon is already discussed here.

The findings summarized above are plausible as a result of the effects of various factors upon the formation of the surface layer and of the interactions of this layer with the water. No deviations occurred at the Thalfang facility, where the corrosion system may characterized as being a metal - bicarbonate - carbon dioxide system. The concentrations of other ions increase from Langen to Berlin and Würzburg, and deviations from the dependence on the acidity of the water may be explained by their influence.

It is impossible, however, to determine the causes of the deviations from the present data. This would require an investigation of the development and of the composition of the surface layer over time. Our study did not focus on these more technical aspects of corrosion behavior. This is discussed in Section 4.2.4 along with the data.

4.2 Influence of the testing period

4.2.1 General considerations

An understanding of the influence of the residence period on the uptake of heavy metals by the water is important for a specification of limits designed to reflect daily consumer behavior. The specification of permissible ranges of use of materials needs to be based on an assessment of the permanent exposure of the consumer, and requires data series from long-term tests or information on the development over time, because the definition of limits presupposes life-long consumption of water that has a certain average concentration of the substances in question. The needs of special groups, e.g. infants or pregnant women, must also be considered, so that an analysis of shorter exposure periods may also be warranted in some cases.

Knowledge of the mechanisms that determine the metal leaching into the water does not permit the assumption that it always follows the same pattern. Initial measurements conducted after a relatively short period of operation of a facility therefore do not provide a base for evaluation, because the values may be too high or too low to prognosticate long-term behavior, thus being inadequate for general assessments. This is the principal reservation against tests of short duration and the conclusions drawn from them.

It is generally known that in materials which form a surface layer the corrosion and leaching of heavy metals declines with time. This has been shown by experiments in the past [1, 2, 3, 20, 21], and it has been shown by Wagner [25] to apply to copper in studies on copper distribution systems which, however, do not permit any conclusions with regard to the type of distribution system or materials for fittings etc.

In discussing the duration of the test, it needs to be kept in mind that the leaching of metal ions from the materials for fittings etc. depends on two overlapping time periods:

An initial phase, during which substances are released into the water by dissolution, leaching, initial corrosion etc. During this phase, the release of substances depends on the state of the surface - and thus on the manufacturing history of the fittings - as well as on the composition of the water. During this phase, layers composed of corrosion products are formed, and the system gradually passes into a state of equilibrium in which the release of metal ions depends on the types of corrosion products and on the composition of the water.

In practice, the mode of operation of a facility obviously exerts an influence as well; but in the test procedure employed here, as well as in the one proposed in DIN 50 931, the mode of operation is maintained constant. The results are thus directly comparable.

A comparison of the situation at different ages of the distribution system or an analysis of the development over time in a certain water or with a certain material can be based either on the amount leached during a given residence period, or different residence periods may be averaged out, as proposed in DIN 50 931 - 1. An evaluation of our data by both procedures shows that they lead to the same results with respect to the temporal trend. The second procedure will usually be the most adequate for specifying permissible ranges of use based on a "representative sample", wherefore standard conditions need to be specified for such tests, as prescribed by DIN 50 931 - 1.

Certain features may, however, be masked by the computation of averages. The first method will therefore be more appropriate to the evaluation of materials and to studies on the effects of water quality, where human health is not directly concerned. In this case, a longer residence period of 4, 8 or 16 hours is preferable from the viewpoint of the concentrations and relationships described in 4.1. The analysis further below is based on 8-hour residence periods, as these have proven adequate for such a purpose.

The temporal trends of the 8-hour values in the alloying elements lead, nickel, copper, zinc and arsenic are discussed below. In the case of the unavoidable incidental elements, a corresponding analysis has little value due to the low concentrations, and they will not be dealt with further (cf. Chapter 3).

4.2.2 Influence of the testing periods based on the results after 8-hour residence periods

The long-term behavior of the materials during their service life can be illustrated on the basis of the results obtained with residence periods of equal duration; we have selected the 8-hour values for this purpose. All of the corresponding curves in our data set were analyzed, with the following results:

All of the curves show a continuous decline in the course of time, or they attain a level lying within the usual range of variation for this type of test (see Sections 2.4 and 3.1). This stage is attained after different time intervals, depending on the alloy, composition of the water, acidity of the test water, and on the element being analyzed. Prior to the decline or to the attainment of a constant level, the curves may follow various patterns that are apparently due to certain principles.

The following 15 Figures (4.2.1. to 4.2.15) provide examples of these curves (4 relating to Pb, 2 to Ni, 3 to Zn, 5 to Cu, 1 to As), and the Figures 3.1.1 and 3.3.1 may serve as further examples. Other similar curves may be computed from the data listed in the Appendix.

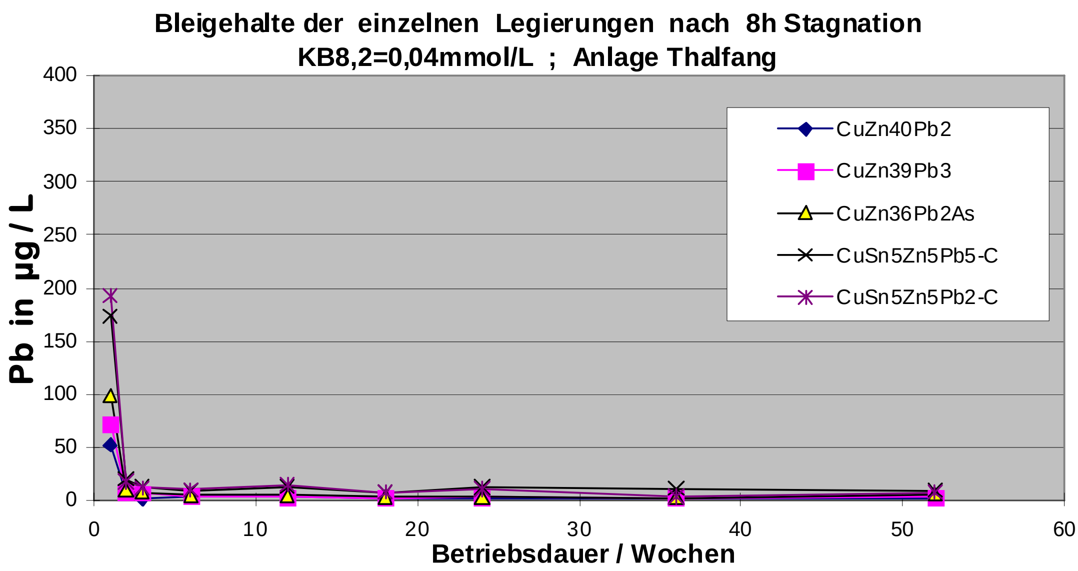


Fig. 4.2.1 Concentrations of lead after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 0.04 mmol L^{-1}. Thalfang facility, Parameter: material.

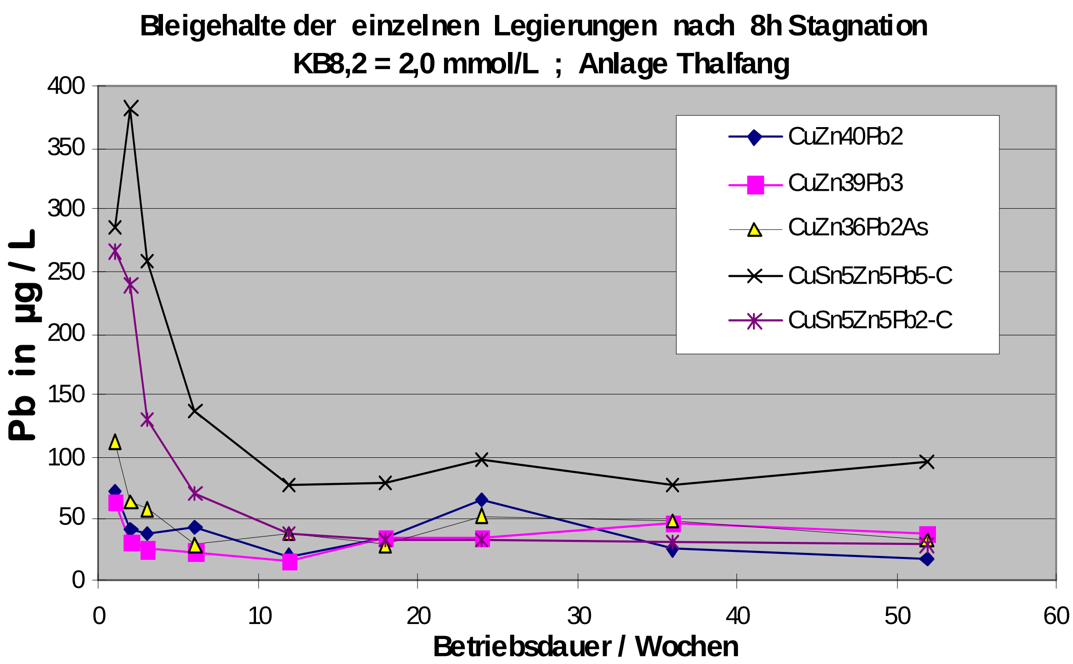


Fig. 4.2.2 Concentrations of lead after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 2.0 mmol L^{-1}. Thalfang facility; parameter: material.

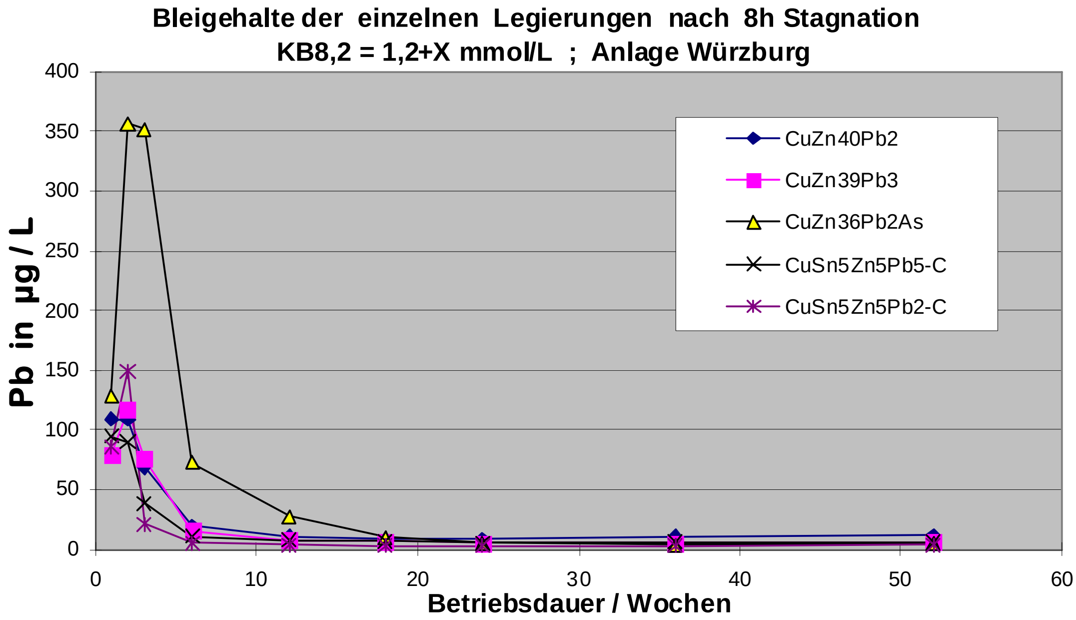


Fig. 4.2.3 Concentrations of lead after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 1.2 + X mmol L^{-1}. Würzburg facility; parameter: material.

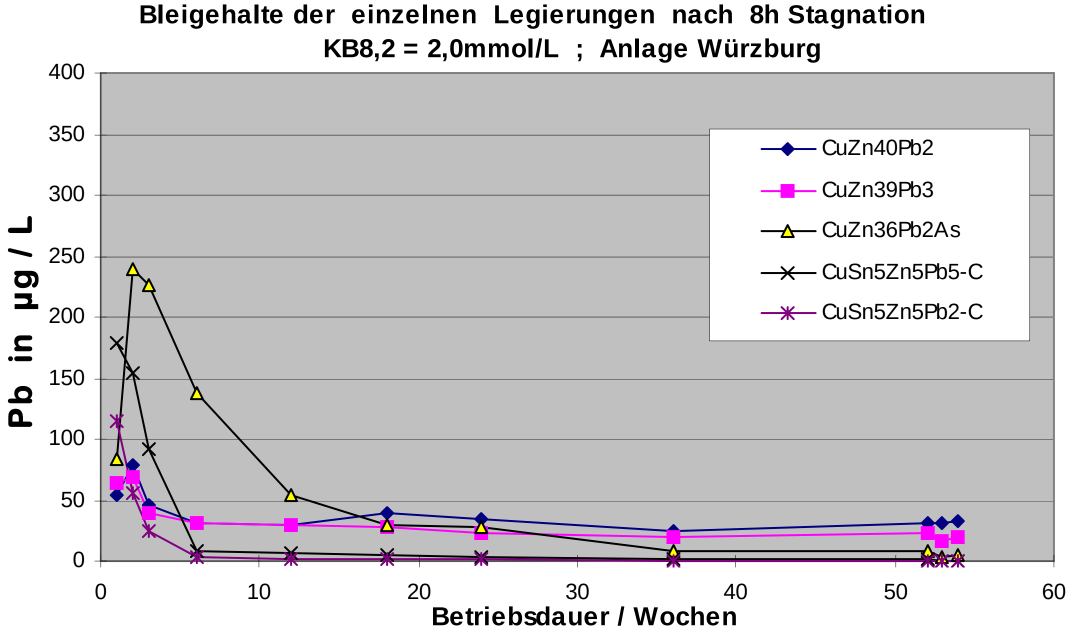


Fig. 4.2.4 Concentrations of lead after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 2.0 mmol L^{-1}. Würzburg facility; parameter: material.

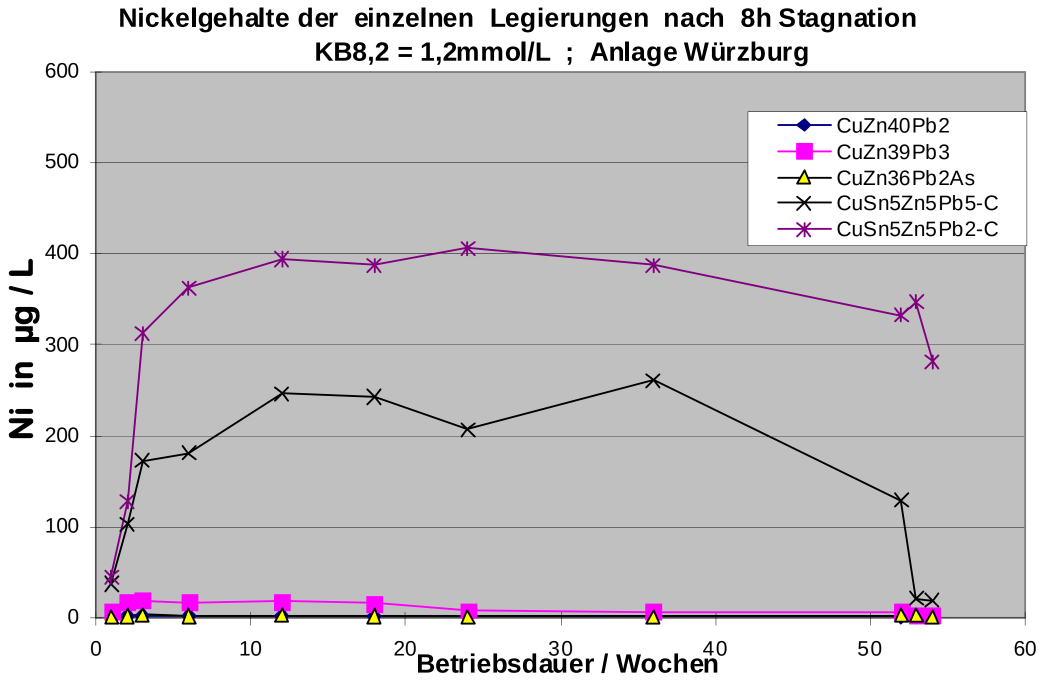


Fig. 4.2.5 Concentrations of nickel after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 1.2 mmol L^{-1}. Würzburg facility; parameter: material.

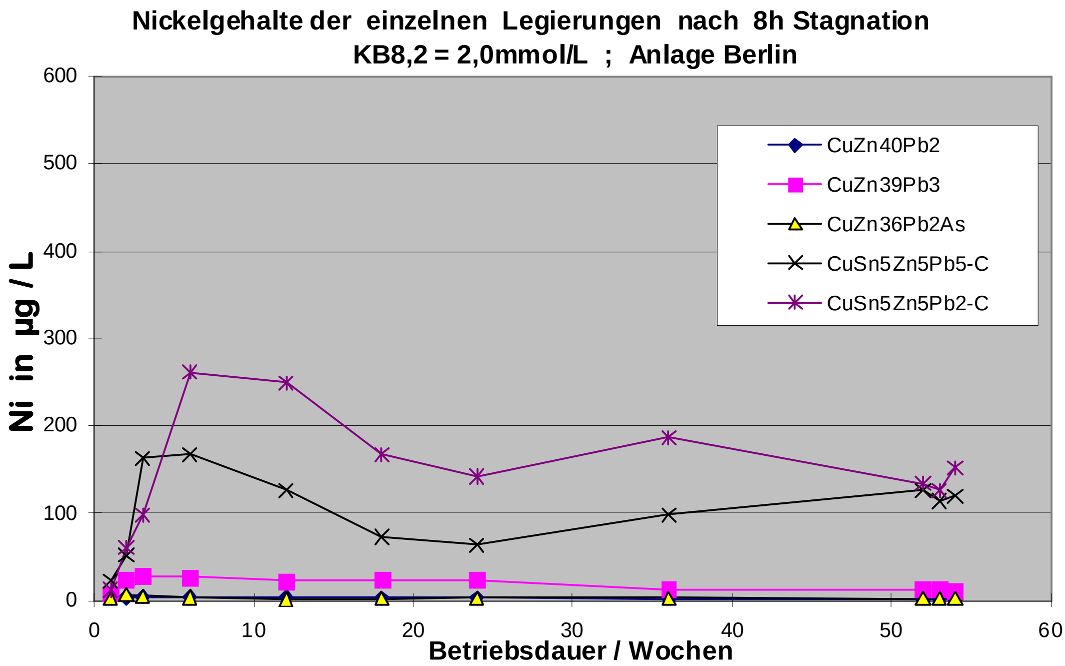


Fig. 4.2.6 Concentrations of nickel after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 2.0 mmol L^{-1}. Berlin facility; parameter: material.

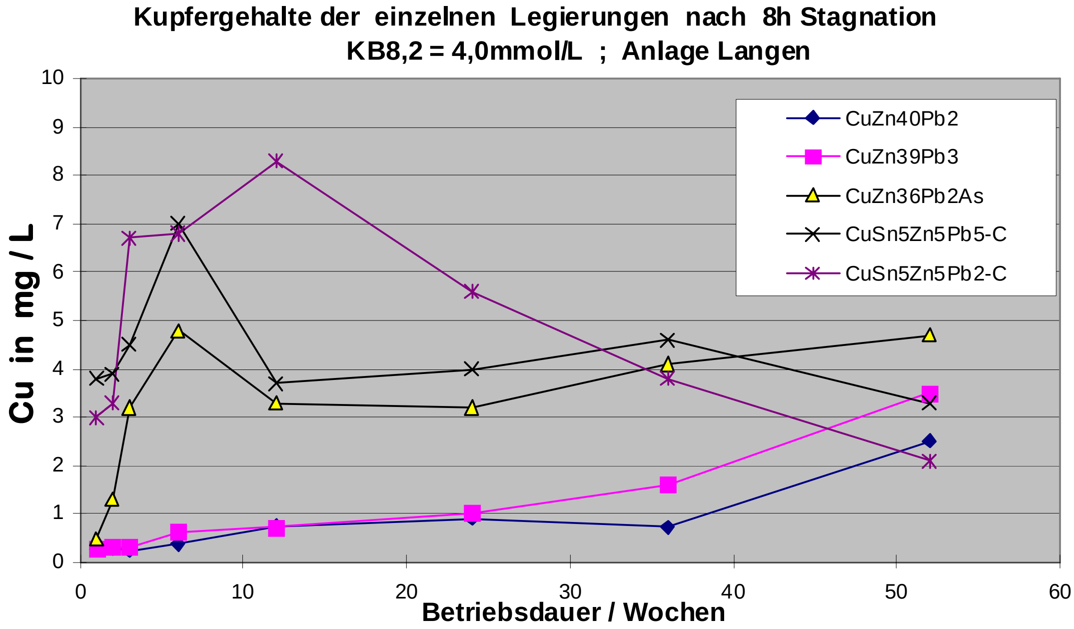


Fig. 4.2.7 Concentrations of copper after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 4.0 mmol L^{-1}. Langen facility; parameter: material.

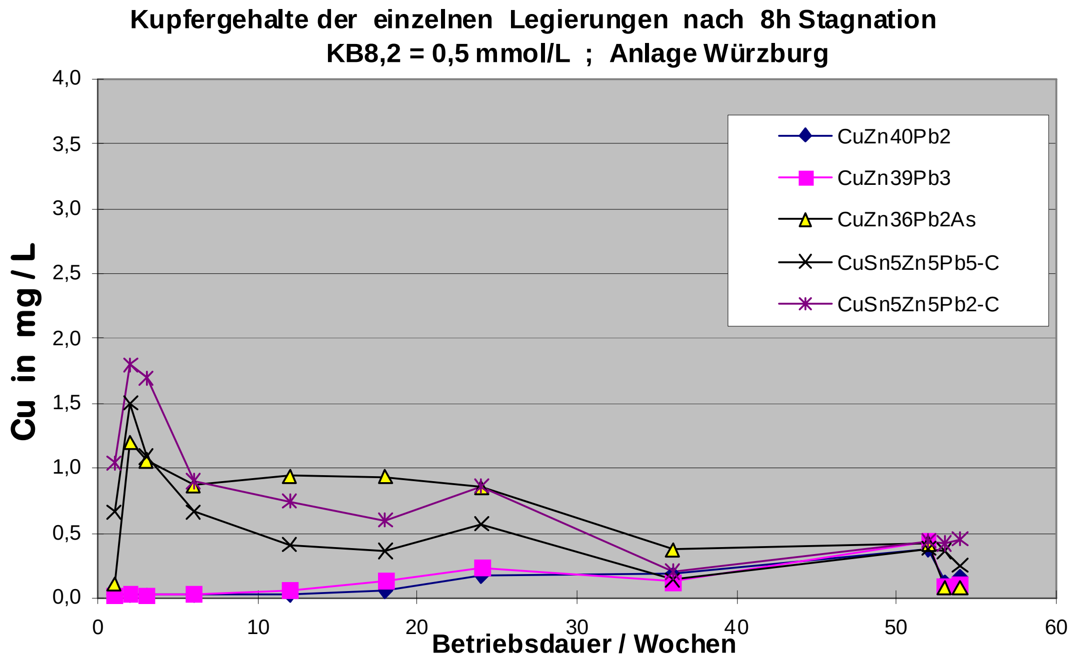


Fig. 4.2.8 Concentrations of copper after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 0.5 mmol L^{-1}. Würzburg facility; parameter: material.

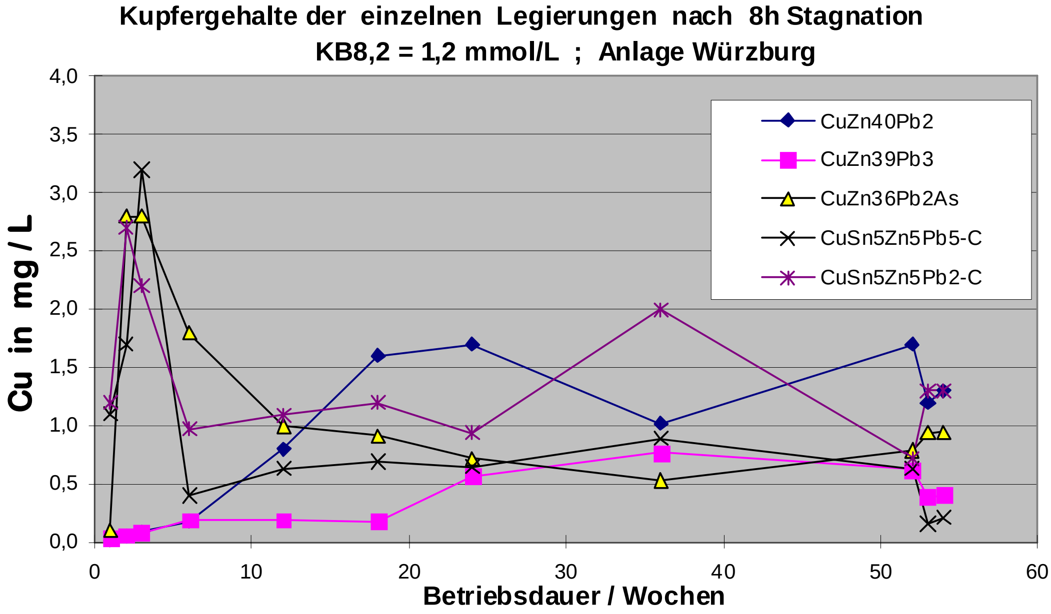


Fig. 4.2.9 Concentrations of copper after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 1.2 mmol L^{-1}. Würzburg facility; parameter: material.

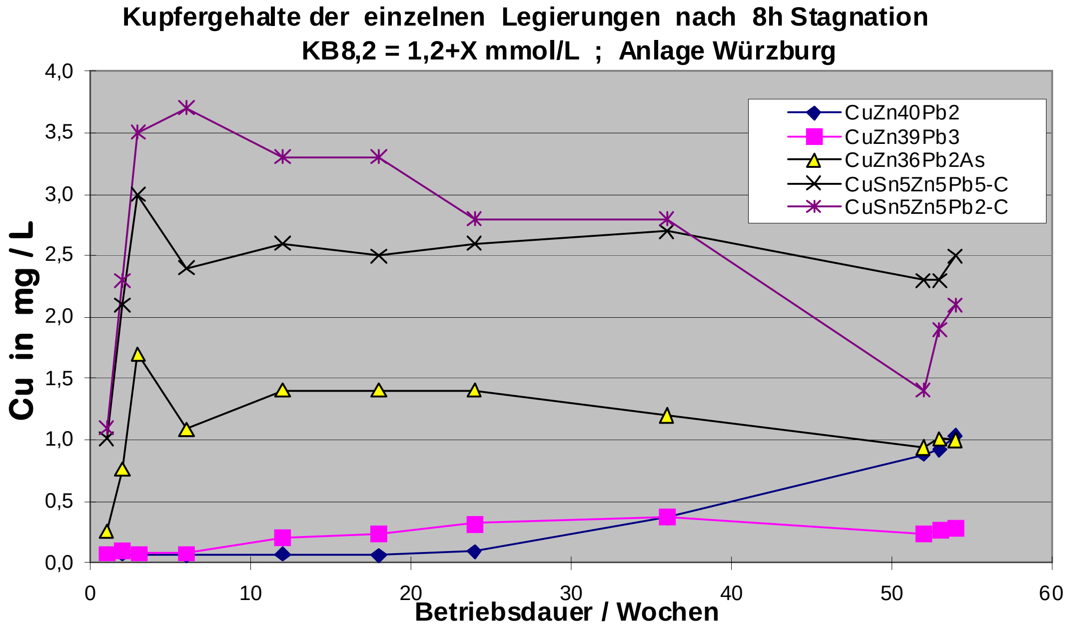


Fig. 4.2.10 Concentrations of copper after 8-hour residence periods versus testing period; acidity $K_{B\ 8.2}$: 1.2 + X mmol L^{-1}. Würzburg facility; parameter: material.

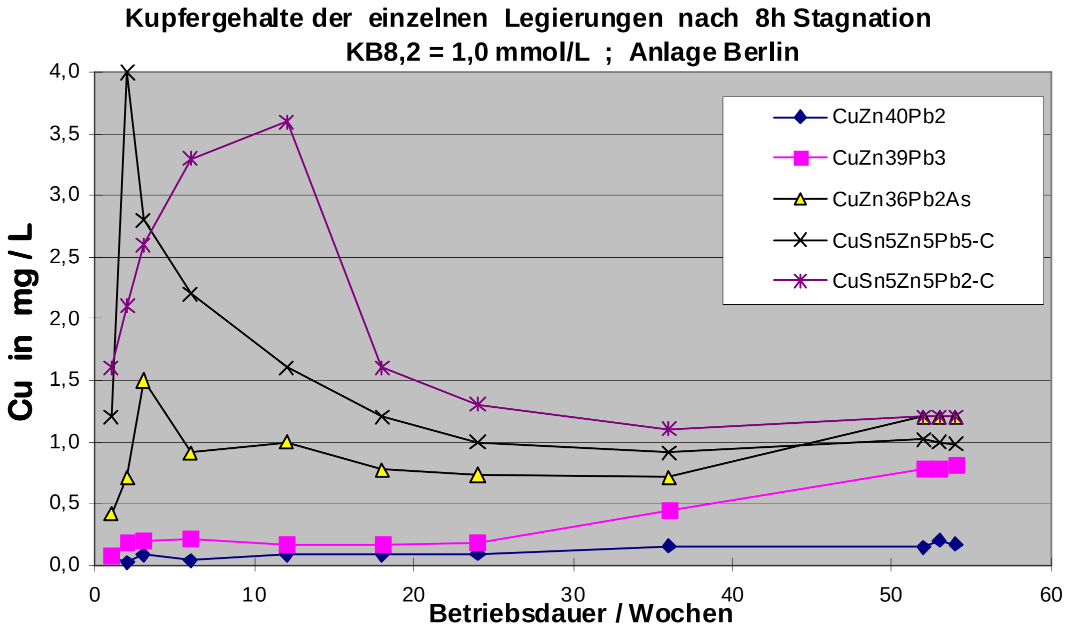


Fig. 4.2.11 Concentrations of copper after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 1.0 mmol L^{-1}. Berlin facility; parameter: material.

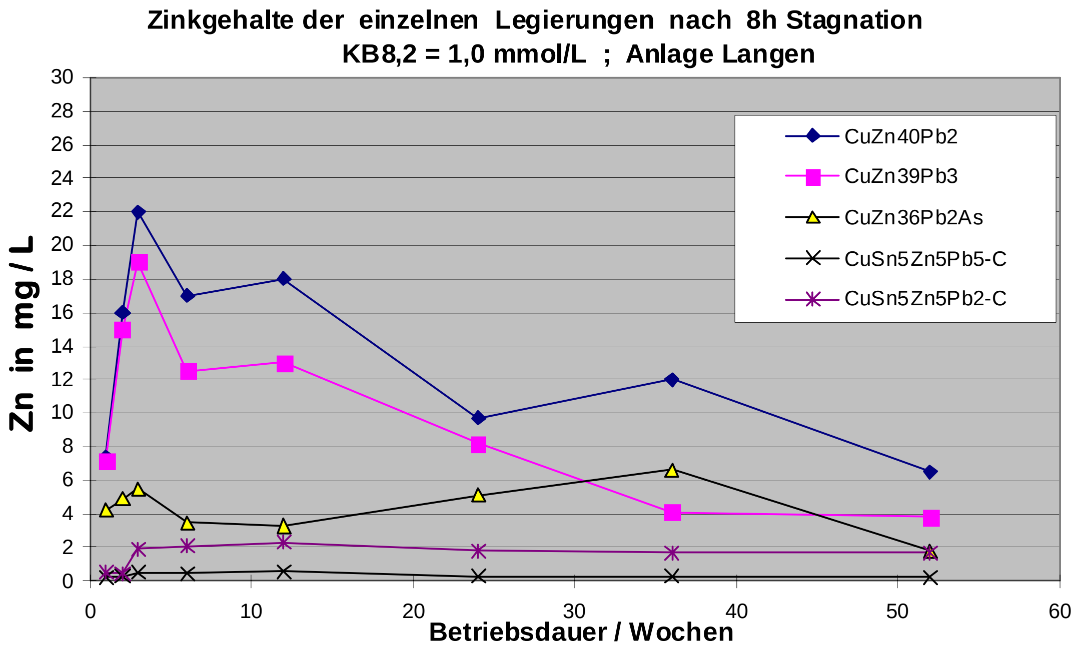


Fig. 4.2.12 Concentrations of zinc after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 1.0 mmol L^{-1}. Langen facility; parameter: material.

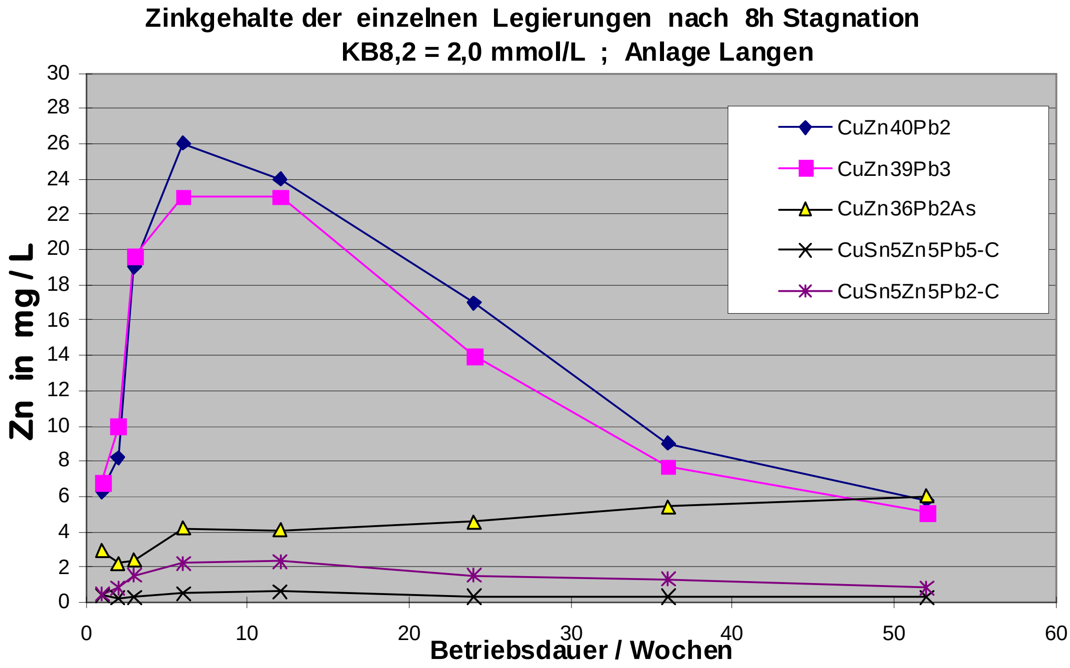


Fig. 4.2.13 Concentrations of zinc after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 2.0 mmol L^{-1}. Langen facility; parameter: material.

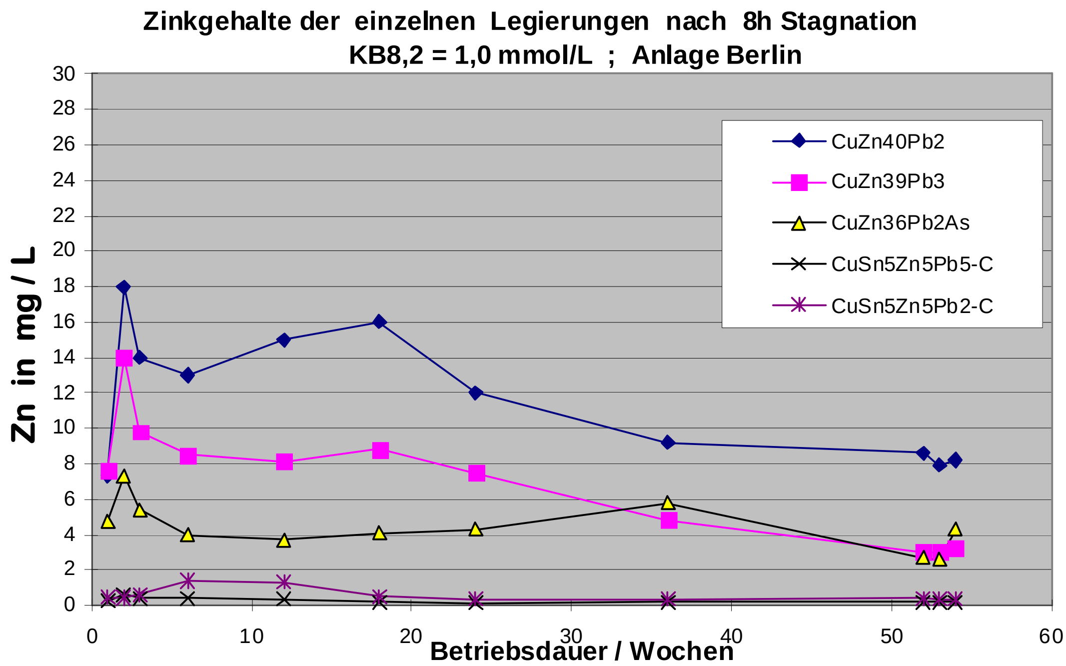


Fig. 4.2.14 Concentrations of zinc after 8-hour residence periods versus testing period; acidity $K_{B\,8.2}$: 1.0 mmol L^{-1}. Berlin facility; parameter: material.

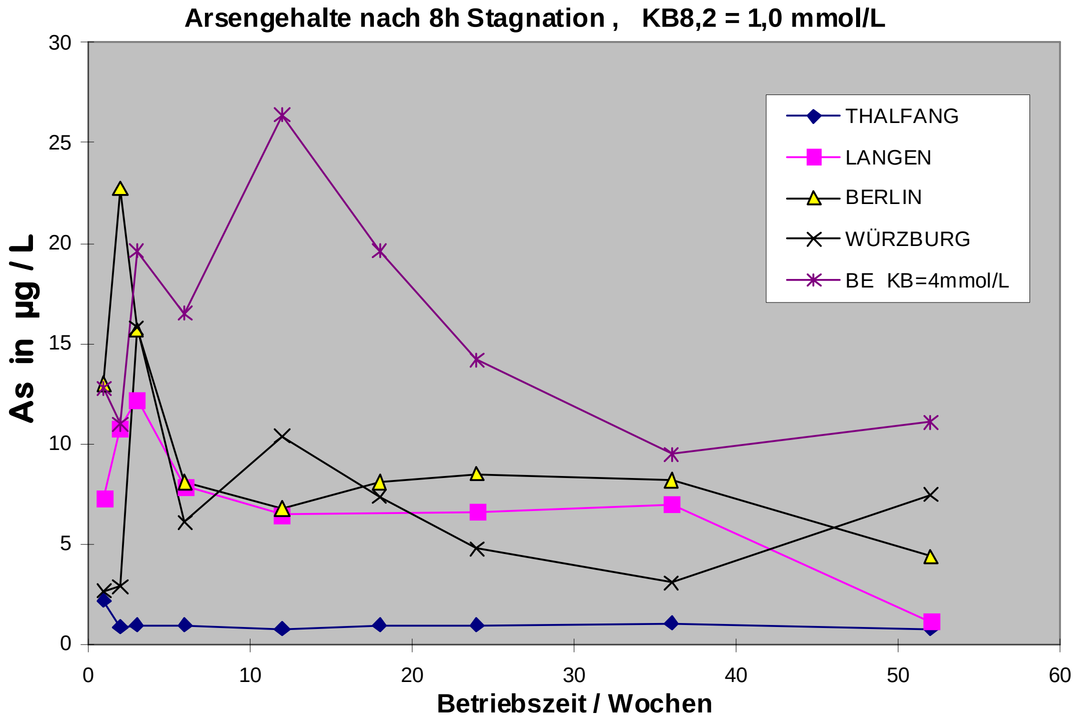


Fig. 4.2.15 Concentrations of arsenic after 8-hour residence periods versus testing period of Alloy E; acidity $K_{B\ 8.2}$: 1.0 mmol L^{-1}. Parameter: test series. (For comparision the plot for $K_{B\ 8.2}$: 4.0 mmol L^{-1} for the Berlin facility BE is included)

The shape of the curves may be summarized as displaying a relatively strong increase during the initial phase, followed by a more or less rapid decline toward lower concentrations, which attain a constant and low level at the end of the test period. The apparent deviations from this pattern result from the different durations of the phases of increase and decline.

The initial phase of increase may be very brief (less than one week), creating the image of a steady decline throughout the test period. This is particularly the case with Pb (Figures 4.2.1 and 4.2.2). A comparison of Fig. 4.2.1 with Fig. 4.2.2 supports the assumption that Pb always peaks early. An early peak is also attained by As in Alloy E (Fig. 4.2.15).

In other cases, the peak is only observed after longer test periods, creating a characteristically different type of curve. Examples are the Zn levels In CuZn alloys (Fig. 4.2.12), the Cu levels in CuSnZn alloys (Fig. 4.2.7) and the Ni levels in CuSnZn alloys (Fig. 4.2.6); in these cases, the curve declines slowly, or the peak is maintained for a longer time period. The Ni levels in CuSnZn alloys at $K_{B\ 8.2}$ = 1 mmol L^{-1} in the Würzburg facility (Fig. 4.2.5) provide a striking example of such a curve. Beside this general pattern, an examination of the plots for Cu, Ni, and to some extent Zn, may give rise to the suspicion that a second flat peak exists after longer testing periods (examples Fig.s 4.2.6 and 4.2.7). However, these phenomena are probably unimportant for the specification of permissible ranges of use from the perspective of human health.

The curves for copper are the most irregular ones in appearance, possibly due to the above-mentioned influences of the residence period on the concentration. This does not have great importance for the evaluation of copper in materials for fittings etc., however, because copper concentrations are essentially determined by the much greater amounts leached from copper pipework, as has already been pointed out.

4.2.3 Influence of the testing period based on the M(T) values according to DIN 50 931-1

An evaluation of the plots of M(T) versus testing period basically yields the same results with respect to the shape of the curves. Figures 4.2.16 to 4.2.19 show four examples. There is no need for a separate discussion of these results.

The four examples show that the curve profiles are largely identical, and that a computation of M(T) values does not smoothen the curves very much. This indicates that the values measured after 8-hour residence periods could be used instead of the M(T) values for the specification of permissible ranges of use; closer analysis of all M(T) : 8-h ratios, however, shows that a conversion of all 8-hour values with a constant conversion factor only provides a very rough approximation of the average.

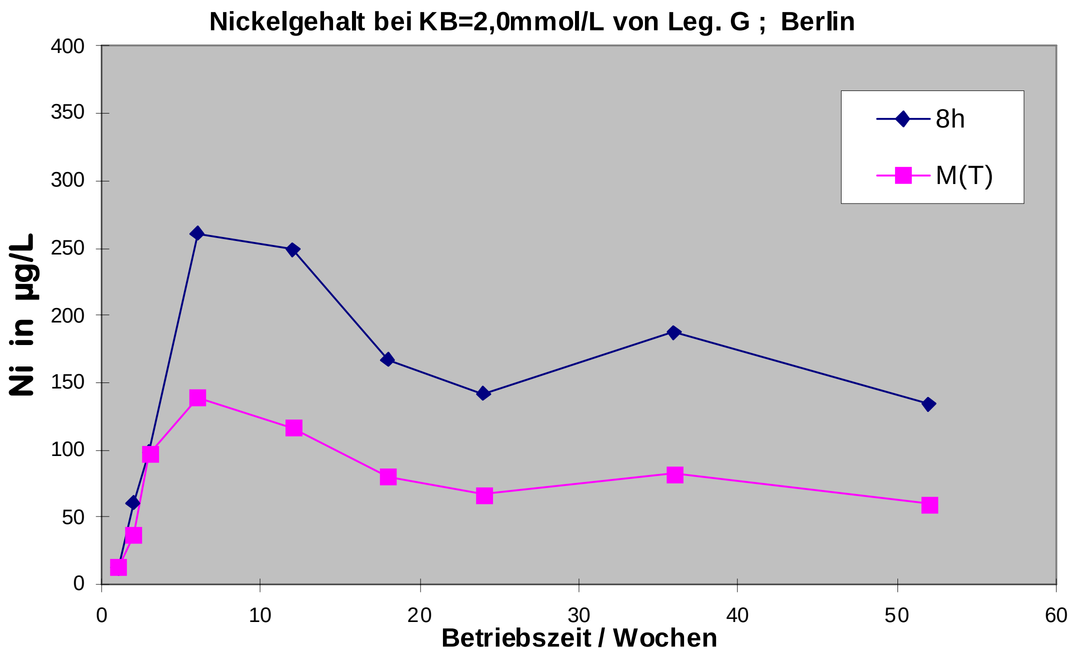


Fig. 4.2.16 M(T) and 8-hour values for Ni, Berlin facility, $K_{B\ 8.2}$ = 2.0 mmol L^{-1}, Alloy G.

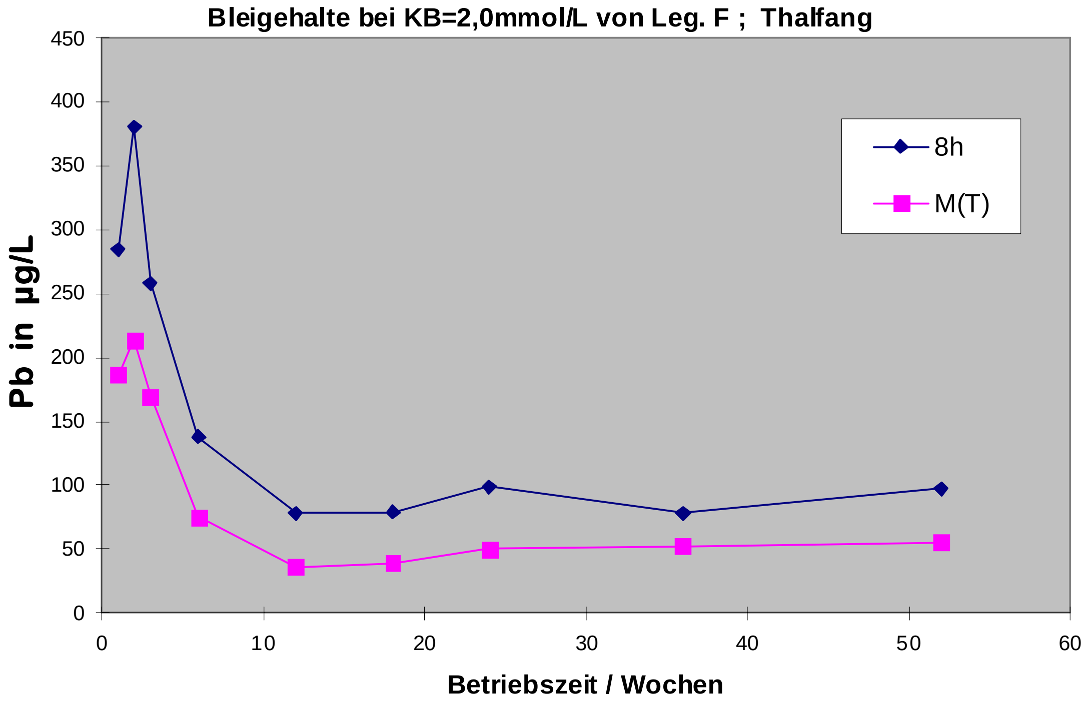


Fig. 4.2.17 M(T) and 8-hour values for Pb, Thalfang facility, $K_{B\ 8.2}$ = 2.0 mmol L^{-1}, Alloy F.

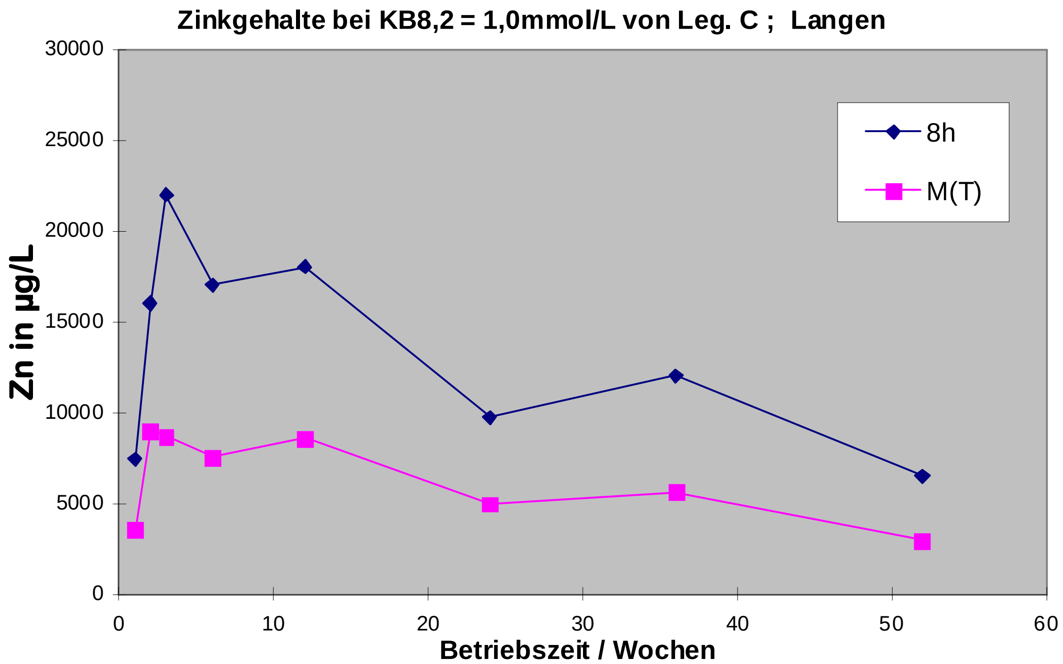


Fig. 4.2.18 M(T) and 8-hour values for Zn, Langen facility, $K_{B\ 8.2}$ = 1.0 mmol L^{-1}, Alloy C.

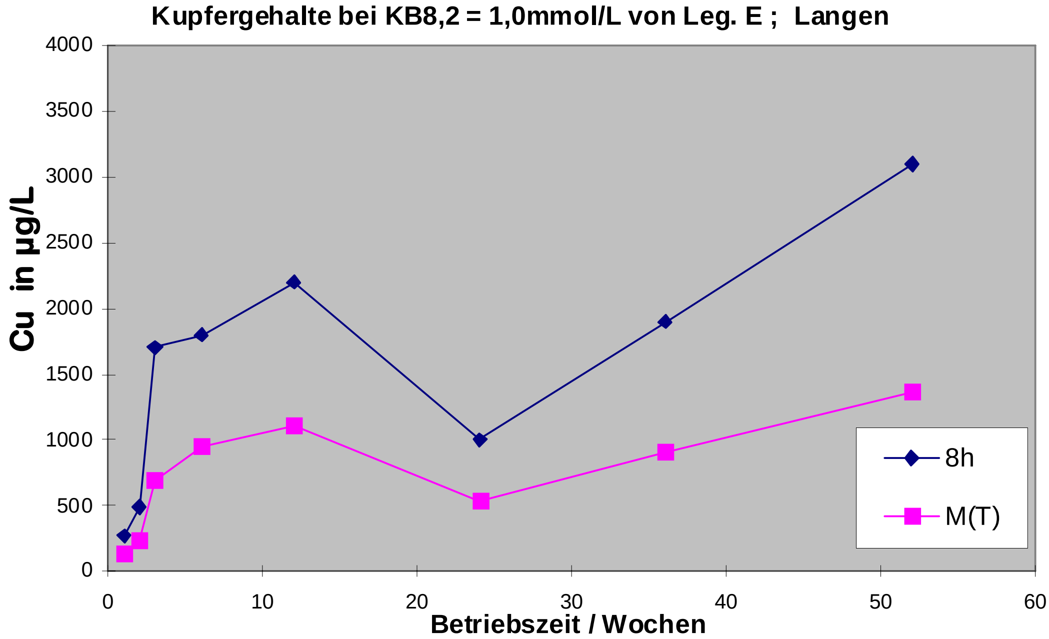


Fig. 4.2.19 M(T) and 8-hour values for Cu, Langen facility, $K_{B\ 8.2}$ = 1.0 mmol L^{-1}, Alloy E.

This analysis was conducted for the elements Pb, Ni, Cu and Zn in all alloys and test series. It shows that the ratios vary considerably in the cases of alloys, elements, as well as in the individual series. The ratios lie between about 0.5 and 1.0. Ratios of 1.0 are most frequent at low concentrations, and low ratios are found at high concentrations. This becomes obvious from a look at the individual values. On the other hand, a computation of different conversion factors from these data is not recommendable, because the procedure would be too unreliable.

The best evaluation basis for a specification of permissible ranges of use are M(T) values computed according to DIN 50 931 -1 or similar procedures.

4.2.4 Influence of the testing period and composition of the alloys

As already mentioned in Section 4.1, it cannot be assumed that the various elements are leached into the water in the same proportion in which they are present in the alloys. This is confirmed by our data on the release of the elements from a given alloy in a given series. To illustrate this more clearly, we divided the concentrations by the mass percentage of the same element in the alloys, and plotted the results against the testing period.

Figures 4.2.20 to 4.2.22 show the results obtained for two CuZn alloys and one gun metal alloy from three test sections at the Berlin facility. Appendix A5 lists the same evaluations for all five alloys in the test sections with $K_{B\ 8.2}$ = 1.0 mmol L^{-1} at all facilities.

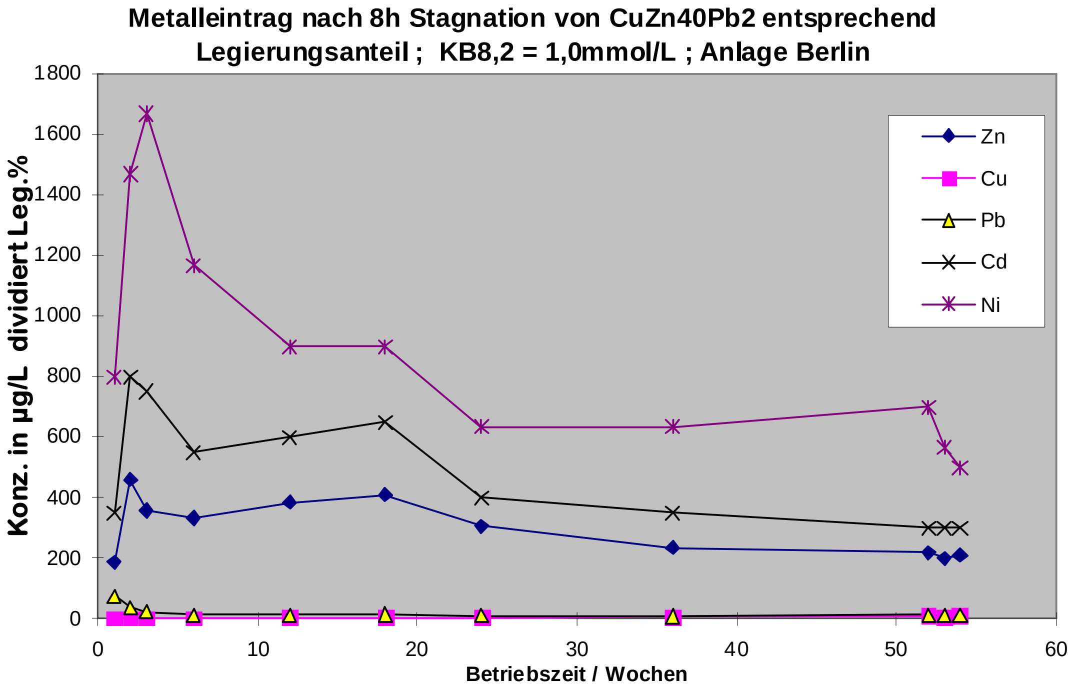


Fig. 4.2.20 Alloy C

Heavy metal leaching after 8 h residence, divided by proportion of the element in the alloy, versus testing period; acidity $K_{B\,8.2}$ = 1.0 mmol L^{-1}. Berlin facility.

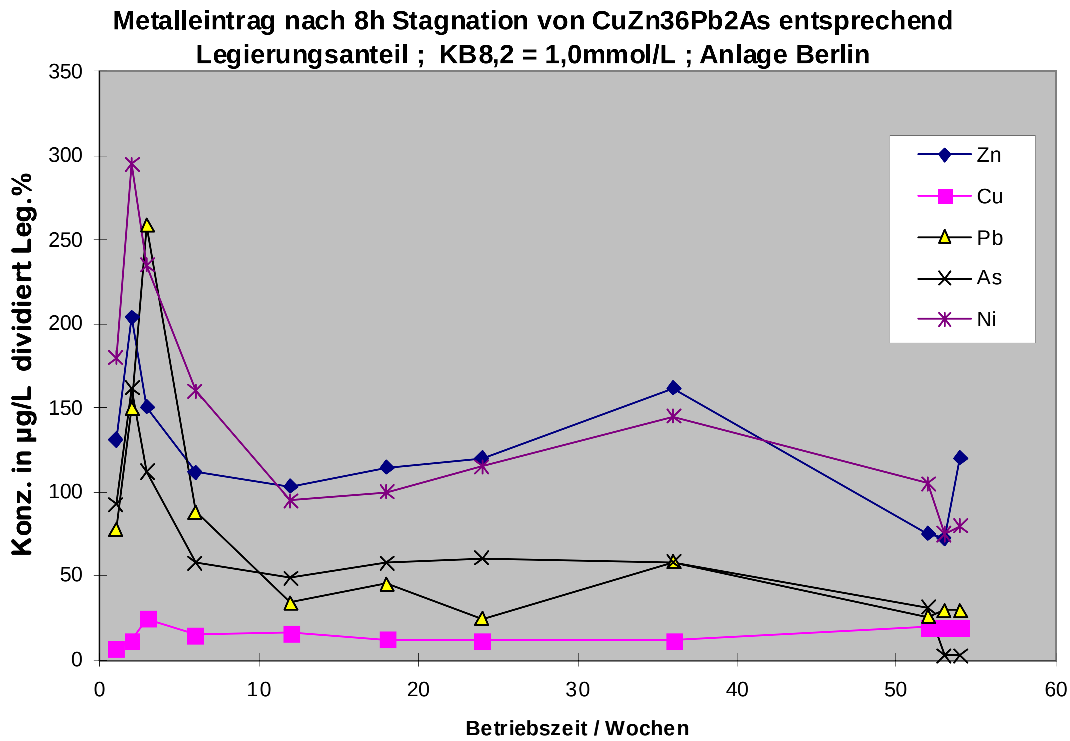


Fig. 4.2.21 Alloy E

Heavy metal leaching after 8 h residence, divided by proportion of the element in the alloy, versus testing period; acidity $K_{B\,8.2}$ = 1.0 mmol L^{-1}. Berlin facility.

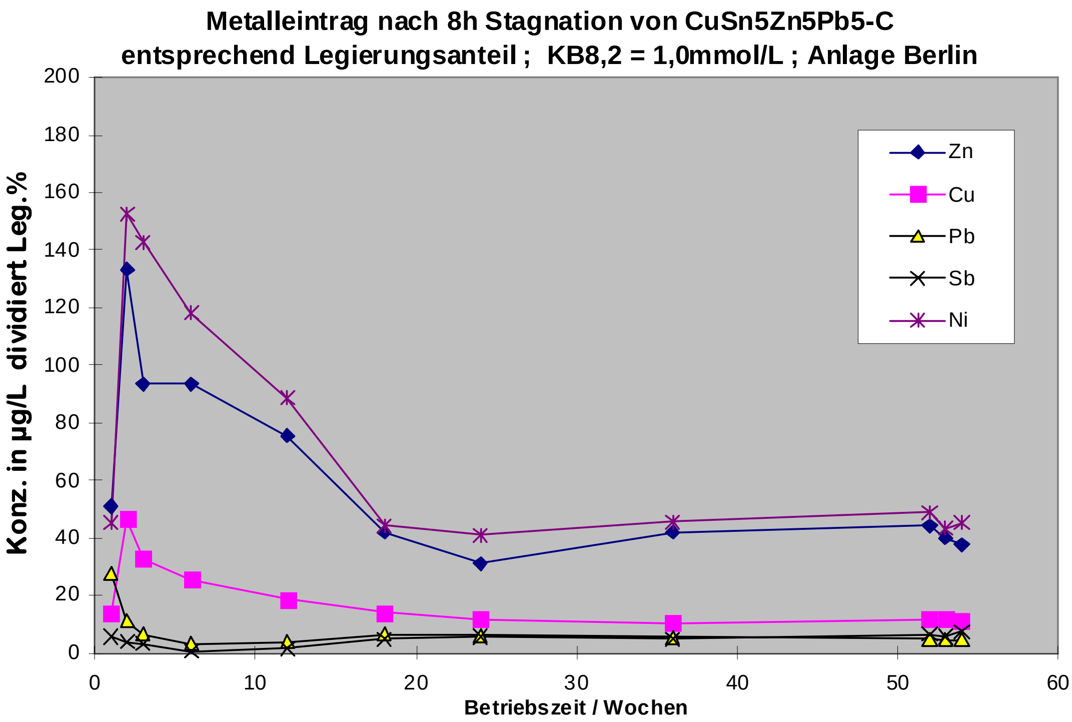


Fig. 4.2.22 Alloy F

Heavy metal leaching after 8 h residence, divided by proportion of the element in the alloy, versus testing period; acidity $K_{B\ 8.2}$ = 1.0 mmol L^{-1}. Berlin facility.

If the leaching of a metal were proportional to its mass in the alloy, this type of plot would generate curves that are very close together or even identical. The examples above show that this, as expected, is not the case. The curves generally follow the same pattern, but they are seldom close together. Figures 4.2.20 to 4.2.22 already contain curves following different patterns. Other examples are provided in Appendix A5.

Our data do not permit any inferences on the types and the quantities of elements within the surface layers. This would require analyses of the composition of these layers in the test sections at various points in time. Our study, however, focused on the leaching of metals into the water, and they were not intended to investigate the development and structure of surface layers. The relationships illustrated in the figures may provide approaches for further studies in that direction.

4.3 Influence of water quality on heavy metal concentrations

Earlier studies have shown that among the water quality parameters, the $K_{B\ 8.2}$ levels have the greatest influence upon the leaching of heavy metal ions into the water. This was taken into consideration in designing the tests by adjusting the test waters accordingly. The expected relationship has been largely confirmed, as already discussed in Section 4.1, "Influence of the residence (stagnation) period".

Evidently, additional effects may cause slight deviations from the expected behavior. Neutral salts and particularly anions need to be considered as influential parameters in this regard. It is impossible to analyze these interrelationships on the basis of our data set, because the four original test waters did not have a sufficient range of variation in neutral salts and anions. It would be feasible, however, to repeat the tests with other waters, in order to obtain additional data.

We did analyze our data on the 52nd week of operation for the effects of conductivity, sulfate concentration, and ratios of sulfate to bicarbonate, sulfate+nitrate to bicarbonate, sulfate+nitrate to bicarbonate+chloride, and chloride to sulfate. But this did not result in any evident relationships. Figures 4.3.1 to 4.3.12 give examples of the M(T) values for the various alloys with respect to the different parameters. The negative result of this evaluation does not preclude that the effects of different anion concentrations become apparent in studies conducted with waters having different anion concentration ratios and otherwise constant conditions.

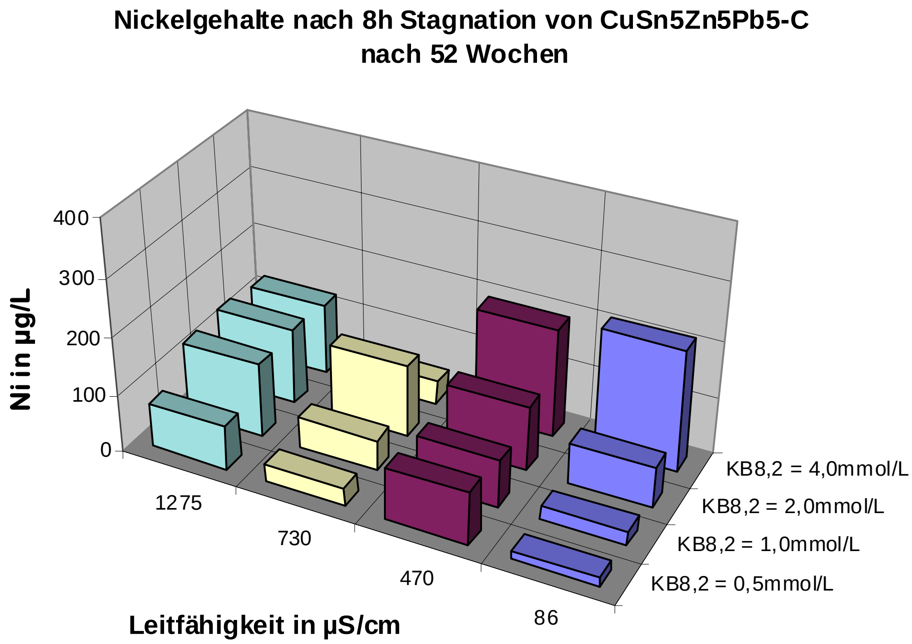


Fig. 4.3.1 Concentrations of nickel after 8 h residence in Alloy F on the 52nd week of operation, versus conductivity of the water; parameter $K_{B\ 8.2}$.

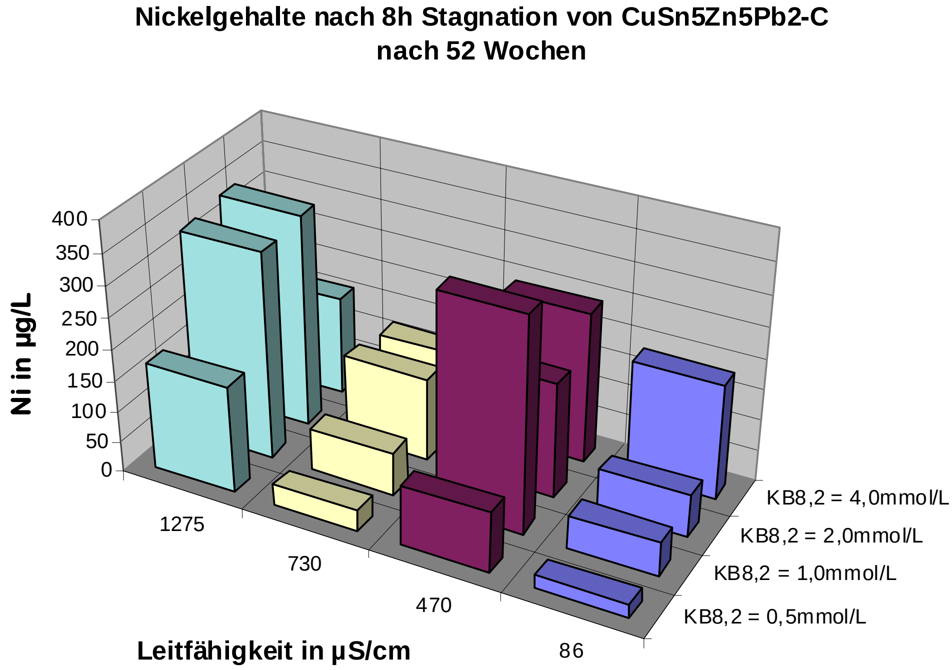


Fig. 4.3.2 Concentrations of nickel after 8 h residence in Alloy G on the 52nd week of operation, versus conductivity of the water; parameter $K_{B\ 8.2}$.

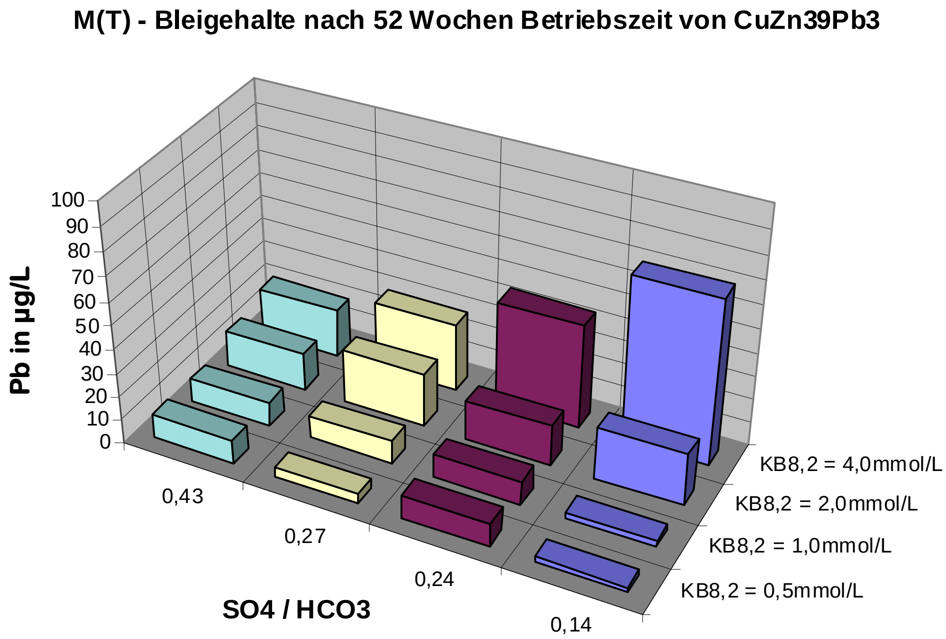


Fig. 4.3.3 M(T) values of lead lead on the 52nd week of operation, versus ratio of sulfate to bicarbonate; parameter: $K_{B\ 8.2}$, Alloy D.

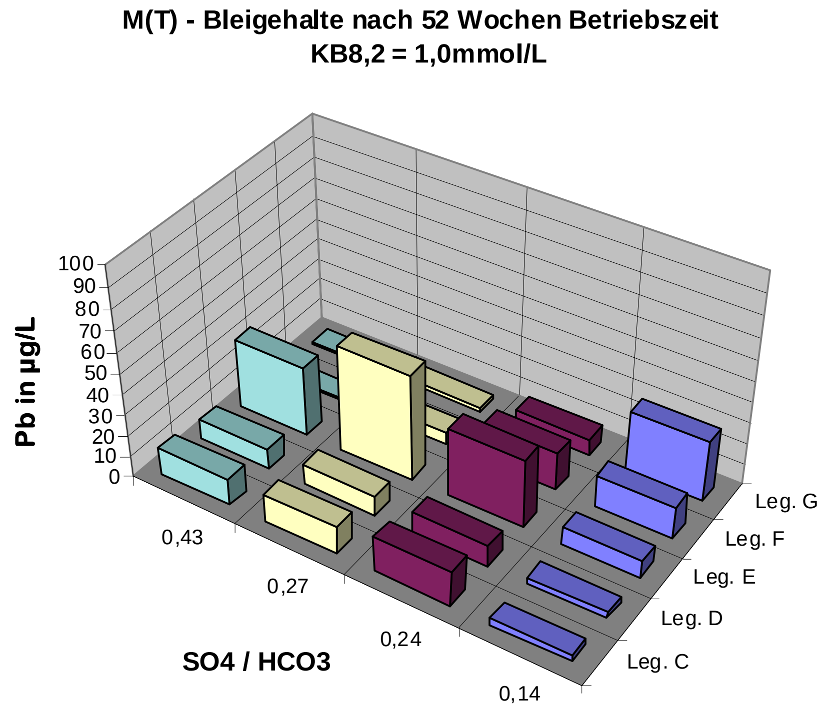


Fig. 4.3.4 M(T) values of lead on the 52nd week of operation, versus ratio of sulfate to bicarbonate; parameter: alloys, $K_{B\ 8.2}$ = 1 mmol L^{-1}.

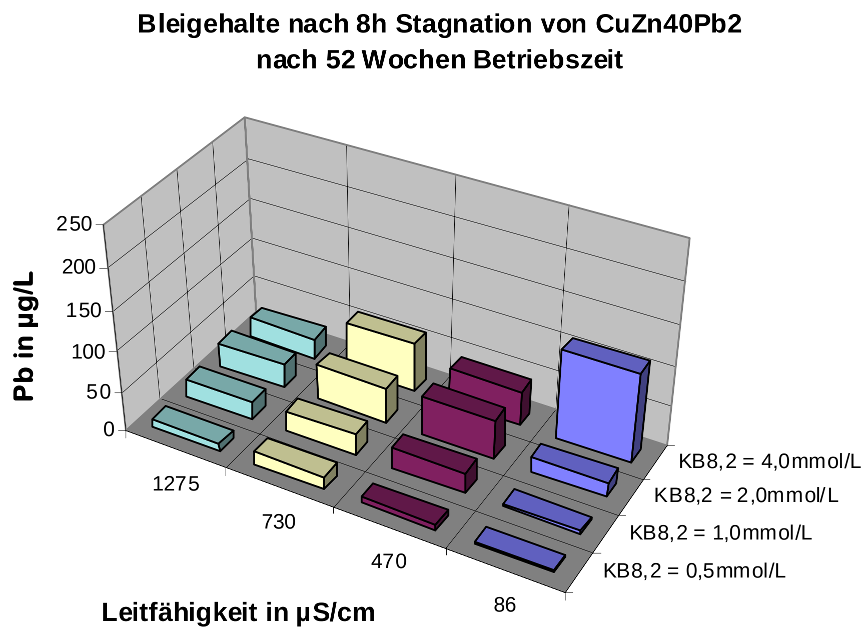


Fig. 4.3.5 Concentrations of lead after 8 h residence in Alloy C on the 52nd week of operation, versus conductivity of the water; parameter: $K_{B\ 8.2}$.

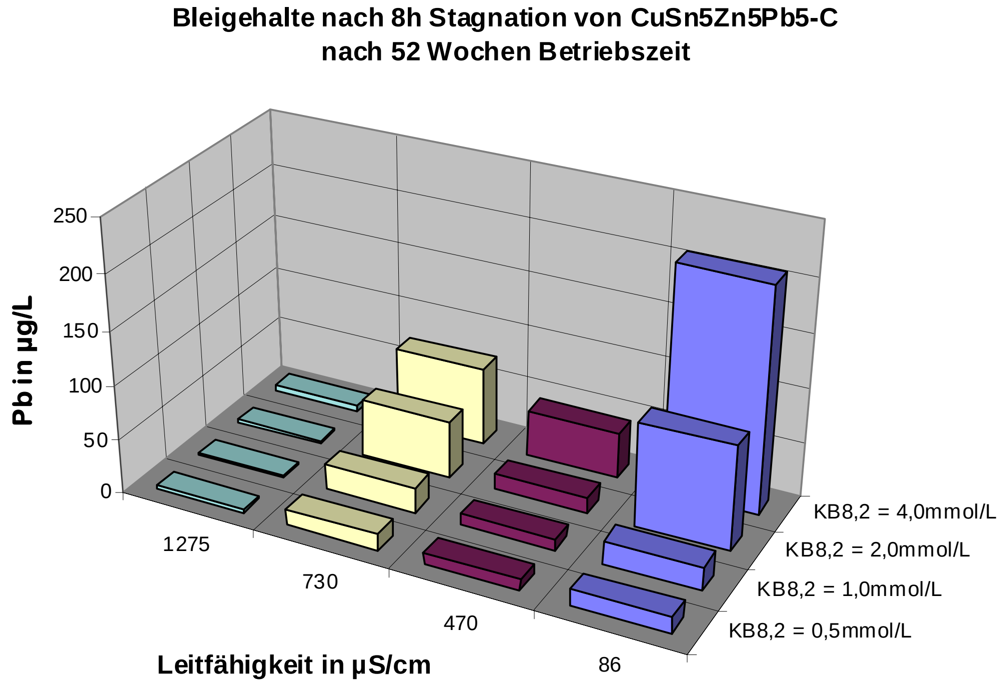


Fig. 4.3.6 Concentrations of lead after 8 h residence in Alloy F on the 52nd week of operation, versus conductivity of the water; parameter: $K_{B\ 8.2}$.

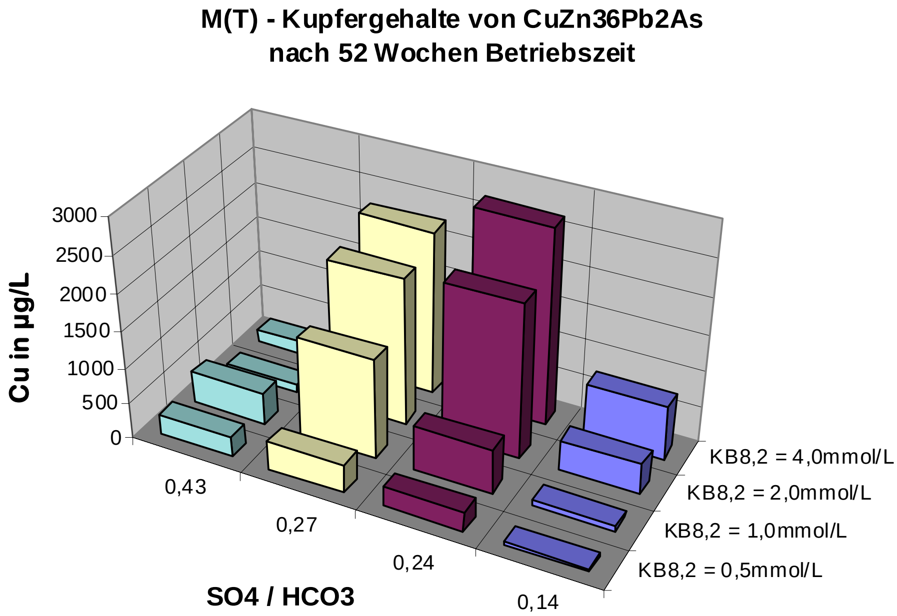


Fig. 4.3.7 M(T) values of copper on the 52nd week of operation, versus ratio of sulfate to bicarbonate; parameter: $K_{B\ 8.2}$, Alloy E.

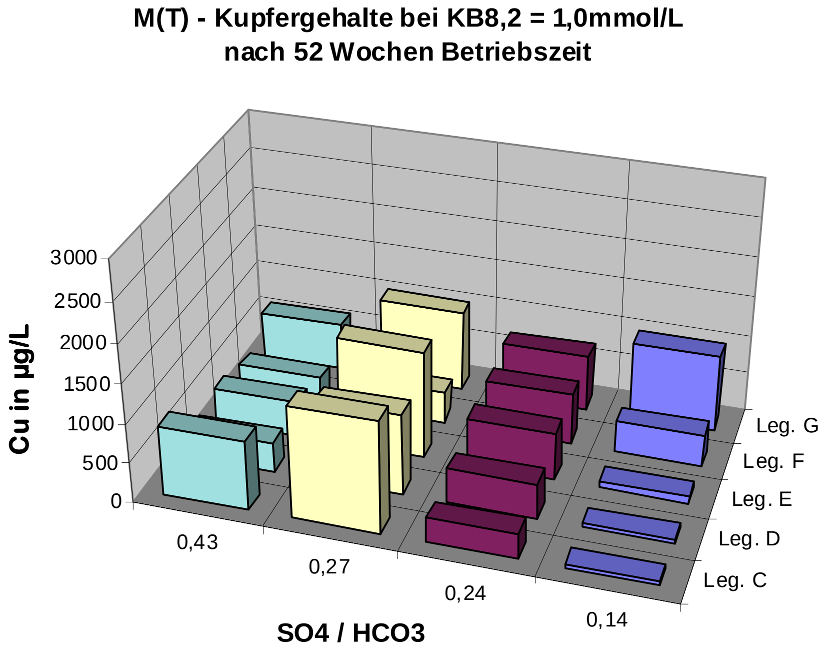


Fig. 4.3.8 M(T) values of copper on the 52nd week of operation, versus ratio of sulfate to bicarbonate; parameter: alloys, $K_{B\ 8.2} = 1$ mmol L^{-1}.

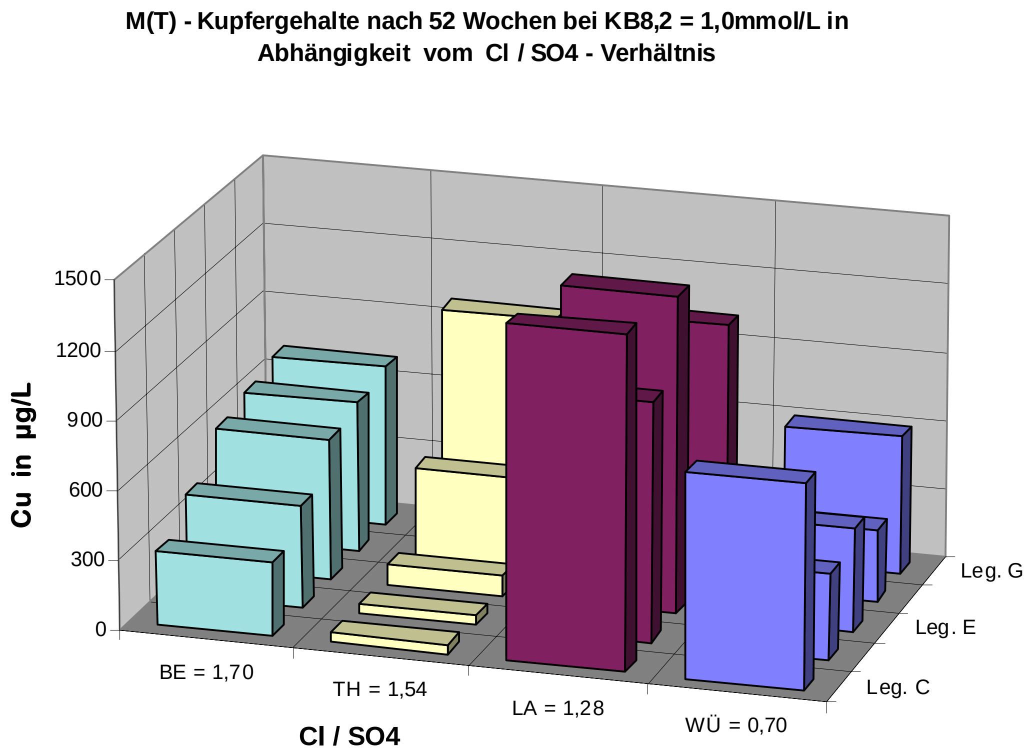


Fig. 4.3.9 M(T) values of copper on the 52nd week of operation, versus ratio of chloride to sulfate; parameter: alloys, $K_{B\ 8.2} = 1$ mmol L^{-1}.

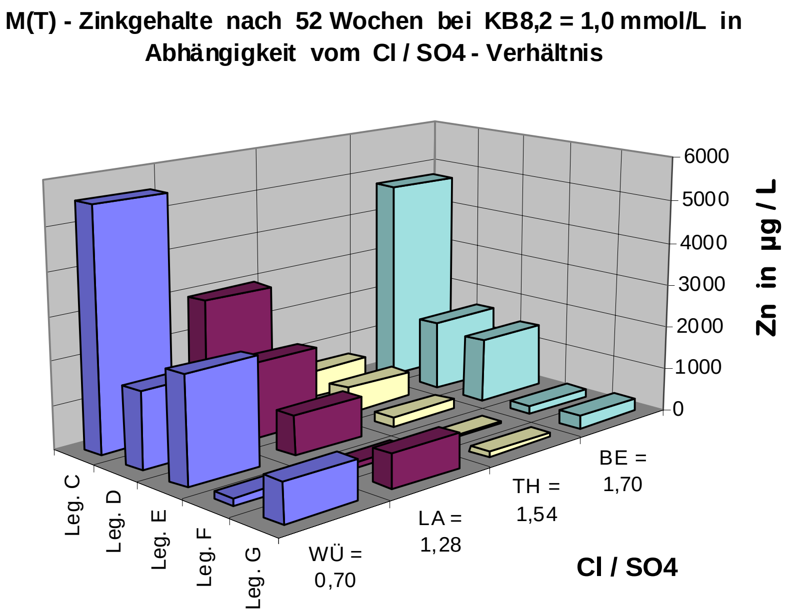


Fig. 4.3.10 M(T) values of zinc on the 52nd week of operation, versus ratio of chloride to sulfate; parameter: alloys, $K_{B\ 8.2} = 1$ mmol L^{-1}.

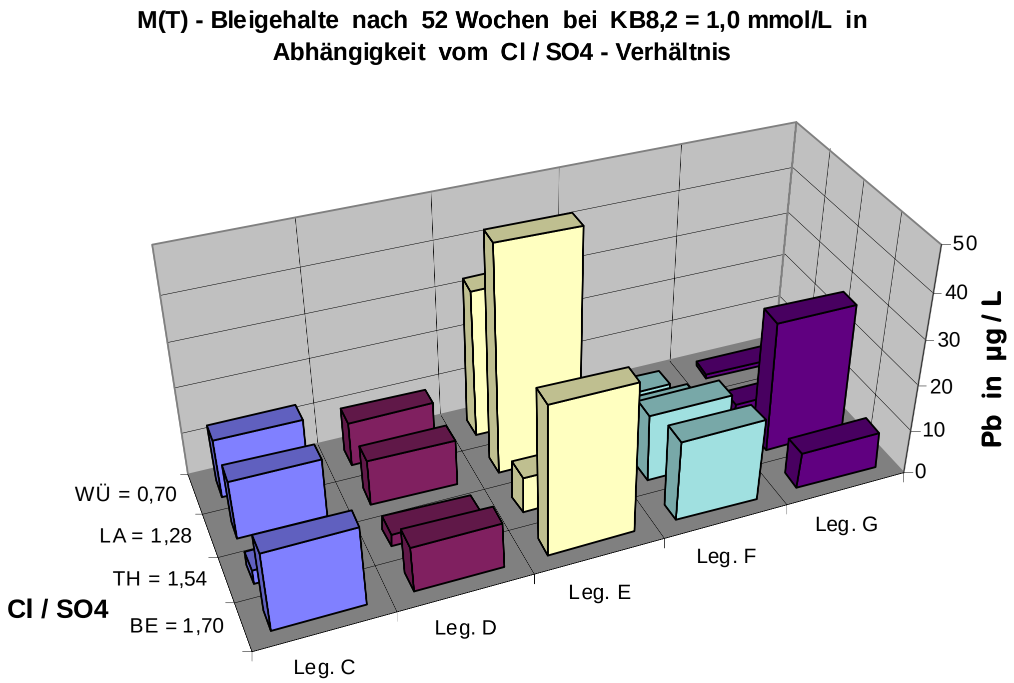


Fig. 4.3.11 M(T) values of lead on the 52nd week of operation, versus ratio of chloride to sulfate; parameter: alloys, $K_{B\ 8.2} = 1$ mmol L^{-1}.

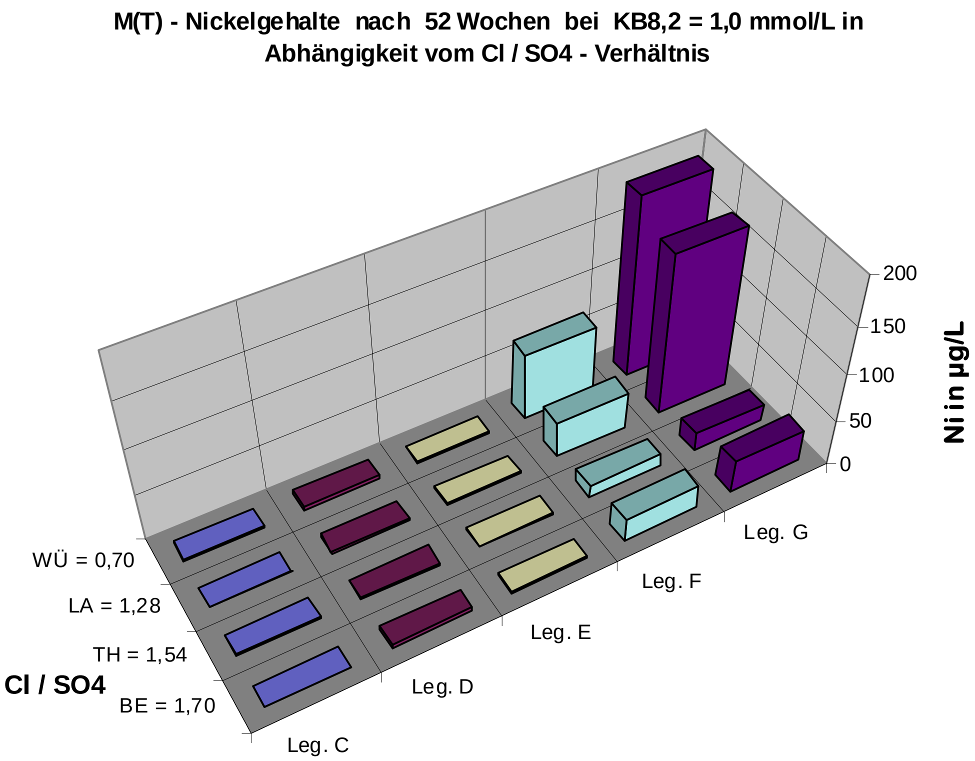


Fig. 4.3.12 M(T) values of nickel on the 52nd week of operation, versus ratio of chloride to sulfate; parameter: alloys, $K_{B\ 8.2} = 1$ mmol L^{-1}.

The plots show a certain similarity between the various ratios. We presume that this is due to the sulfate concentrations of the test waters. It is notable in this context that the ratio of the molar concentrations of chloride to sulfate is greater than 0.7 in all of the waters. In future tests, it would certainly be interesting to study waters with chloride to sulfate ratios of less than 0.7.

Apart from the small size of the data set, an investigation of the temporal development of the surface layers would have been necessary for interpretation of possible interrelationships. In our test procedure, this would have required sampling of the test pieces at the occasions water samples were taken.

Also, our test program did not foresee further variations in the anion composition. The possibility to include such a variation existed only in Würzburg, where original waters with and without silicate-phosphate additive were available (see Section 2.3). A comparison of Figures 4.2.9 and 4.2.10 shows that the additive causes a pronounced increase in copper leaching from CuSnZn alloys, which behave like pure copper in this respect. Because of the peculiar variability of the copper values, a clear assessment of the brass alloys is not possible. On the other hand, the leaching of lead is lower in the brass alloys, whereas an assessment is difficult in the case of gun metal, due to the low overall levels (see Table 4.3.1).

The additive appears to lead to a slight decrease in the leaching of nickel in the course of the test, whereas a definite assessment is impossible in the case of zinc, due to the changes in concentration with time during the operation of the facility.

Table 4.3.1 Concentrations of lead (in µg L-1) in the 52nd week at the Würzburg facility, 1 mmol L-1 with and without additive

Alloy	Without additive	With additive
C	13	7
D	10	4
E	33	3
F	1	4
G	1	2

4.4 Influence of the composition of the alloy

With respect to the influence of alloy composition, the situation is similar to that of the influence of the composition of the water. Only five alloys from two different categories were tested. The evaluation of the data sets must therefore remain incomplete with regard to the composition of the materials, as this was not a primary objective of the study. Another aspect is that neither the contents in unavoidable incidental elements nor in alloy components can be regarded as independent variables. Nevertheless, a rough evaluation of our data does provide some interesting information, which may be of interest in an assessment of materials for fittings etc. from the standpoint of human health.

In any category of materials and sometimes in different categories of materials, it is generally assumed that the leaching of a given element into the water depends on the amount of that element in the material. This is a basic assumption in the creation of alloys. It has already been demonstrated that this postulate does not hold true for lead in brass materials [3, 26]. It has been found, for instance, that in the long run the leaching of lead from copper-based materials is relatively independent of the quantity of lead present [3]. It has also been pointed out that the concentration of lead is only one factor affecting the leaching process, and that the overall corrosion rate is important too. This needs to be considered in the creation of new alloys. A modification of the lead content inevitably changes the ratios of the other alloy components. This, however, may result in a change of the corrosion behavior, leading to higher overall corrosion and counteracting the advantages of the lower lead concentration in the alloy.

Our new data set confirms these indications and conclusions (see Section 4.2.4), but it also provides examples which show that heavy metal concentrations in the water samples may depend on the amounts present in the alloy. Some of these trends are described below:

Such a relationship exists in the case of cadmium. Table 3.3.3 shows that the highest levels of cadmium are found in the tests with alloys C and D, materials which have higher Cd contents than the alloys E, F and G.

The leaching of nickel from brass, in which this element is merely incidental, shows a certain correlation to the nickel content of the alloy. Table 3.3.5 shows that the peak values for alloy D are substantially higher than in the other two alloys, while alloy D also has a much higher content of Ni. The difference in nickel between alloys C and E, on the other hand, is insignificant. In the case of gun metal, where nickel is an alloying element, leaching is also correlated to the Ni content of the alloy (Fig. 4.3.1).

This relationship also exists in the unavoidable incidental element antimony in both brass and gun metal (see Table 3.3.6), except for the Würzburg data in the latter.

The alloying element lead has already been discussed above, and the new data set provides an impressive example of those remarks. Alloys C, E, and G have approximately the same lead content, but alloy E has the highest leaching rate (Fig. 4.3.4). On the other hand, water samples from the test sections with alloys F and G approximately reflect the alloys' lead content. Alloy E is interesting in that its composition hardly differs from that of alloy C, except for the levels of copper and arsenic. The difference may thus be due to the difference in the Cu and As contents, or to the difference in structure, as alloy E consisted of much larger grains.

The leaching of copper appears to be independent of the quantity of copper in the alloy. Figure 4.3.9 shows that this depends mostly on the composition of the water. Only in the data on the Thalfang facility is it possible to see a difference between the brass alloys and the gun metals. In the other cases, the copper values spread considerably and without a definite pattern.

In zinc, there are clear differences between the brass alloys and the gun metals (illustrated in Figures 4.2.12, 4.2.13 and 4.2.14). In the brass group, leaching is lowest in alloy E whereas it is higher in alloys C and D, which are at about the same level. It should be recalled that alloy E is a dezincification resistant brass containing arsenic as an additive. This may have influenced the release of Zn to a greater extent than the somewhat lower zinc levels in alloy E, compared to the other two alloys.

5. Metallurgical analyses

After the test series, the test pieces were analyzed at various laboratories. This included inspection of the inner surfaces, analyses of the surface layers, and metallographic sections. The results from replicate devices were largely identical. These analyses were chiefly conducted to check for significant disparities. The tests were not designed, however, to investigate the corrosion behavior of the test materials, such as uniform and local corrosion, or formation of the surface layer. We will therefore not report the results in detail, but point out that they are available from the Institut für Wasser-, Boden- und Lufthygiene (Institute of Water, Soil and Air Hygiene), just as the heavy metal concentrations in the water samples (see Section 3.1).

An evaluation similar to the study on metal ion pick-up of the water as described in Sections 3 and 4 would not be acceptable for methodological reasons [27]. An evaluation of metallurgical results in this manner would require several samples taken at different times, whereas in our case there exists only one sampling occasion. It would therefore be inadequate to compare the materials on the sole basis of a single set of samples taken at the end of the test period. The results of the metallurgical investigations were not surprising. Apart from the fact that different surface layers developed in the different test waters, dezincification was observed in the CuZn alloys, as was to be expected. In alloys C and D the depth of the dezincified zone depended on the acidity in all test series. This relationship was not found in alloys E, F, and G, however, where corrosion effects were restricted to a depth of 0 to 100 µm, with the exception of a few isolated spots. There was no obvious influence of conductivity, SO_4/HCO_3 ratio or Cl/SO_4 ratio by the end of the experimental period.

6. References

[1] Meyer,E.; Sauter,W.; Franqué,O.von; : Operation of a Test Rig to Assess the Suitability of Alloys in Different Types of Water. In: Proceedings of Int. Workshop and Seminar “Internal Corrosion in Water Distribution Systems“ Göteborg, May1995,

Editor: Hedberg,T. et. al. Chalmers University of Technology and Göteborg University, Göteborg 1996 ISBN 91-7197-339-7

[2] Meyer,E.; Sauter,W.; Franqué,O.von; : Beurteilung von Armaturenwerkstoffen auf ihre Eignung im Trinkwasserbereich. Sanitär und Heizungstechnik SHT 61 (1996)10, S.97-100,105

[3] Meyer,E.; Sauter,W.; Franqué,O.von; : Ergebnisse von Untersuchungen zur Abgabe von Schwermetallen an Trinkwasser aus Armaturenwerkstoffen. In: “Trinkwasser im Kontakt mit Rohrwerkstoffen“, Dokumentation zum 11. Wassertechnischen Seminar des Rheinisch-Westfälischen Instituts für Wasserchemie und Wassertechnologie GmbH; Mülheim 1997 ISSN 0941-0961

[4] DIN 50931-1 : Korrosion der Metalle, Korrosionsversuche mit Trinkwässern, Teil 1 Veränderung der Trinkwasserbeschaffenheit 1999; Beuth-Verlag, Berlin

[5] Lytle,D.A.; Schock,M.R.; : Stagnation Time, Composition, pH, and Orthophosphate Effects on Metal Leaching From Brass. EPA/600/R-96/103 September 1996

[6] Amtsblatt der Europäischen Gemeinschaft Nr. L 229; 11-29 vom 30.08.1980 Richtlinie des Rates vom 15.Juli 1980 über die Qualität von Wasser für den menschlichen Gebrauch. (80/778/EWG)

[7] Guidelines for Drinking Water Quality, Vol. 1 - Recommendations, WHO, Genf 1993, 2.nd ed.

[8] Verordnung über Trinkwasser und über Wasser für Lebensmittelbetriebe. (Trinkwasserverordnung - TrinkwV) Bundesgesetzblatt 12.12.1990, 2613-2629

[9] Official Journal of the European Communities L 330; 32-54 of 05.12.1998 Council Directive 98/83/EC of 3 November 1998

[10] Pontius, F.W. : The New Lead and Copper Rule. Journal AWWA 7/1991, p. 12-20 + 108-109

[11] U.S. Environmental Protection Agency (1992) : Lead and Copper, Final Rule Correction Fed. Reg. 57(124), 28785

[12] DIN 50930, Teile 1bis 5 : Korrosion metallischer Werkstoffe im Innern von Rohrleitungen, Behältern und Apparaten bei Korrosionsbelastung durch Wässer, Ausgabe Februar 1993, Beuth Verlag Berlin

[13] Umwelt-Survey 1990/92 Band V Trinkwasser , WaBoLu -Heft 5/97. ISSN 0175-4211

[14] NSF Standard 61, Drinking Water System Components - Health Effects Section 9-1997 NSF International, Ann Arbour, Michigan, January 1997

[15] BS 7766 : Specification of Requirements for Suitability of Metallic Materials for Use in Contact with Water Intended for Human Consumption with Regard to Their Effect on the Quality of the Water, British Standard Institution 1994

[16] Türpe,M.; Büchler, H. : Untersuchungen zur Bleiabgabe des Messings CuZn39Pb3 . Materials and Corrosion 48, 813-821 (1997)

[17] Franqué, O. von; Schiffer,K.-H.; Schmidt, G. : Eignung von Armaturenwerkstoffen für Trinkwasserinstallationen. Sanitär und Heizungstechnik SHT 62 (1997) 10, S.122-127

[18] Meyer,E. : Blei in Trinkwasser und Abhilfestrategien. Schr.-Reihe Verein WaBoLu 74, Gustav Fischer Verlag, Stuttgart, 1987

[19] Bailey, R.J.; Jolly, P.K.and Lacey, R.F.(1986), Domestic Water Use Patterns, WRc Report TR 225

[20] Meyer, E. : Transfert de métaux lourds provenant des installations domestiques de distribution d'eau dans l'eau de boisson en fonction de la nature de l'eau et des conditions de fonctionnement. La Tribune du CEBEDEAU Nr.420 Novembre 1978 S.431-441

[21] Meyer, E. : Zum Übergang von Schwermetallen aus der Hausinstallation in Trinkwasser in Abhängigkeit von der Wasserbeschaffenheit und den Betriebsbedingungen. Gaz - Eaux - Eaux useés, 60. année 1980 no. 8

[22] Deutsche Einheitsverfahren zur Wasser-, Abwasser- und Schlammuntersuchung Band II 42. Lieferung (1998) ISBN 3-410-14153-7 (Beuth Verlag)

[23] Schwenk, W. : Untersuchung über die Ni-Abgabe nichtrostender CrNi-Stähle, gwf Wasser Abwasser 133.Jahrgang Nr. 6 (1992); 281-286

[24] Werner,W. et al : Untersuchungen zur Flächenkorrosion in Trinkwasserleitungen aus Kupfer gwf Wasser Abwasser135.Jahrg. Nr.2 (1994) S.92-103

[25] Wagner, I. : Kupfer im Trinkwasser von Hausinstallationen aus Kupfer. gwf Wasser Abwasser 129.Jahrgang Nr.11 (1988); S.690-693

[26] Oliphant, R. J. : Contamination of Potable Water by Lead From Leaded Copper Alloys. In: Proceedings of Int. Workshop and Seminar "Internal Corrosion in Water Distribution Systems" Göteborg, May1995, Editor: Hedberg,T. et. al. Chalmers University of Technology and Göteborg University, Göteborg 1996

ISBN 91-7197-339-7

[27] DIN 50905 Teil 1 : Korrosionsuntersuchungen - Grundsätze Januar 1987 Beuth Verlag Berlin

[28] DIN 1988 Technische Regeln für Trinkwasser-Installationen (TRWI), Beuth Verlag Berlin, Dezember 1988

[29] EC Report "Developing a new protocol for the monitoring of lead in drinking water" -draft- Order Number SMT4-CT96-2112 Kiwa N.V., January 1998

[30] Meyer, E.; Roßkamp, E.: „Die Trinkwasserverordnung, die AVB WasserV und die Hausinstallation." Seite 91-116 In: Die Trinkwasserverordnung 2.Auflage 1987

ISBN 3 503 02606 1

[31] European co-normative research consortium (J.Baron et. al.) , Co-normative research on test methods for materials in contact with drinking water, metallic materials, Final report, January 2000

Acknowledgments

We are especially grateful to the companies which supported the tests by manufacturing the test pieces. Preliminary results were made available for discussion to interested organizations and other parties. We thank our colleagues for critical remarks and suggestions. The study also enjoyed the support of the staff of the Institut für Wasser-, Boden- und Lufthygiene, and we gratefully acknowledge their conscientious cooperation.

Appendix

German - English Glossary

German	English
Anlage	test-site, facility
Arsengehalt	arsenic content
Ausgangswasser (Ausgangsw.)	water from local network
Basekapazität bis pH 8,2 (KB8,2 ; KB; Bk)	acidity
Behälter	vessel
Beispiel	example
Besonderheit	particularity
Bestimmungsgrenze	detection limit
Betriebszeit	testing period
Bleigehalt	lead content
CO2 - Magnetventil	CO2 - magnetic valve
CO2 - Ausströmerstein	CO2 - discharge
Dachrinne	eaves
Diagramm	plot
dividiert (durch)	divided (by)
Dreiwegehahn	three way spigot
Edelstahl	stainless steel
Elementanalyse	analyses of elements
entsprechend	corresponding to
Entwicklung	development
Ergebnisse	results
ETWA Serie	internal designation of test serie
fett gedruckt	in bold types
Füllventil	filling valve
Frischwasserleitung	water from local network
Gehalt	content
Konzentration	concentration
KS4,3 (KS4,3 nach DIN 38409-7)	alcalinity
Kupfergehalt	copper content
Legierung , Leg.	alloy
Legierungsanteil	proportion (of element) in alloy
Magnetventil	magnetic valve
Metalleintrag	leaching , metal pick-up
Mittelwerte	arithmetic means , average values
nachfolgend	following

A 0

Nickelgehalte	nickel content
Qualitätskontrolle	quality control
pH - Elektrode	pH - electrode
pH - IST/SOLL - Regelung	pH - control
Probeflasche	sampling bottle
Rohrbe-und Entlüfter	aeration
Rührmotor	stirring motor
Sauerstoffgehalt	oxygen content
Schaltkasten	switch board
Schwermetallgehalte	content of heavy metals
SOLL	set value
Standardabweichung	standard deviation
Stagnation	residence period , stagnation
Standort	test-site
Tabelle	table
Tage	days
Übersicht	survey , summary
Vergleich	comparision
Verlauf	course
Werkstoff	material
wichtig , wichtigsten	important , most important
Woche	week
zeitlicher Verlauf	variation with time
Zinkgehalt	zinc content

A 1

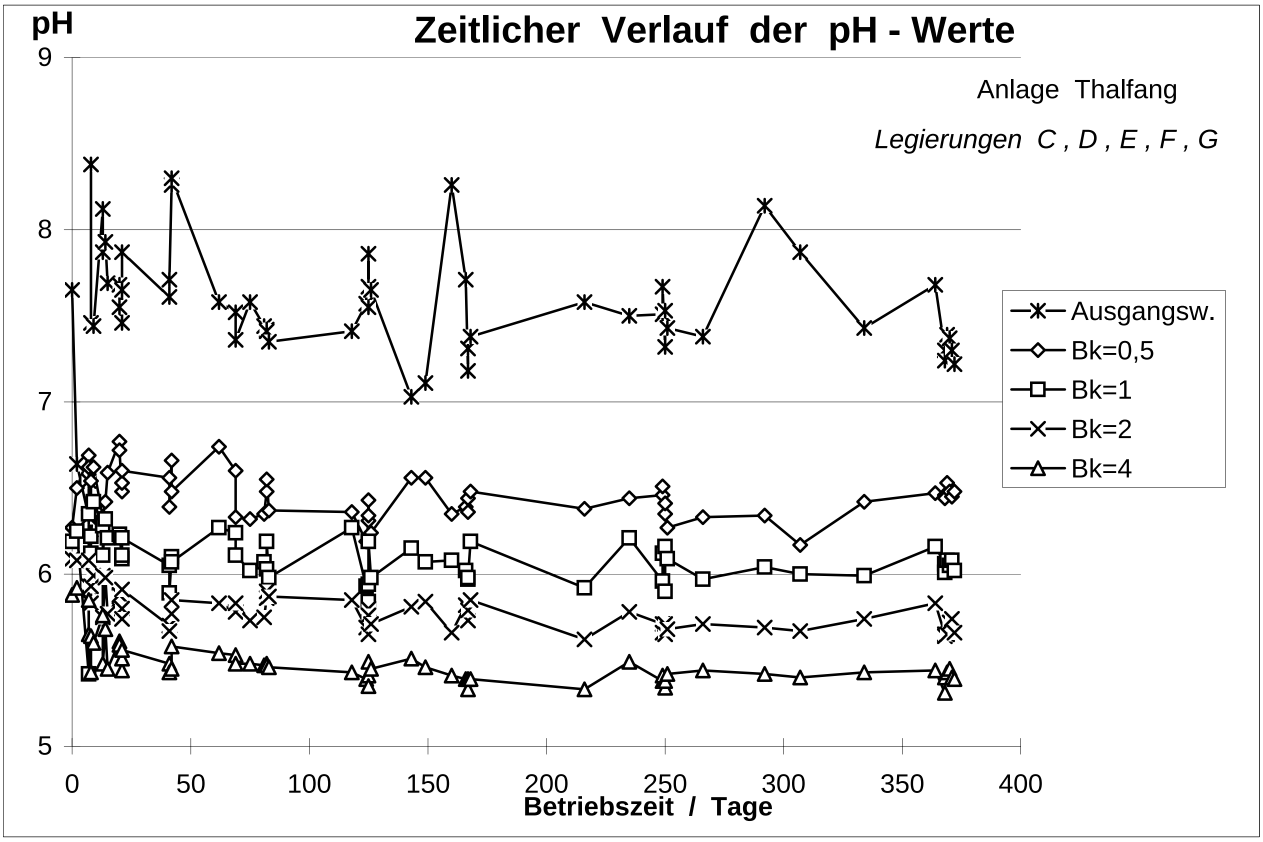
Übersicht der wichtigsten Parameter (Mittelwerte über 1 Jahr Betriebszeit)

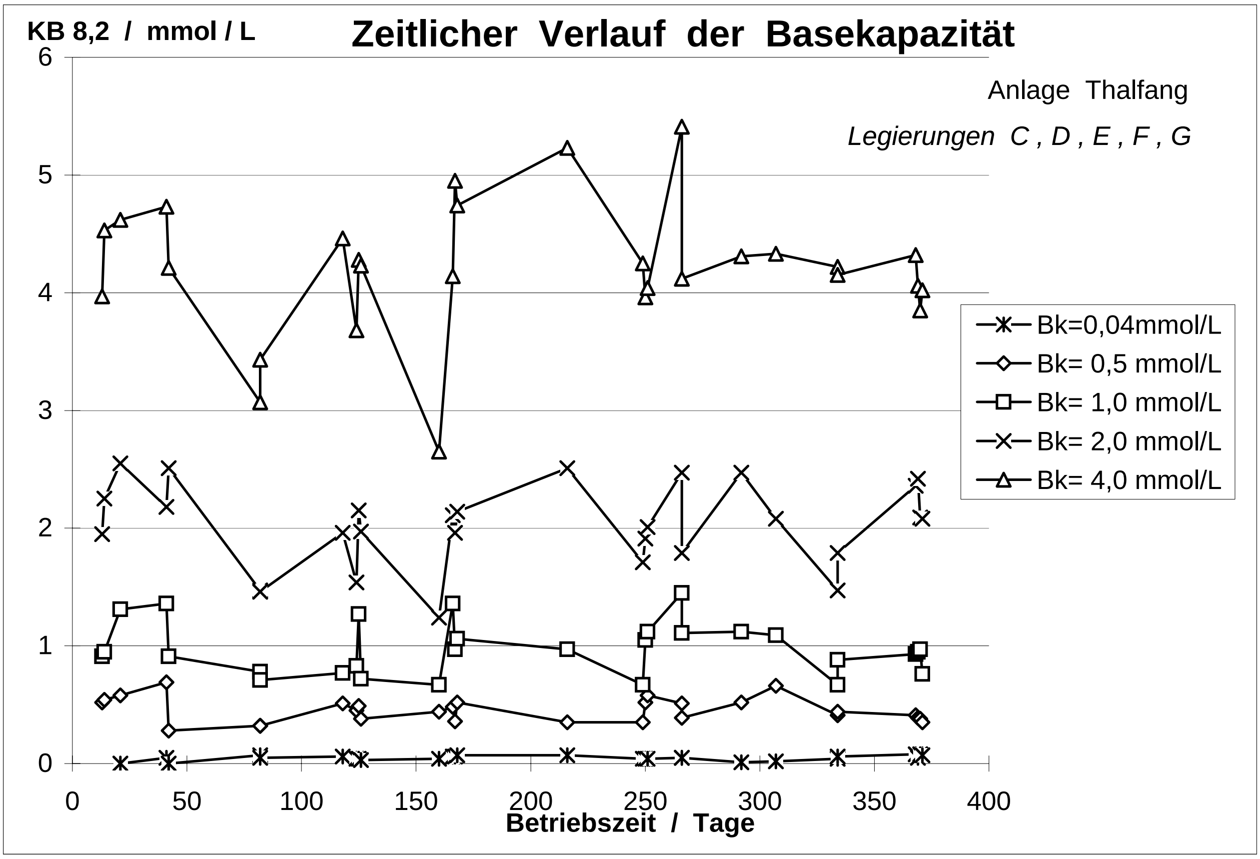
Standort	KB8,2 *Soll* mmol/L	KB8,2 *Mittelwert* mmol/L	pH *Soll*	pH *Mittelwert*	KS4,3 mmol/L	DIC mg / L
Thalfang	**0,04**	0,04	**7,5**	7,59	0,5	6
Thalfang	**0,5**	0,45	**6,4**	6,44	0,5	12
Thalfang	**1,0**	0,98	**6,1**	6,09	0,5	18
Thalfang	**2,0**	2,02	**5,8**	5,77	0,5	30
Thalfang	**4,0**	4,21	**5,5**	5,46	0,5	54
Langen	**0,5**	0,47	**7,0**	7,03	2,0	30
Langen	**1,0**	1,10	**6,7**	6,68	2,0	36
Langen	**2,0**	2,04	**6,4**	6,39	2,0	48
Langen	**4,0**	4,08	**6,1**	6,09	2,0	72
Berlin	**0,2**	0,16	**7,7**	7,76	3,5	43
Berlin	**0,5**	0,47	**7,2**	7,28	3,5	48
Berlin	**1,0**	0,85	**6,9**	7,00	3,5	54
Berlin	**2,0**	1,94	**6,6**	6,62	3,5	66
Berlin	**4,0**	3,68	**6,3**	6,34	3,5	90
Würzburg	**0,5**	0,48	**7,6**	7,57	6,4	83
Würzburg	**1,2**	1,16	**7,1**	7,11	6,4	91
Würzburg	**2,0**	2,02	**6,9**	6,85	6,4	101
Würzburg	**4,0**	4,06	**6,6**	6,57	6,4	125
Würzburg	**1,2 + X**	1,15	**7,1**	7,11	6,4	91

Besonderheiten : In Würzburg bei einer Anlage mit Phosphat / Silikatdosierung (1,2 + X)

A 2

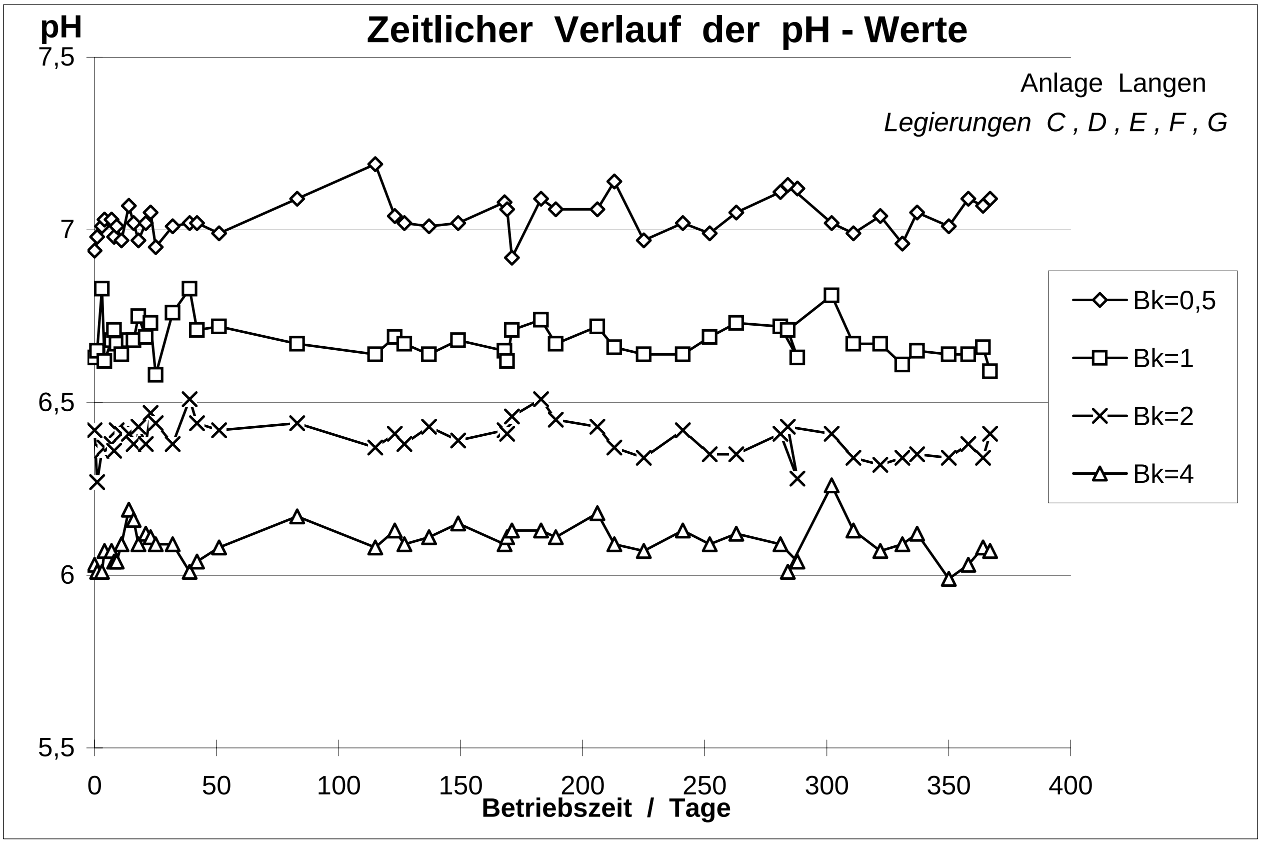
THALFANG

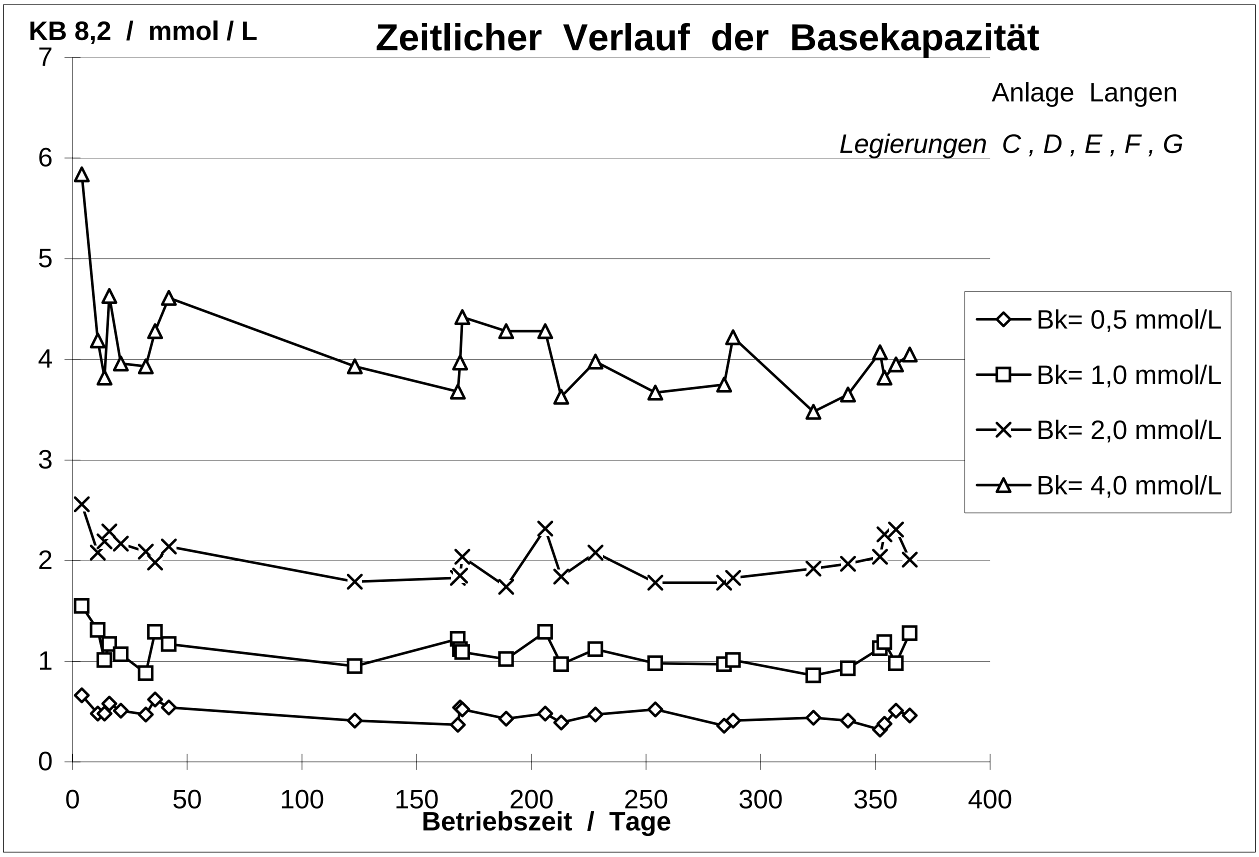

pH
Zeitlicher Verlauf der pH - Werte
Anlage Thalfang
Legierungen C , D , E , F , G
Ausgangsw.
Bk=0,5
Bk=1
Bk=2
Bk=4
9
8
7
6
5
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage


KB 8,2 / mmol / L
Zeitlicher Verlauf der Basekapazität
Anlage Thalfang
Legierungen C , D , E , F , G
Bk=0,04mmol/L
Bk= 0,5 mmol/L
Bk= 1,0 mmol/L
Bk= 2,0 mmol/L
Bk= 4,0 mmol/L
6
5
4
3
2
1
0
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage

A 2

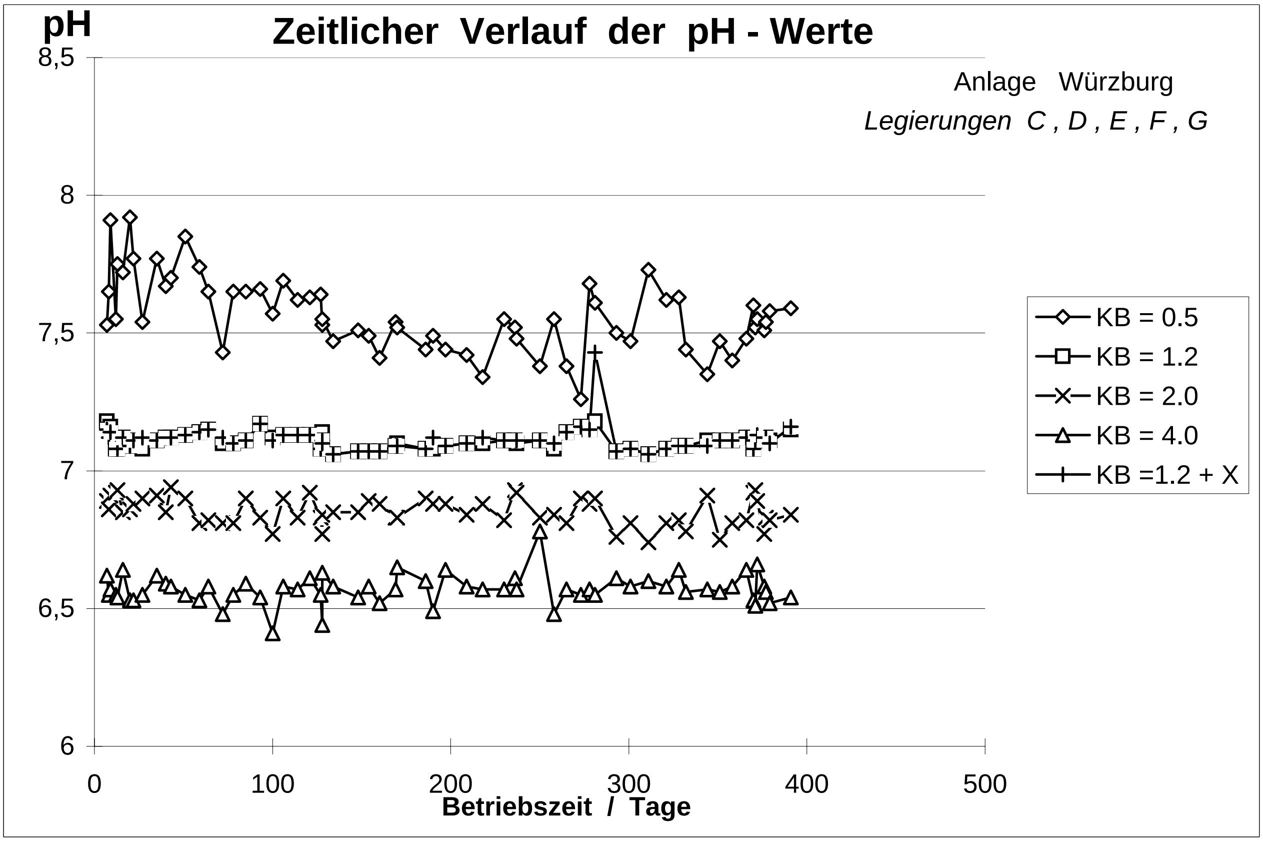
LANGEN

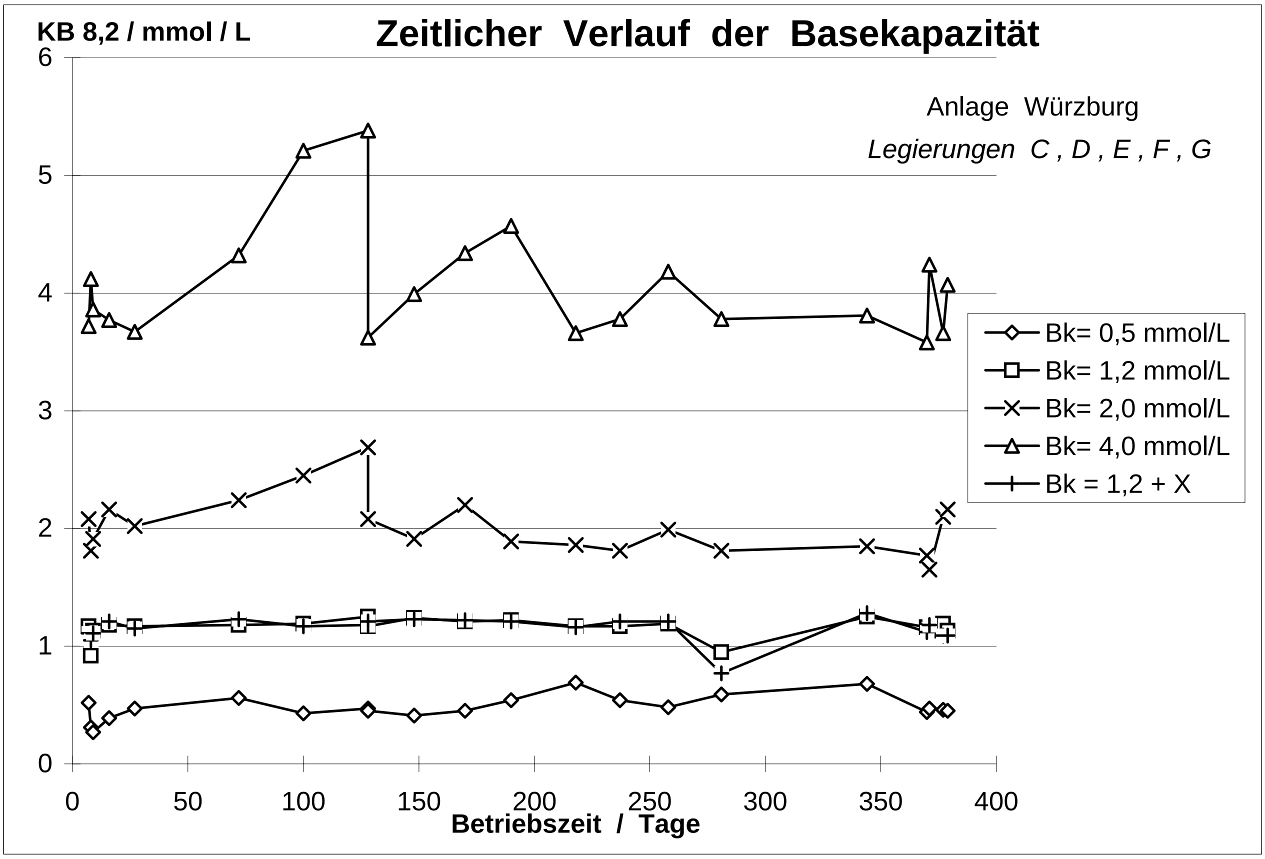

pH
Zeitlicher Verlauf der pH - Werte
Anlage Langen
Legierungen C , D , E , F , G
7,5
7
6,5
6
5,5
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage
Bk=0,5
Bk=1
Bk=2
Bk=4


KB 8,2 / mmol / L
Zeitlicher Verlauf der Basekapazität
Anlage Langen
Legierungen C , D , E , F , G
7
6
5
4
3
2
1
0
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage
Bk= 0,5 mmol/L
Bk= 1,0 mmol/L
Bk= 2,0 mmol/L
Bk= 4,0 mmol/L

A 2

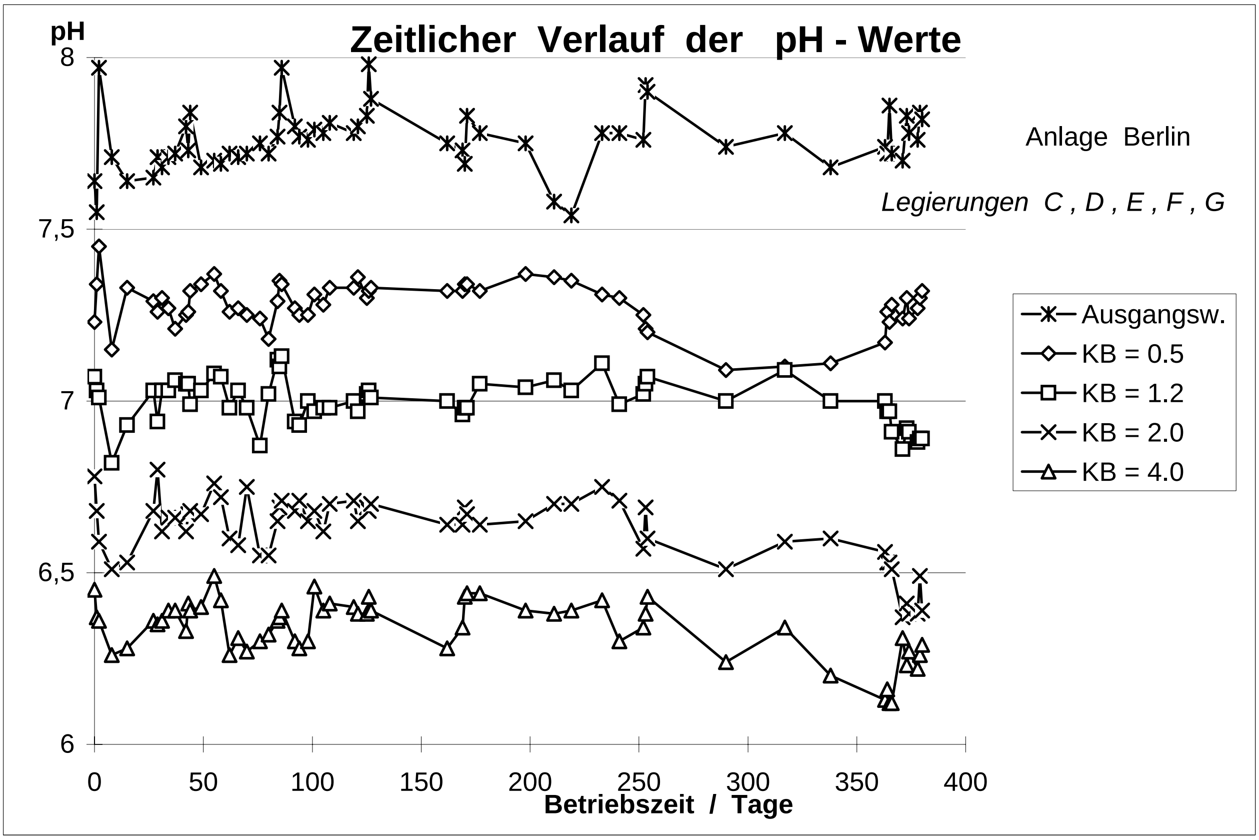
WÜRZBURG


pH
Zeitlicher Verlauf der pH - Werte
Anlage Würzburg
Legierungen C , D , E , F , G
8,5
8
7,5
7
6,5
6
0
100
200
300
400
500
Betriebszeit / Tage
KB = 0.5
KB = 1.2
KB = 2.0
KB = 4.0
KB =1.2 + X

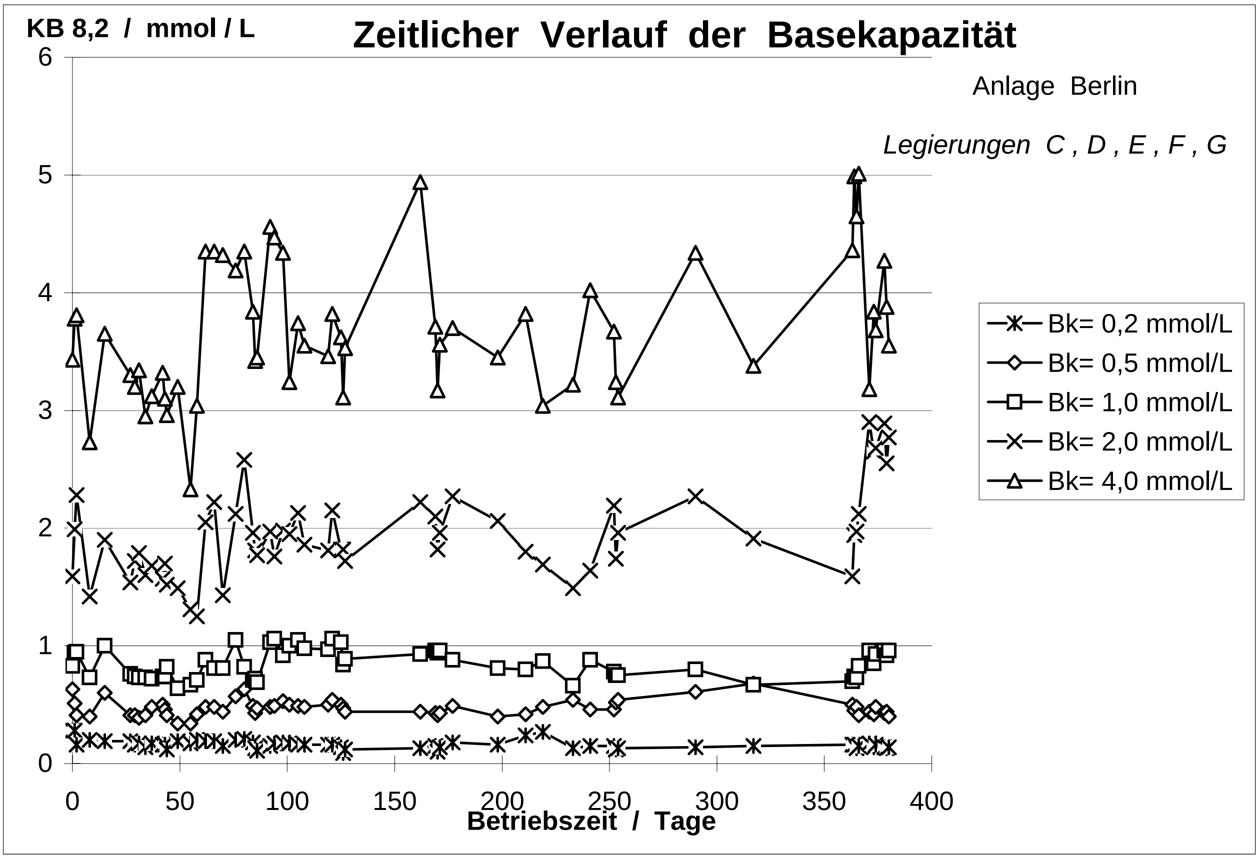

KB 8,2 / mmol / L
Zeitlicher Verlauf der Basekapazität
Anlage Würzburg
Legierungen C , D , E , F , G
6
5
4
3
2
1
0
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage
Bk= 0,5 mmol/L
Bk= 1,2 mmol/L
Bk= 2,0 mmol/L
Bk= 4,0 mmol/L
Bk = 1,2 + X

A 2

BERLIN

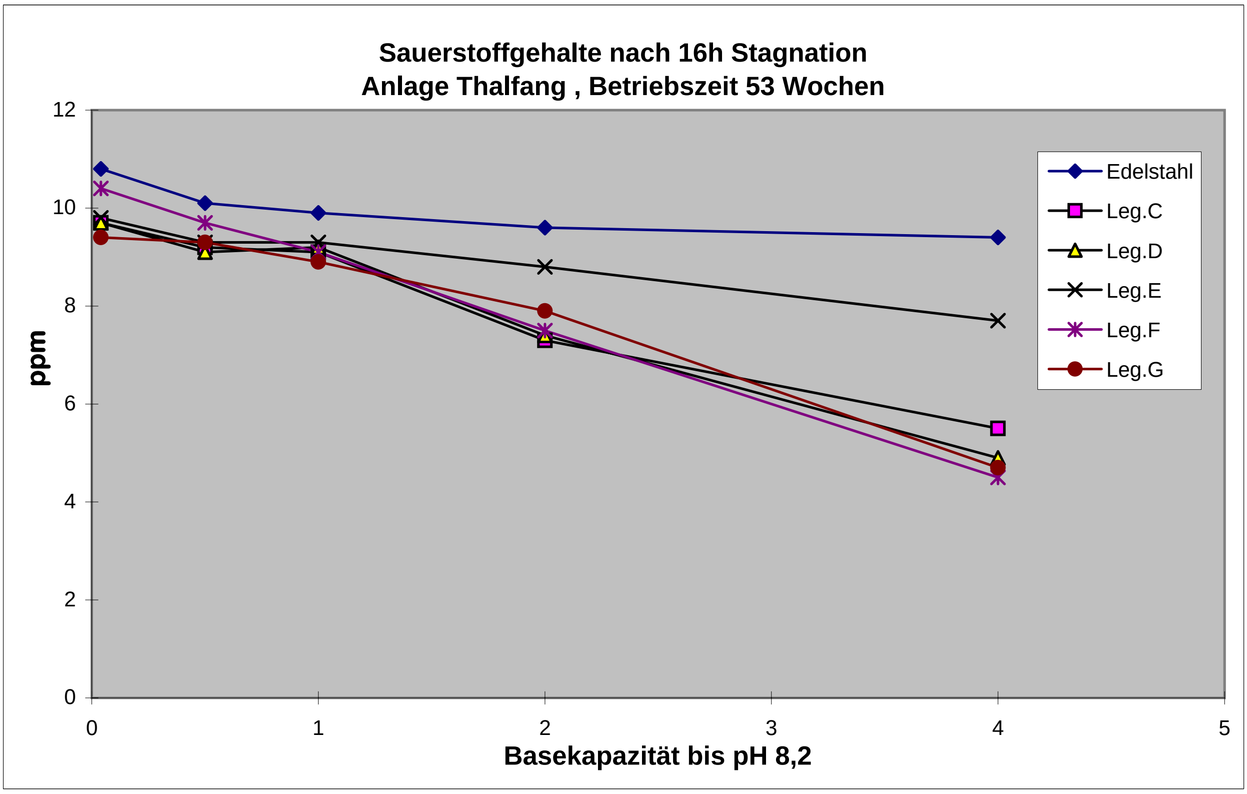


pH
Zeitlicher Verlauf der pH - Werte
8
7,5
7
6,5
6
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage
Anlage Berlin
Legierungen C , D , E , F , G
Ausgangsw.
KB = 0.5
KB = 1.2
KB = 2.0
KB = 4.0

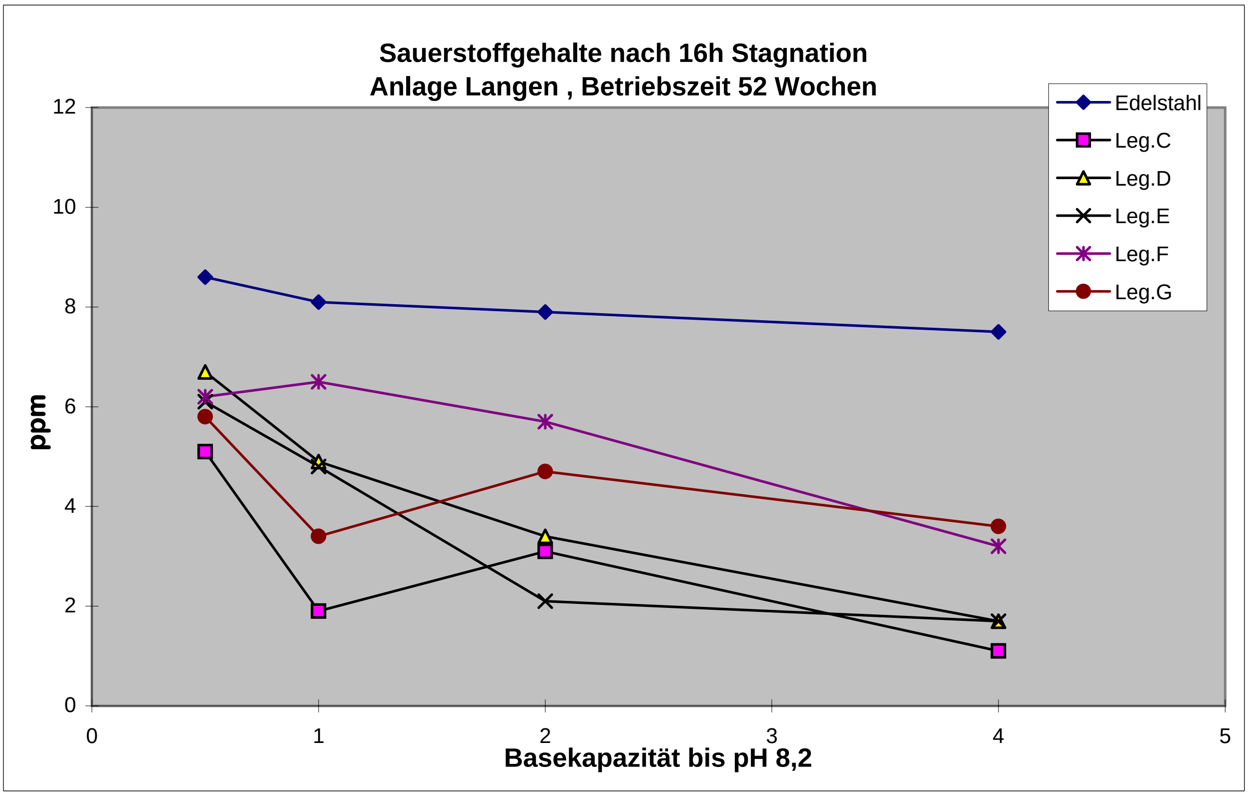


KB 8,2 / mmol / L
Zeitlicher Verlauf der Basekapazität
6
5
4
3
2
1
0
0
50
100
150
200
250
300
350
400
Betriebszeit / Tage
Anlage Berlin
Legierungen C , D , E , F , G
Bk= 0,2 mmol/L
Bk= 0,5 mmol/L
Bk= 1,0 mmol/L
Bk= 2,0 mmol/L
Bk= 4,0 mmol/L

A 3

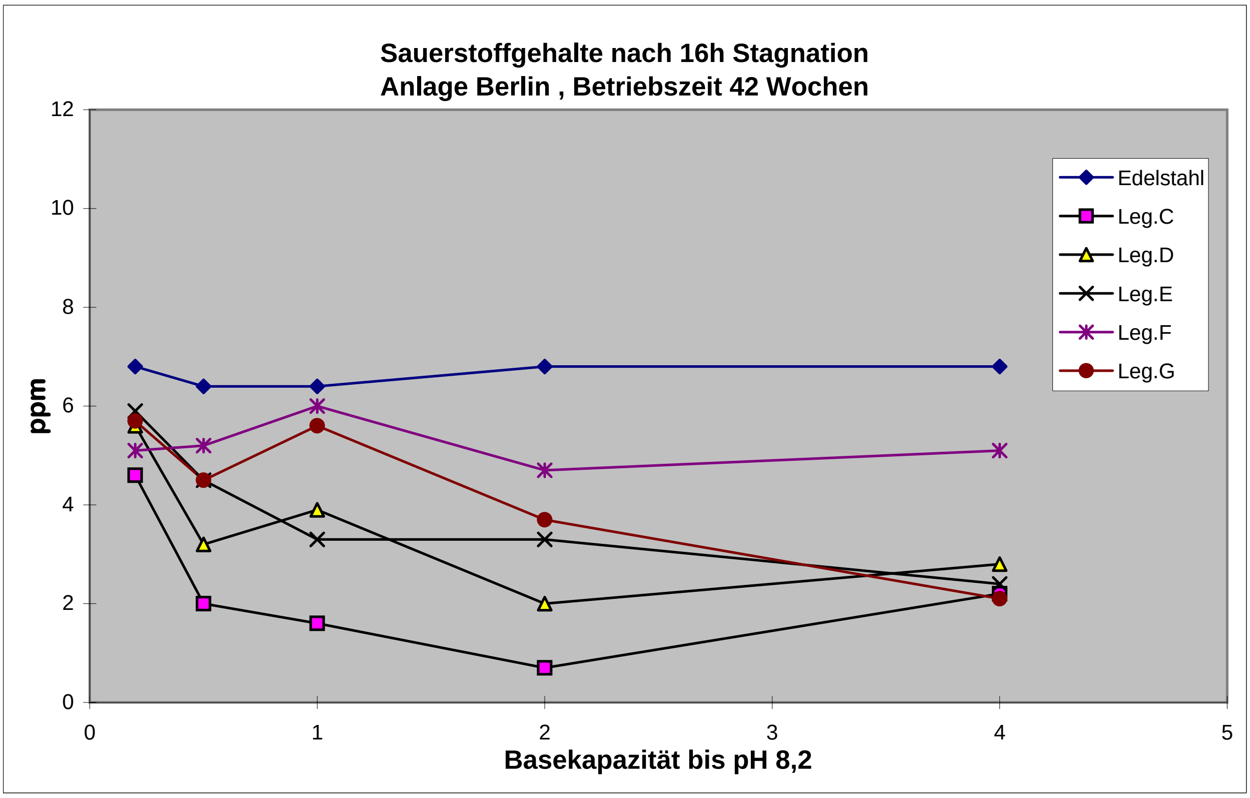


Sauerstoffgehalte der Anlage **Thalfang**

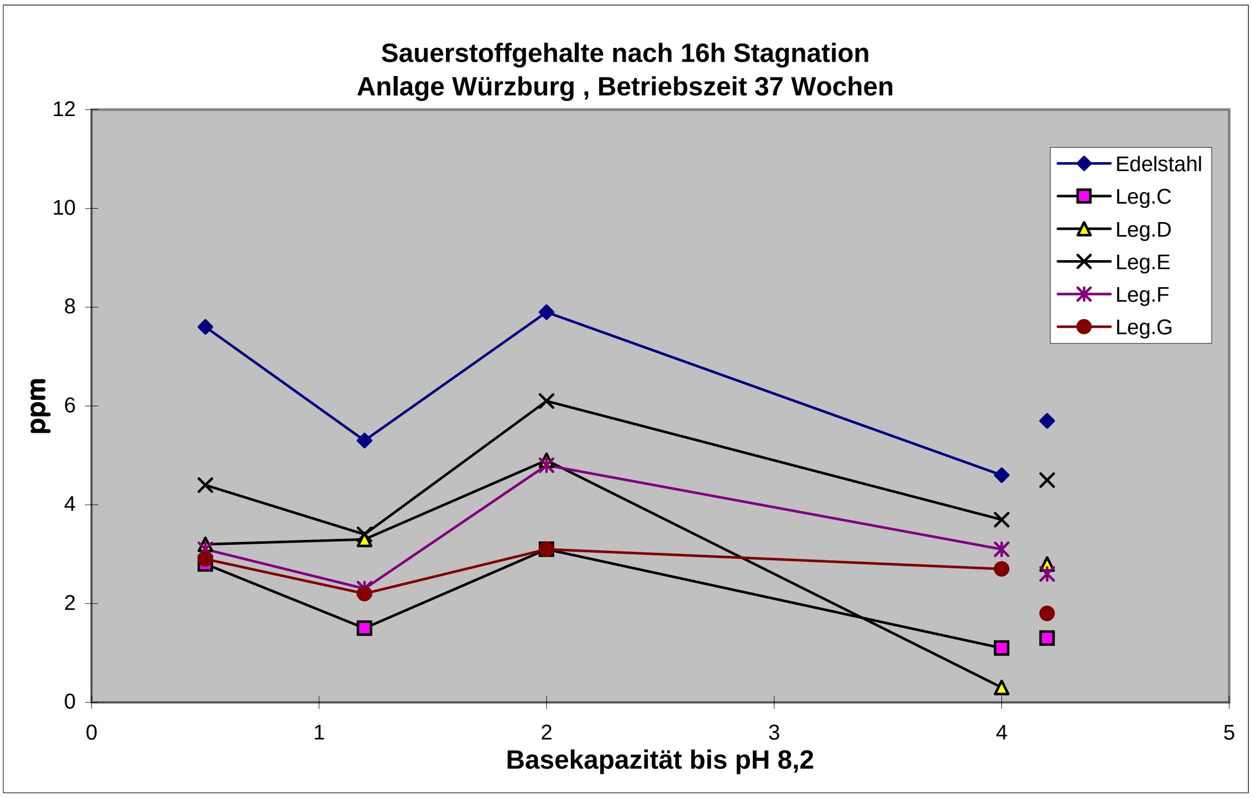


Sauerstoffgehalte der Anlage **Langen**

A 3



Sauerstoffgehalte der Anlage **Berlin**



Sauerstoffgehalte der Anlage **Würzburg**

* Die Werte außerhalb entsprechen KB8,2 = 1,2 + X mmol/L

A 4

Interne Qualitätskontrolle für die Elementanalyse mit ICP - MS
ETWA Serie 2 (Langen)

Element	BG	Sollwerte		Ergebnisse der Kontrollmessungen			
	µg/L	*µg/L*	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Pb	**0,5**	1	66	1,05	0,27	25,53	4,56
		5	36	5,05	0,19	3,71	1,00
		10	67	9,99	0,27	2,68	-0,08
		50	127	50,12	2,18	4,36	0,24
		100	30	100,66	1,77	1,46	0,66
	STD cert	27 ± 1	53	27,61	2,12	7,68	2,25
	STD cert	15 ± 0,6	18	15,33	1,49	9,70	2,19
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Ni	**0,5**	1	66	1,05	0,13	12,43	4,91
		5	36	5,04	0,17	3,31	0,78
		10	67	10,07	0,5	5,01	0,72
		50	127	50,32	2,10	4,18	0,64
		100	30	101,56	5,89	5,80	1,56
	STD cert	58 ± 3	18	59,50	5,37	9,02	2,59
	STD cert	55 ± 3	53	55,06	3,19	5,79	1,97
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cd	**0,2**	1	66	1,00	0,07	6,63	0,30
		5	36	4,99	0,19	3,72	-0,21
		10	67	9,93	0,29	2,88	-0,74
		50	127	50,17	1,10	2,19	0,34
		100	30	100,83	1,54	1,53	0,83
	STD cert	6,5 ± 0,4	18	6,37	0,39	6,10	6,12
	STD cert	10 ± 1	52	9,69	0,51	5,3	-8,21
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
As	**0,8**	1	66	1,00	0,06	6,20	0,32
		5	36	5,02	0,20	3,94	0,30
		10	67	10,05	0,43	4,25	0,46
		50	127	50,43	1,77	3,51	0,85
		100	30	101,61	4,17	4,10	1,61
	STD cert	76 ± 7	53	63,38	3,25	5,13	53,40
	STD cert	56 ± 0,7	18	57,79	4,36	7,54	3,20
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Sb	**0,5**	1	72	0,98	0,07	7,60	-2,33
		5	52	4,91	0,16	3,22	-1,81
		10	47	9,97	0,26	2,61	-0,25
		50	115	50,05	1,25	2,50	0,10
		100	29	101,18	2,63	2,60	1,18
	STD cert	54 ± 1	18	55,14	3,29	5,96	2,12
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cr	**0,5**	1	66	1,02	0,08	7,87	1,73
		5	36	4,98	0,20	3,95	-0,35
		10	67	11,01	7,66	69,6	10,08
		50	127	50,53	1,76	3,49	1,06
		100	30	101,11	5,13	5,08	1,11
	STD cert	18,5 ± 0,2	18	19,52	1,60	8,21	8,43
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Mo	**0,1**	1	66	1,00	0,04	3,52	-0,5
		5	36	4,99	0,15	2,95	-0,22
		10	67	9,91	0,31	3,12	-0,94
		50	127	48,53	8,86	18,26	-2,94
		100	30	100,15	2,30	2,30	0,15
	STD cert	113 ± 2	18	120,78	7,96	6,59	6,88
	STD cert	113 ± 2	53	106,22	2,98	2,81	-9,67

BG = Bestimmungsgrenze
AM = arithmetrisches Mittel
s = Standardabweichung
n = Anzahl der Kontrollmessungen
SAM = Standardabweichung des Mittelwertes in %
SWA = Sollwertabweichung (des Mittelwertes) in %

A 4

Interne Qualitätskontrolle für die Elementanalyse mit ICP - MS
ETWA Serie 3 (Thalfang)

Element	BG	Sollwerte		Ergebnisse der Kontrollmessungen			
	µg/L	*µg/L*	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Pb	**0,5**	1	82	1,28	0,72	56,2	27,8
		5	107	4,90	0,64	13,1	2,07
		10	106	9,88	0,36	3,66	-1,17
		50	128	50,14	1,81	3,60	0,27
	STD cert	15 ± 0,6	39	14,96	0,58	3,87	-7,23
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Ni	**0,5**	1	82	1,00	0,16	15,6	0,02
		5	107	4,95	0,33	6,76	-0,99
		10	106	10,01	0,52	5,21	0,08
		50	128	50,38	2,20	4,36	0,75
	STD cert	58 ± 3	39	54,99	3,18	5,78	-18,3
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cd	**0,2**	1	82	1,01	0,06	6,21	0,78
		5	107	4,94	0,21	4,29	-1,15
		10	106	9,95	0,19	1,93	-0,52
		50	128	50,27	1,24	2,48	0,53
	STD cert	6,5 ± 0,4	39	6,05	0,25	4,14	-8,88
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
As	**0,8**	1	82	1,00	0,07	6,82	0,16
		5	107	4,96	0,28	5,62	-0,82
		10	106	10,03	0,46	4,57	0,29
		50	128	50,48	2,13	4,22	0,95
	STD cert	56 ± 0,7	39	54,14	1,94	3,58	-2,70
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Sb	**0,5**	1	82	0,94	0,08	8,63	-6,37
		5	107	4,75	0,57	12,09	-4,90
		10	106	9,92	0,15	1,46	-0,76
		50	128	49,88	0,49	0,99	-0,25
	STD cert	54 ± 1	39	53,44	1,88	3,52	-1,04
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cr	**0,5**	1	82	0,98	0,09	8,96	-1,56
		5	107	4,89	0,26	5,30	-2,25
		10	106	9,88	0,45	4,56	-1,20
		50	128	50,07	1,89	3,77	0,14
	STD cert	18,5 ± 0,2	39	17,91	1,02	5,68	-6,68
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Mo	**0,1**	1	82	1,00	0,06	5,68	0,11
		5	107	4,94	0,22	4,46	-1,13
		10	106	9,86	0,99	10,03	-1,42
		50	128	50,34	1,48	2,93	0,69
	STD cert	113 ± 2	39	114,92	4,87	4,24	1,12
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Sn	**0,5**	1	83	0,99	0,06	5,89	-0,84
		5	144	4,83	0,57	11,73	-3,36
		10	54	9,92	0,18	1,77	-0,77
		50	97	50,01	0,45	0,91	0,02
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Fe	**10**	1	82	0,69	2,14	309	-31,1
		5	107	4,05	6,54	162	-19,1
		10	106	9,35	4,10	43,9	-6,54
		50	128	49,72	5,48	11,01	-0,56
	STD cert	91 ± 4	39	71,62	11,74	16,4	-32,6

BG = Bestimmungsgrenze
AM = arithmetrisches Mittel
s = Standardabweichung
n = Anzahl der Kontrollmessungen
SAM = Standardabweichung des Mittelwertes in %
SWA = Sollwertabweichung (des Mittelwertes) in %

A 4

Interne Qualitätskontrolle für die Elementanalyse mit ICP - MS

ETWA Serie 4 (Berlin)

Element	BG	Sollwerte			Ergebnisse der Kontrollmessungen		
	µg/L	*µg/L*	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Pb	**0,5**	1	183	1,13	0,42	37,43	12,83
		5	168	5,14	0,64	12,47	2,80
		10	87	10,84	0,50	4,60	8,45
		50	241	50,07	1,33	2,65	0,14
	STD cert	15 ± 0,6	63	14,63	0,72	4,95	-7,29
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Ni	**0,5**	1	183	1,10	0,57	52,03	9,75
		5	168	4,99	0,36	7,19	-0,25
		10	87	10,85	0,60	5,51	8,49
		50	241	50,26	3,03	6,03	0,52
	STD cert	58 ± 3	63	58,34	3,36	5,76	8,04
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cd	**0,2**	1	183	1,03	0,06	5,83	2,70
		5	168	5,01	0,19	3,84	0,20
		10	177	9,95	0,32	3,23	-0,47
		50	241	50,24	1,53	3,05	0,48
	STD cert	6,5 ± 0,4	63	6,31	0,37	5,94	-8,83
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
As	**0,8**	1	183	0,99	0,22	22,08	-0,73
		5	168	5,03	0,51	10,20	0,55
		10	177	9,97	0,50	5,06	-0,26
		50	241	50,50	3,06	6,05	1,01
	STD cert	56 ± 0,7	63	56,83	3,11	5,48	5,24
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Sb	**0,5**	1	188	0,96	0,07	7,05	-4,03
		5	256	4,97	0,17	3,39	-0,55
		10	88	9,96	0,22	2,19	-0,39
		50	163	50,37	1,52	3,02	0,73
	STD cert	54 ± 1	63	54,16	2,50	4,62	0,30
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Cr	**0,5**	1	183	0,99	0,11	10,97	-0,96
		5	168	4,96	0,32	6,39	-0,77
		10	87	10,64	0,53	5,03	6,42
		50	128	50,31	2,62	5,21	0,63
	STD cert	18,5 ± 0,2	39				
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Mo	**0,1**	1	183	1,00	0,06	5,97	0,45
		5	168	5,04	0,27	5,26	0,88
		10	177	9,96	0,38	3,81	-0,38
		50	241	50,64	2,36	4,67	1,27
	STD cert	113 ± 2	63	119,95	6,41	5,34	12,21
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Sn	**0,5**	1	188	0,99	0,08	7,91	-1,44
		5	256	4,97	0,13	2,62	-0,53
		10	88	9,94	0,19	1,93	-0,64
		50	97	50,16	1,02	2,04	0,31
		µg/L	*n*	*AM (µg/L)*	*s (µg/L)*	*SAM (%)*	*SWA (%)*
Fe	**10**	1	183	0,86	3,29	384	14,2
		5	168	4,76	2,54	53,43	-4,79
		10	87	10,96	1,61	14,70	9,56
		50	241	51,49	9,98	19,38	2,97
	STD cert	91 ± 4	63	81,91	18,54	22,63	51,69

BG = Bestimmungsgrenze
AM = arithmetrisches Mittel
s = Standardabweichung
n = Anzahl der Kontrollmessungen
SAM = Standardabweichung des Mittelwertes in %
SWA = Sollwertabweichung (des Mittelwertes) in %

A 4

Interne Qualitätskontrolle für die Elementanalyse mit ICP - MS
ETWA Serie 5 (Würzburg)

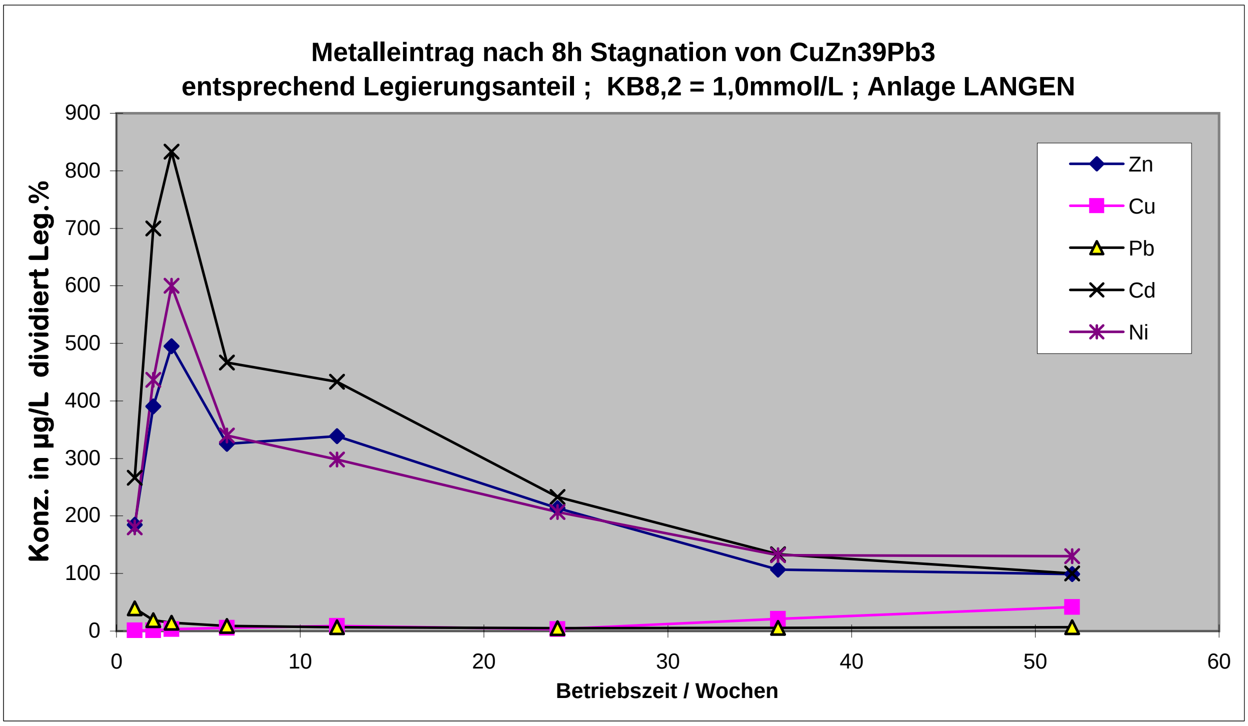
Element	BG	Sollwerte	Ergebnisse der Kontrollmessungen				
	µg/L	***µg/L***	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Pb	**0,5**	1	179	0,94	0,32	33,82	-5,98
		5	172	4,94	0,37	7,45	-1,21
		10	174	10,10	2,73	26,98	1,02
		50	251	50,05	1,14	2,27	0,10
		100	8	99,45	2,78	2,80	-0,55
	STD cert	15 ± 0,6	80	14,83	0,55	3,69	-7,25
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Ni	**0,5**	1	179	1,00	0,21	20,42	0,41
		5	172	4,92	0,73	14,83	-1,57
		10	80	10,63	0,72	6,81	6,29
		50	251	49,78	4,70	9,44	-0,44
		100	8	99,49	1,49	1,50	-0,51
	STD cert	58 ± 3	80	56,48	3,39	6,01	4,60
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Cd	**0,2**	1	179	1,00	0,05	4,94	-0,01
		5	172	4,98	0,19	3,75	-0,36
		10	174	9,94	0,28	2,78	-0,60
		50	251	49,99	1,89	3,78	-0,03
		100	8	100,25	0,86	0,86	0,25
	STD cert	6,5 ± 0,4	80	6,15	0,25	4,15	-8,86
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
As	**0,8**	1	178	0,96	0,48	50,04	-4,04
		5	172	4,98	0,73	14,60	-0,40
		10	174	9,94	0,73	7,35	-0,60
		50	251	50,62	3,31	6,55	1,24
		100	8	100,17	2,45	2,44	0,17
	STD cert	56 ± 0,7	80	55,27	2,51	4,54	2,35
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Sb	**0,5**	1	192	0,91	0,08	9,00	-8,6
		5	242	4,95	0,20	3,98	-0,99
		10	99	9,97	0,39	3,88	-0,28
		50	172	50,33	1,86	3,70	0,66
	STD cert	54 ± 1	80	54,04	2,20	4,08	0,07
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Cr	**0,5**	1	179	1,00	0,10	9,72	0,31
		5	172	4,93	0,49	9,97	-1,37
		10	80	9,95	0,61	6,09	-0,52
		50	251	50,05	4,10	8,20	0,09
		100	8	101,04	2,77	2,74	1,04
	STD cert	18,5 ± 0,2	80	18,49	1,06	5,75	
		µg/L	***n***	***AM (µg/L)***	***s (µg/L)***	***SAM (%)***	***SWA (%)***
Mo	**0,1**	1	179	1,00	0,06	5,72	-0,38
		5	172	4,98	0,45	8,99	-0,47
		10	174	9,94	0,51	5,10	-0,64
		50	251	50,17	4,04	8,05	0,35
		100	8	101,09	2,43	2,40	1,08
	STD cert	113 ± 2	80	116,79	5,63	4,82	

BG = Bestimmungsgrenze
AM = arithmetrisches Mittel
s = Standardabweichung
n = Anzahl der Kontrollmessungen
SAM = Standardabweichung des Mittelwertes in %
SWA = Sollwertabweichung (des Mittelwertes) in %

Beispiel für die Entwicklung der nachfolgenden Diagramme A 5

Gehalte an Zn,Cu,Pb,Ni, der Legierung D nach 8h Stagnation, KB8,2 = 1,0 mmol/L; Anlage LANGEN

Leg.-Anteil in %	**38,4**	**57,5**	**2,7**	**0,003**	**0,06**
Wochen	**Zn**	**Cu**	**Pb**	**Cd**	**Ni**
1	**185**	**1,0**	**39,3**	**267**	**180**
2	**391**	**1,2**	**18,7**	**700**	**437**
3	**495**	**3,5**	**14,6**	**833**	**600**
6	**326**	**5,6**	**9,1**	**467**	**340**
12	**339**	**8,7**	**6,6**	**433**	**298**
18	**#NV**	**#NV**	**#NV**	**#NV**	**#NV**
24	**214**	**3,1**	**5,2**	**233**	**207**
36	**107**	**20,9**	**5,4**	**133**	**132**
52	**99**	**41,7**	**6,7**	**100**	**130**



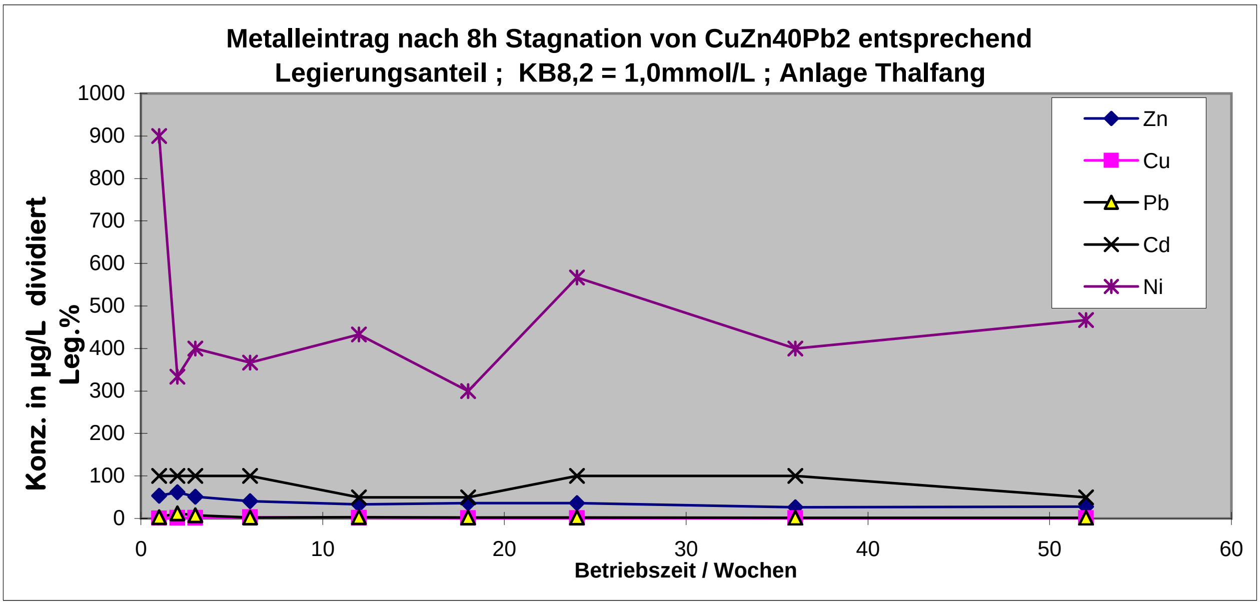
Gehalte an Zn,Cu,Pb,Ni, der Legierung D nach 8h Stagnation, KB8,2 = 1,0 mmol/L; Anlage LANGEN

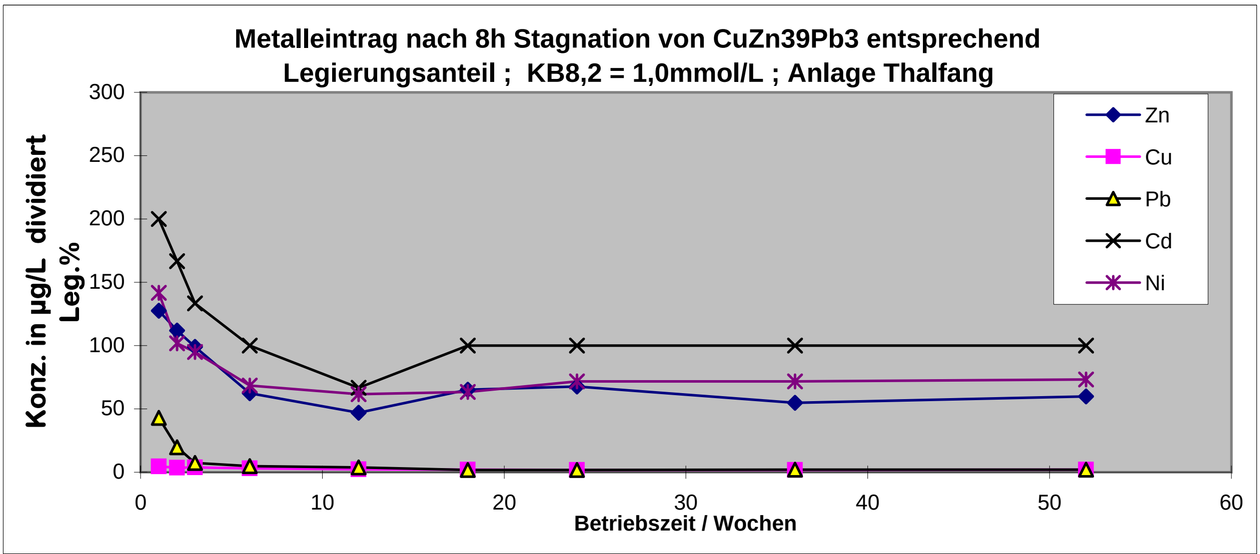
Leg.-Anteil in %		**38,4**		**57,5**		**2,7**		**0,003**		**0,06**
Wochen	Zn in µg/L		Cu in µg/L		Pb in µg/L		Cd in µg/L		Ni in µg/L	
1	7100	**185**	60	**1,0**	107,2	**39,3**	0,8	**267**	10,8	**180**
2	15000	**391**	70	**1,2**	51,1	**18,7**	2,1	**700**	26,2	**437**
3	19000	**495**	200	**3,5**	39,9	**14,6**	2,5	**833**	36	**600**
6	12500	**326**	320	**5,6**	24,8	**9,1**	1,4	**467**	20,4	**340**
12	13000	**339**	500	**8,7**	17,9	**6,6**	1,3	**433**	17,9	**298**
18	#NV	**#NV**	#NV	**#NV**	#NV	**#NV**	#NV	**#NV**	#NV	**#NV**
24	8200	**214**	180	**3,1**	14,3	**5,2**	0,7	**233**	12,4	**207**
36	4100	**107**	1200	**20,9**	14,8	**5,4**	0,4	**133**	7,9	**132**
52	3800	**99**	2400	**41,7**	18,3	**6,7**	0,3	**100**	7,8	**130**

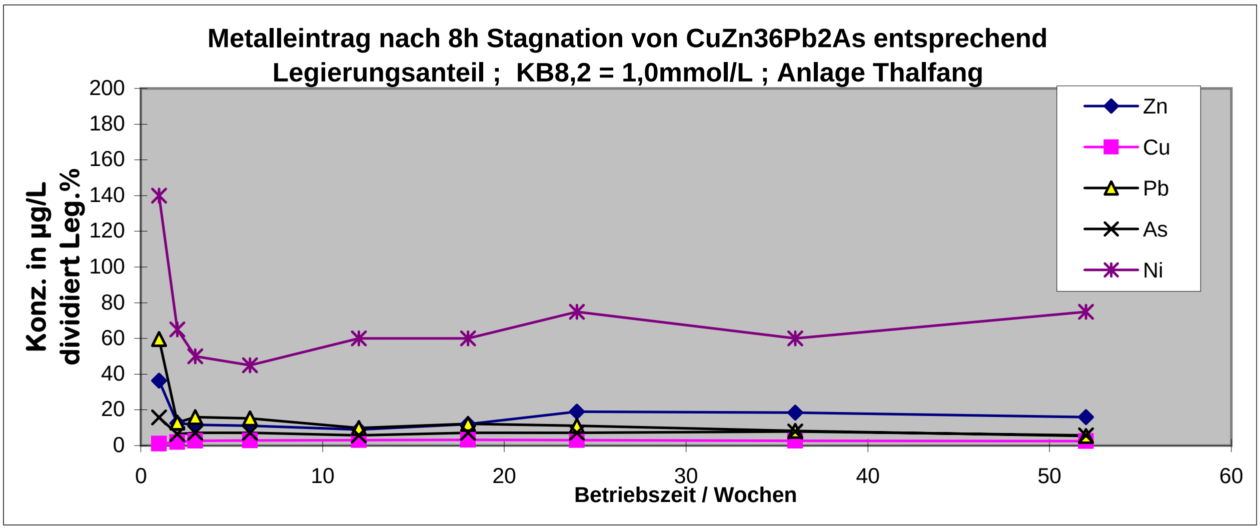
Vorgehensweise : Aus den M(T) - Tabellen im Anhang A 6 wurden die Schwermetallgehalte nach 8h Stagnation entnommen und durch den Legierungsanteil dividiert. Aus den so erhaltenen **fett** gedruckten Werten wurde das jeweilige Diagramm gezeichnet.

A 5

Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
THALFANG

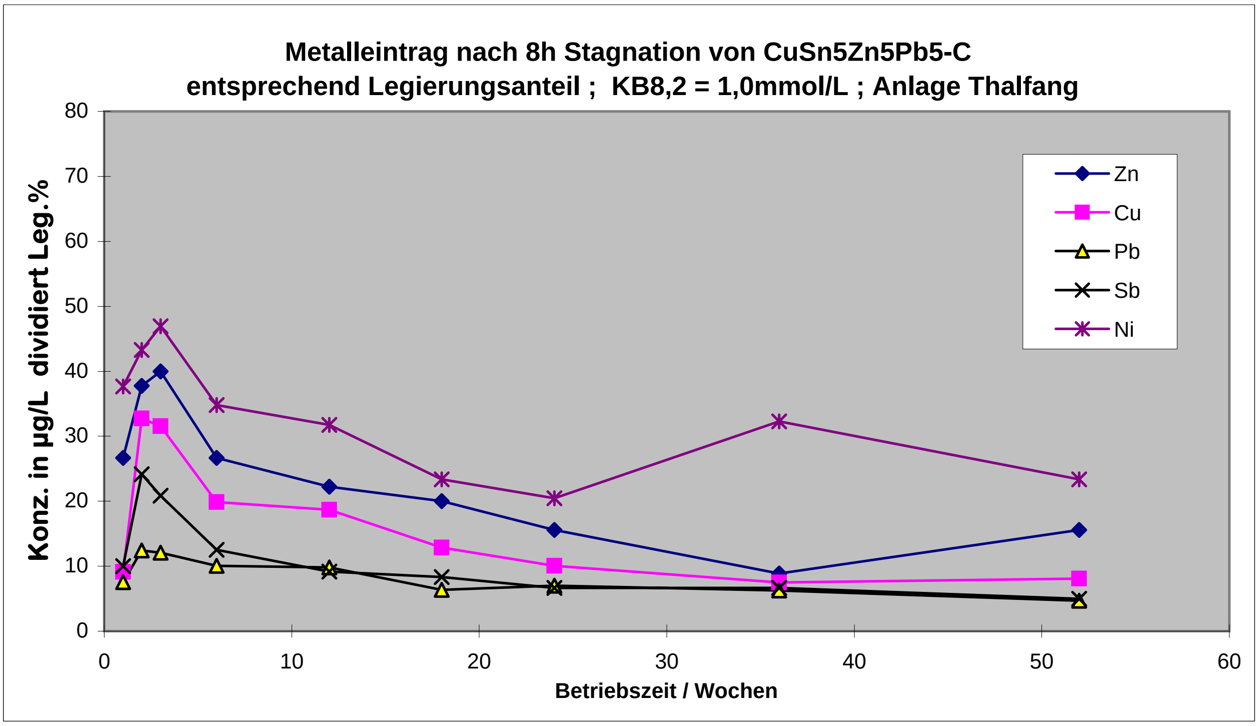


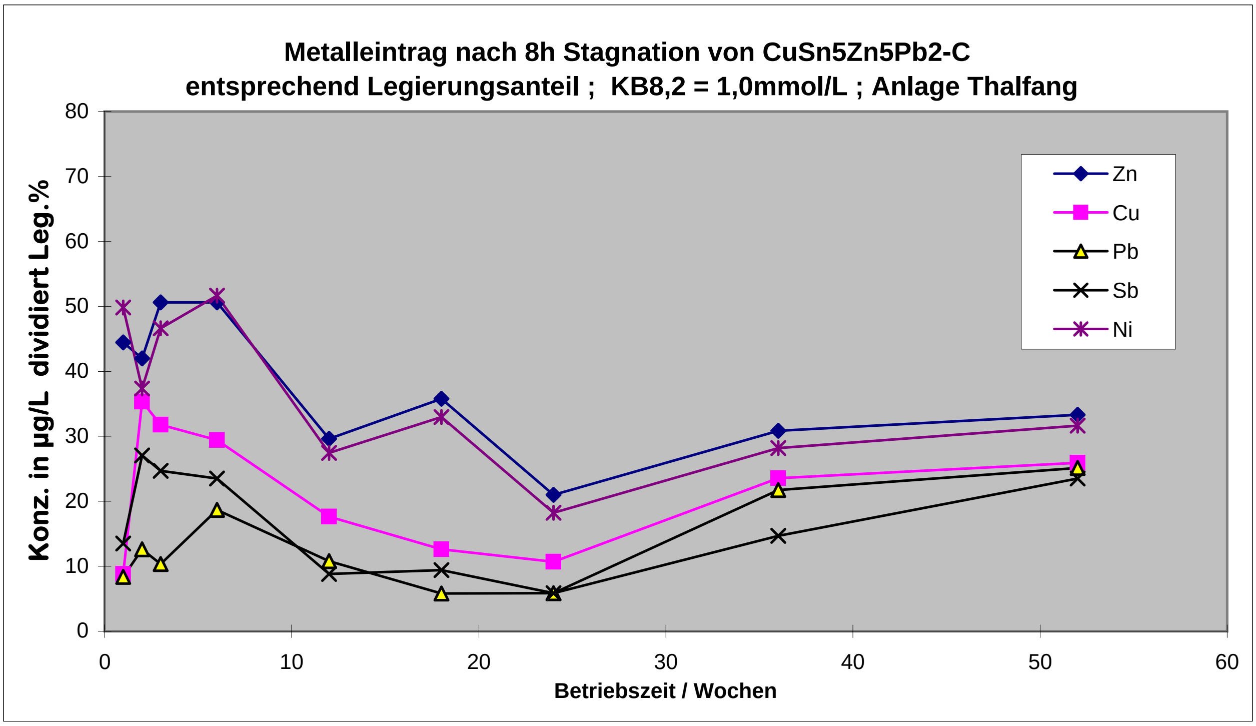




A 5

Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
THALFANG

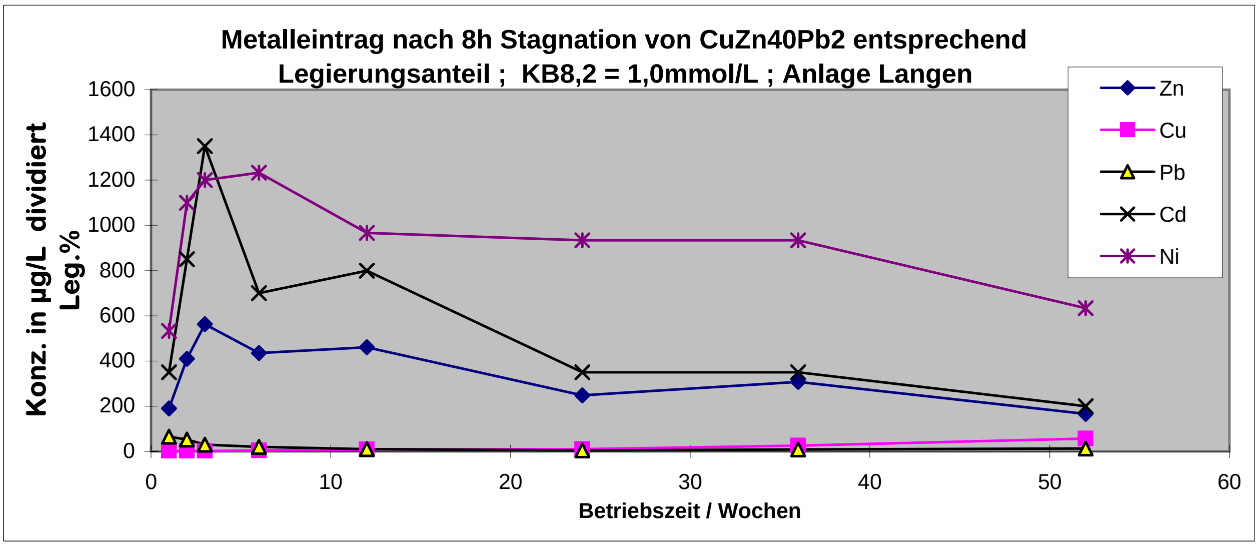


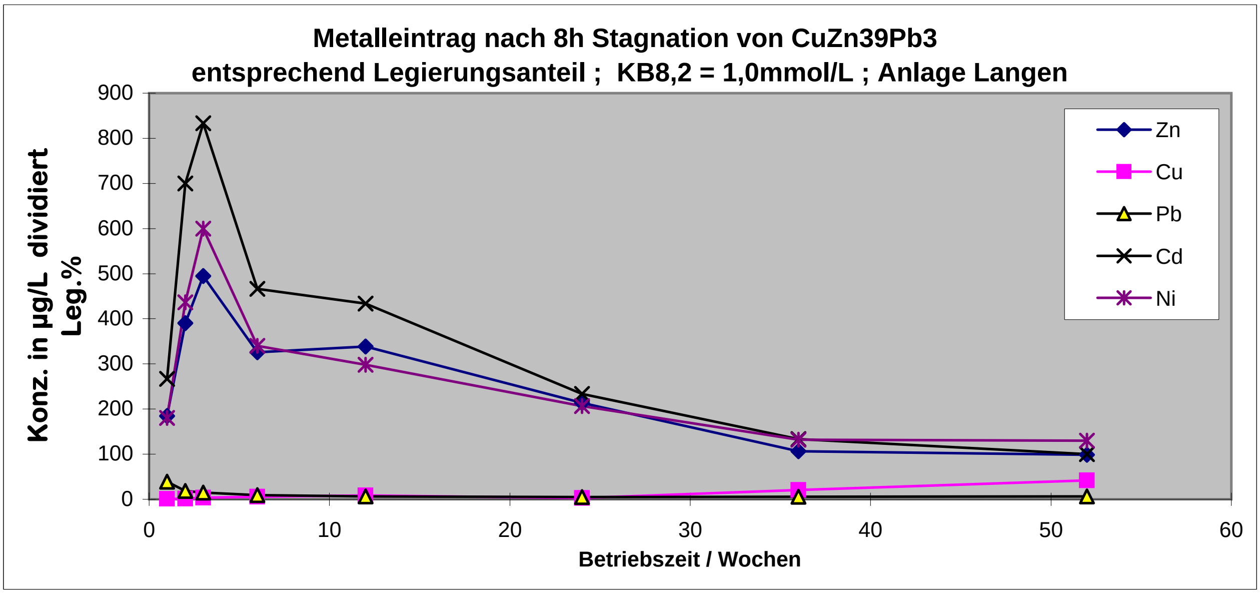


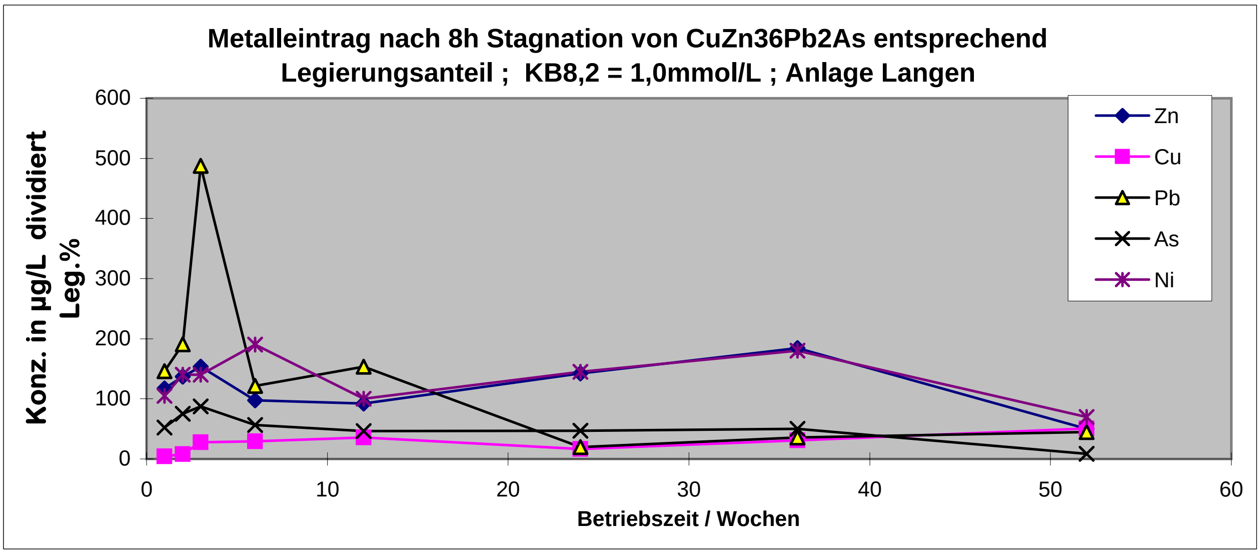
A 5

Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles

LANGEN

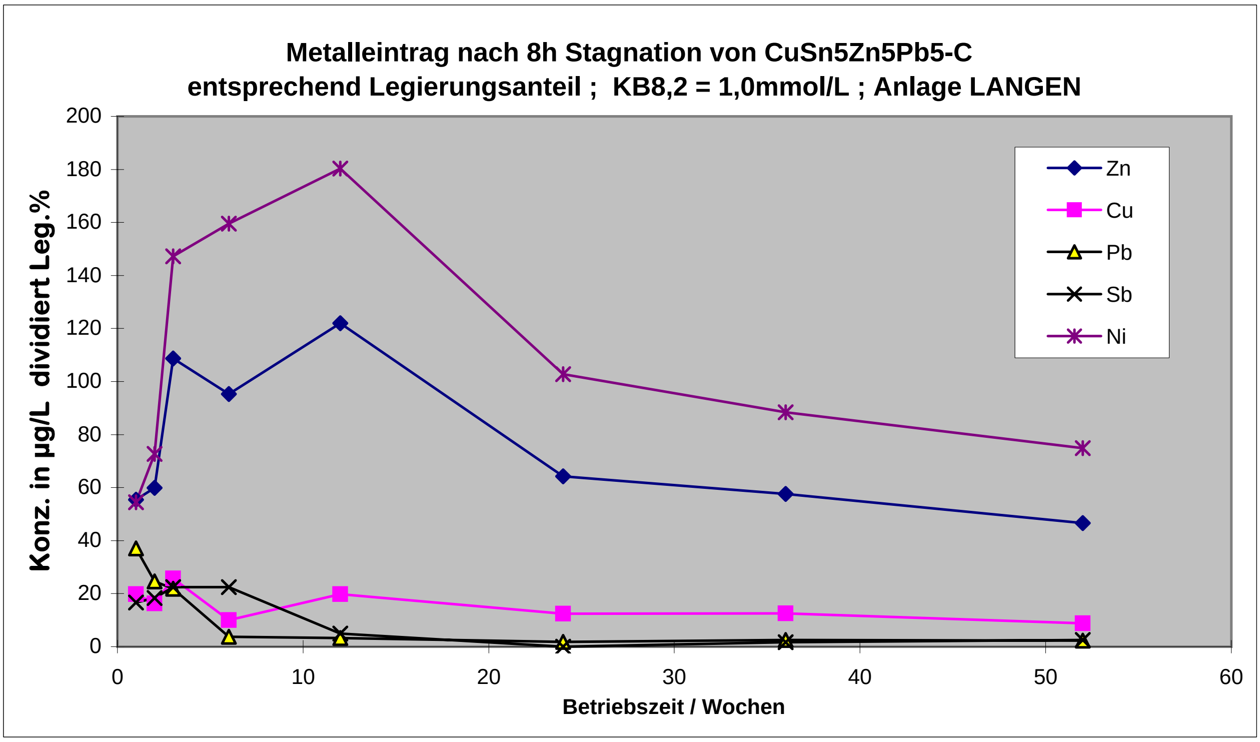


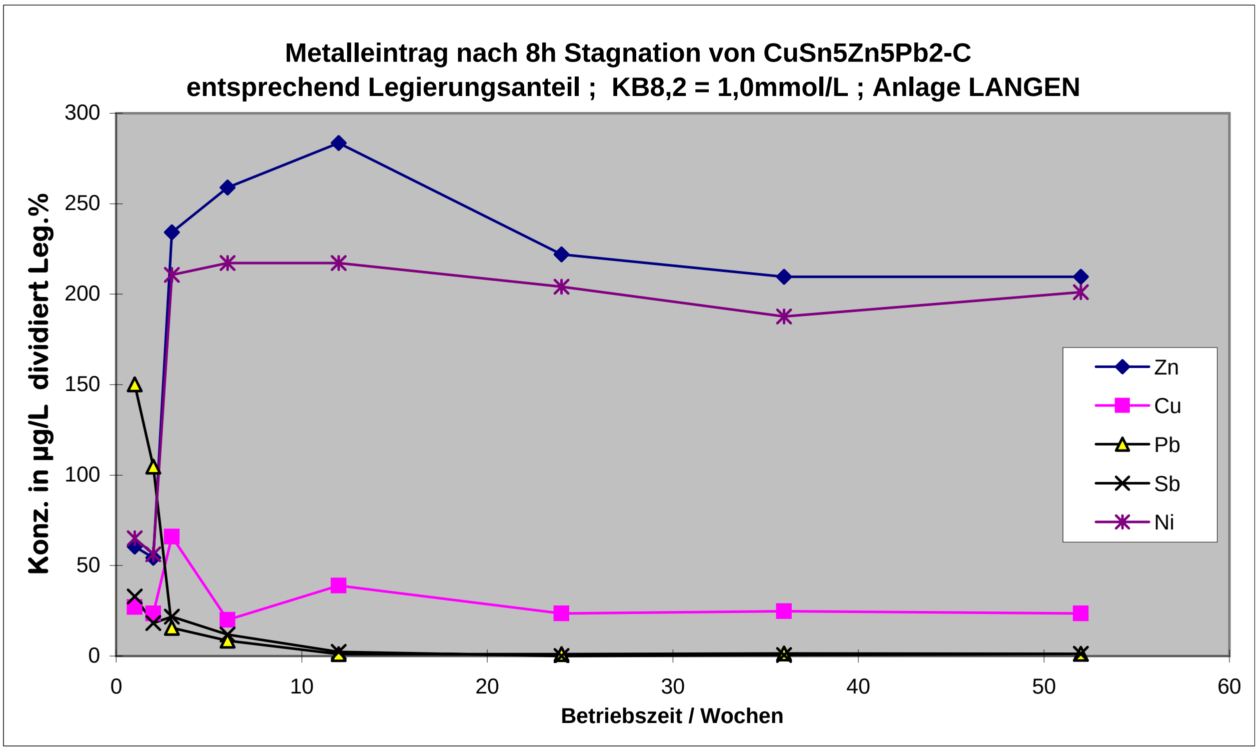




A 5

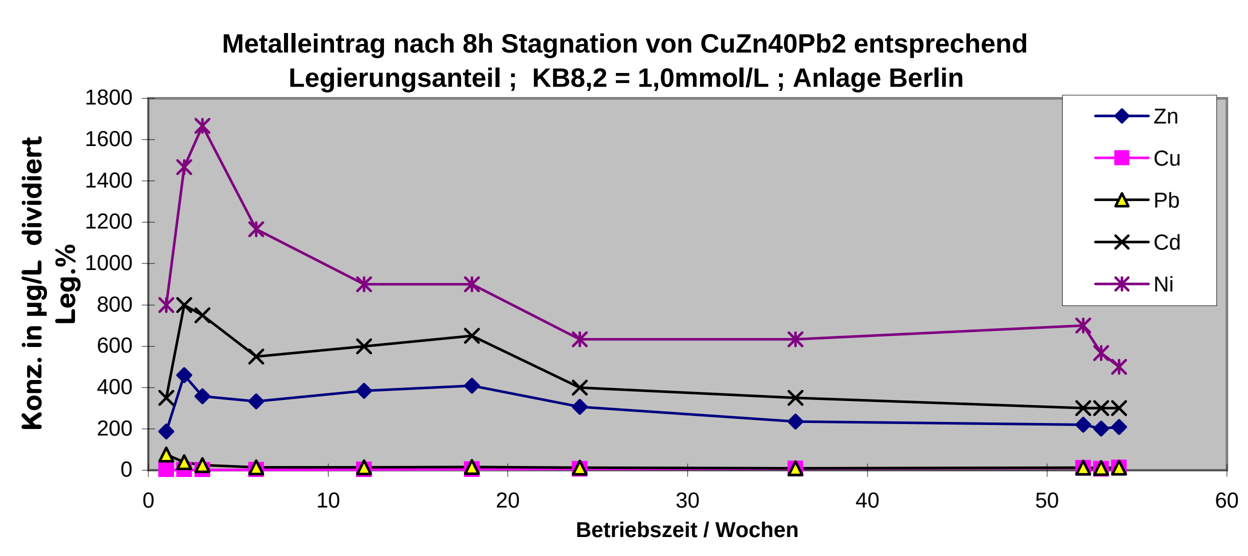
Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
LANGEN

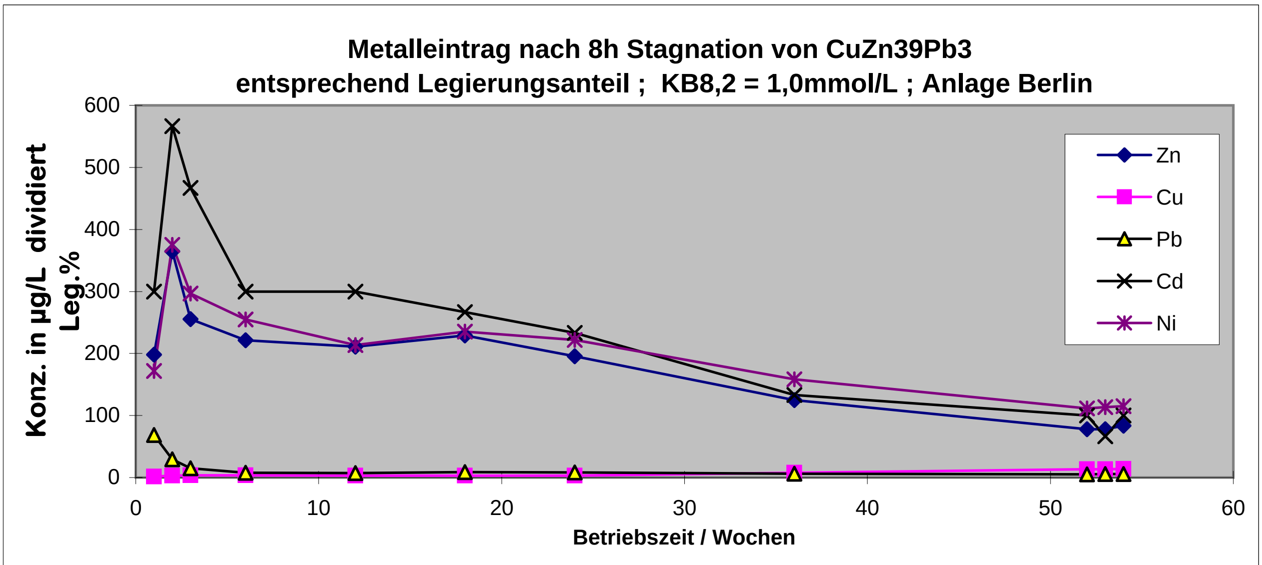


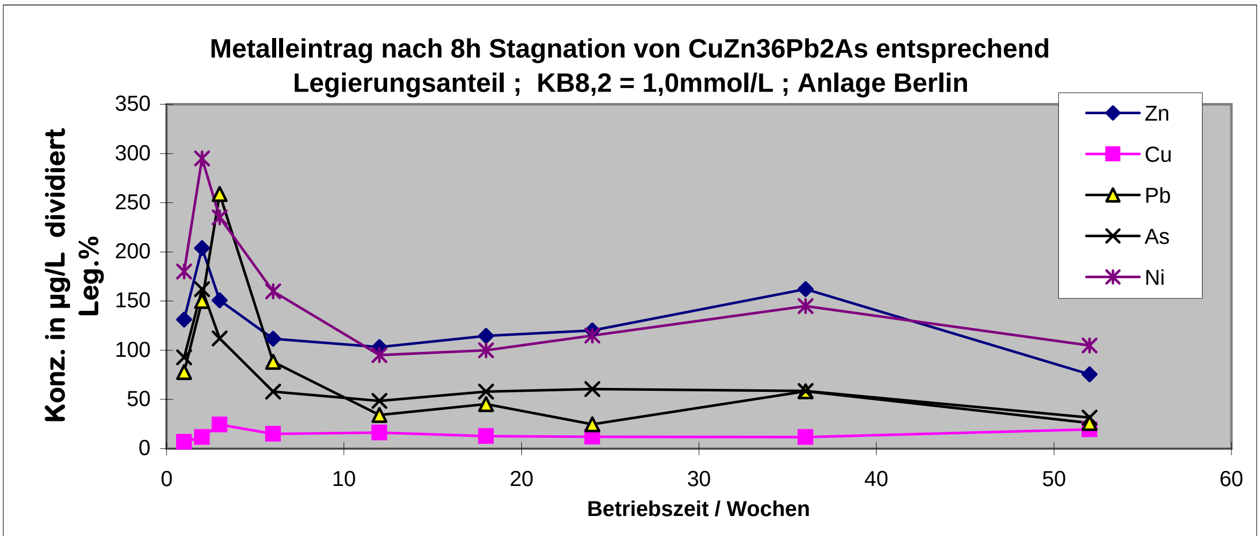


A 5

Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
BERLIN

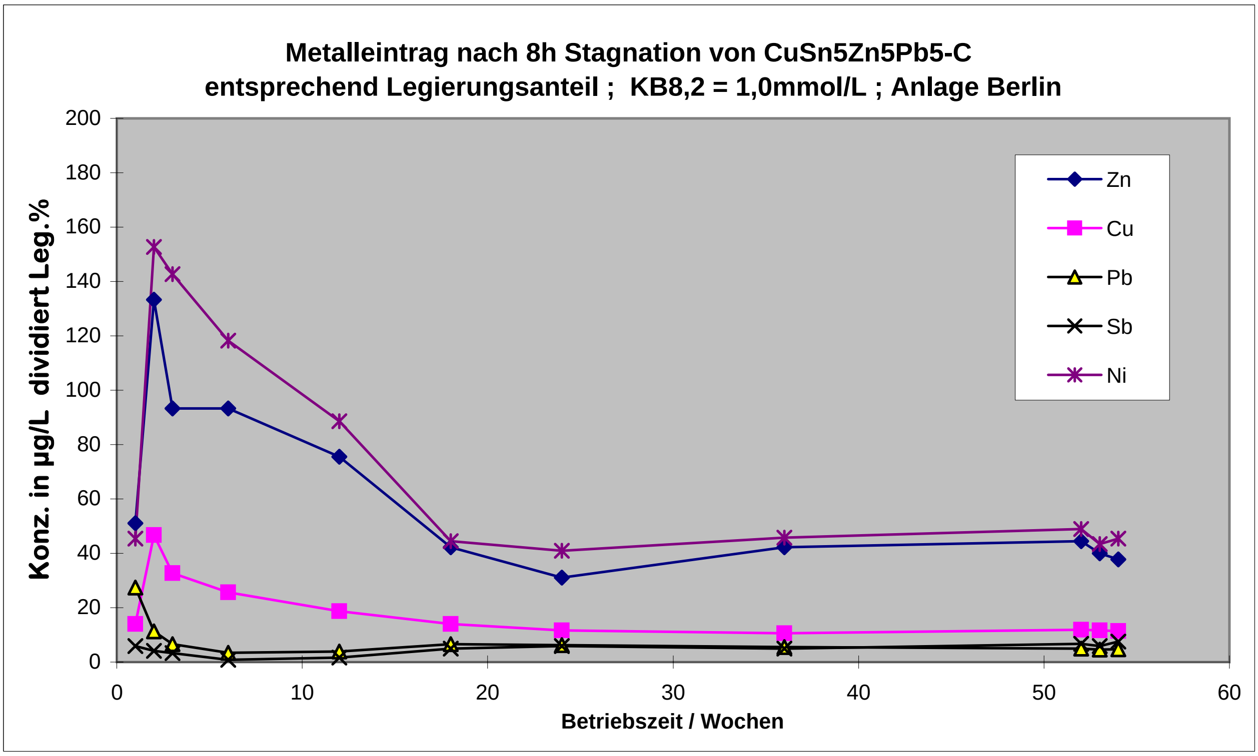


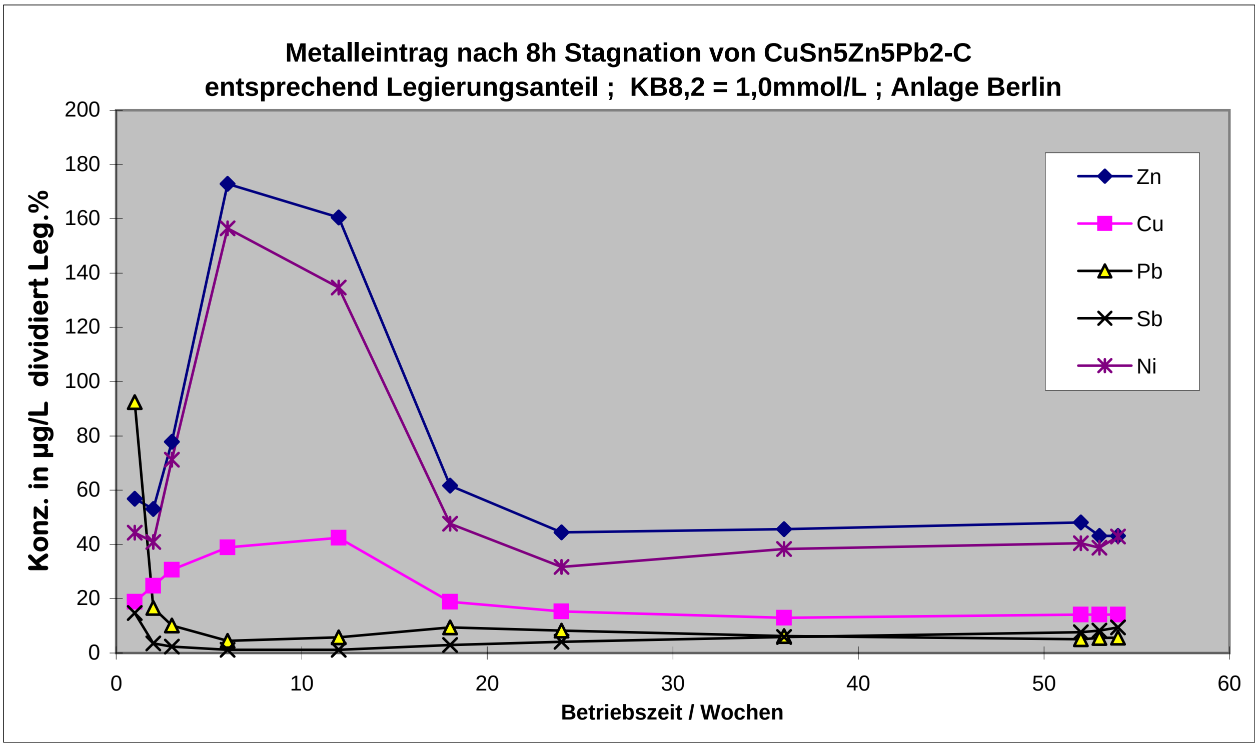




A 5

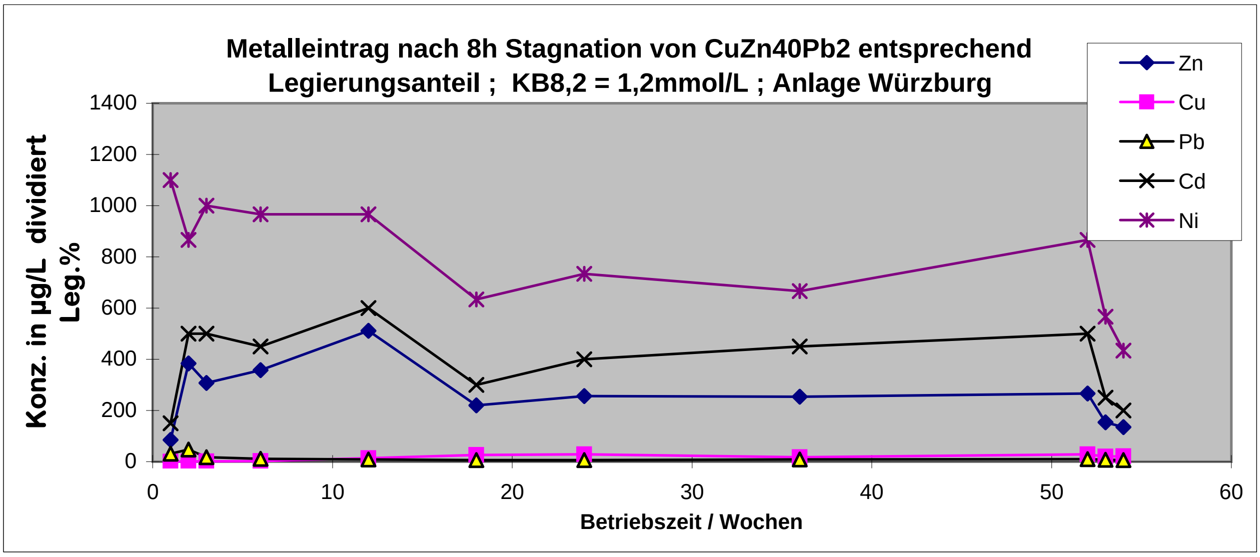
Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
BERLIN

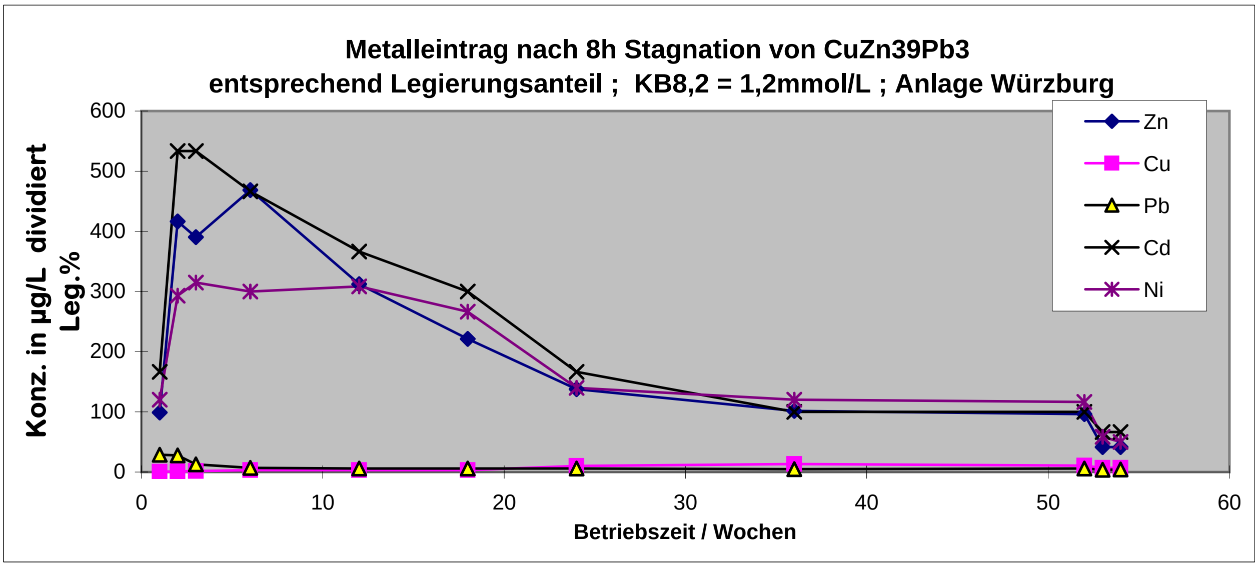


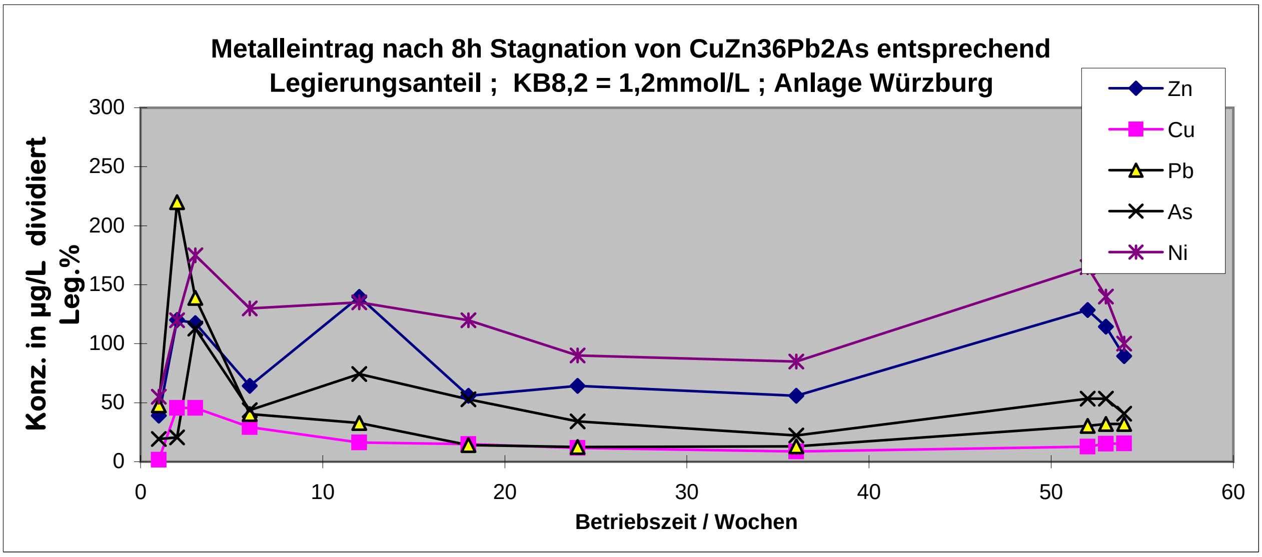


A 5

Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
WÜRZBURG

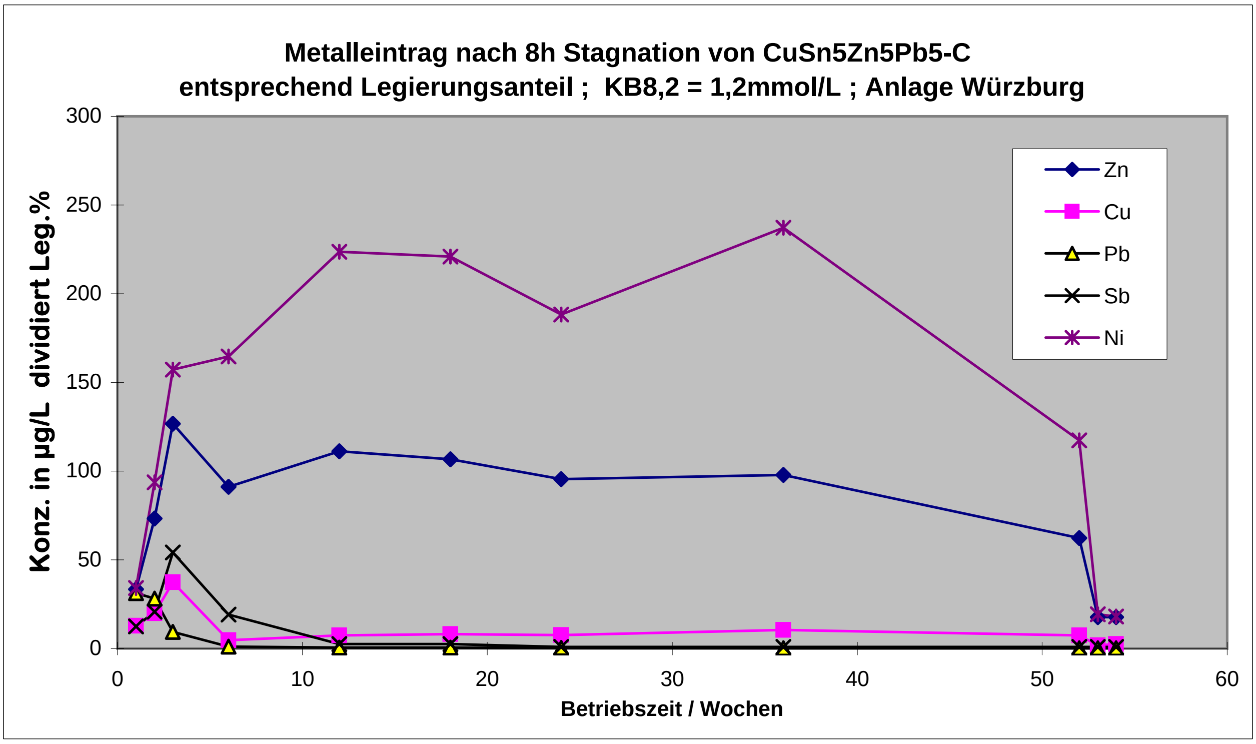


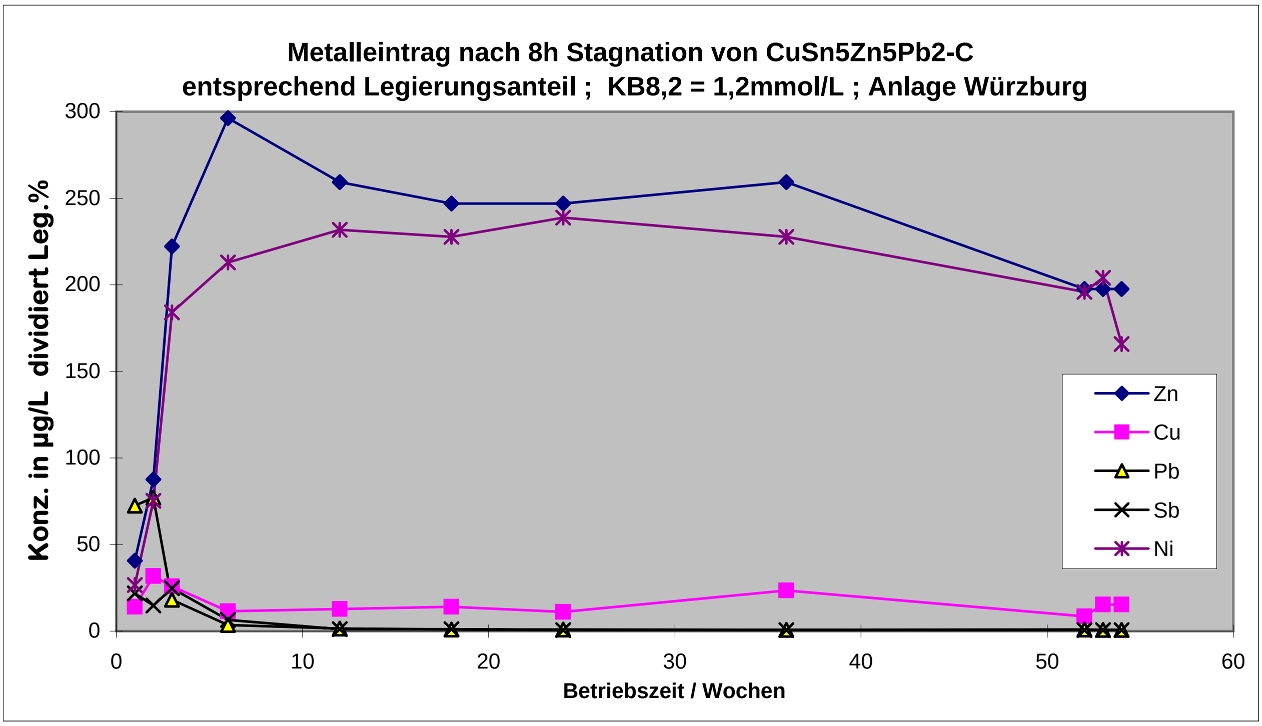




A 5

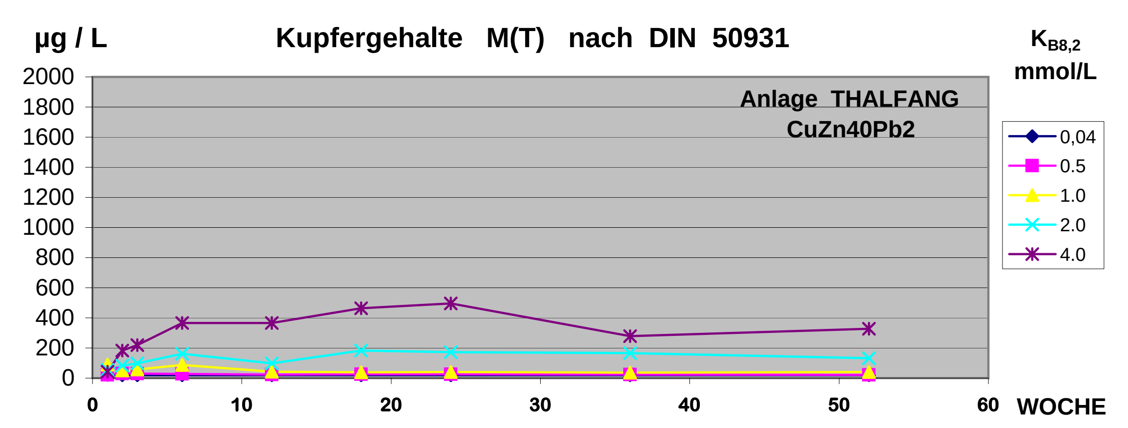
Vergleich der Schwermetallabgabe unter Berücksichtigung des Legierungsanteiles
WÜRZBURG

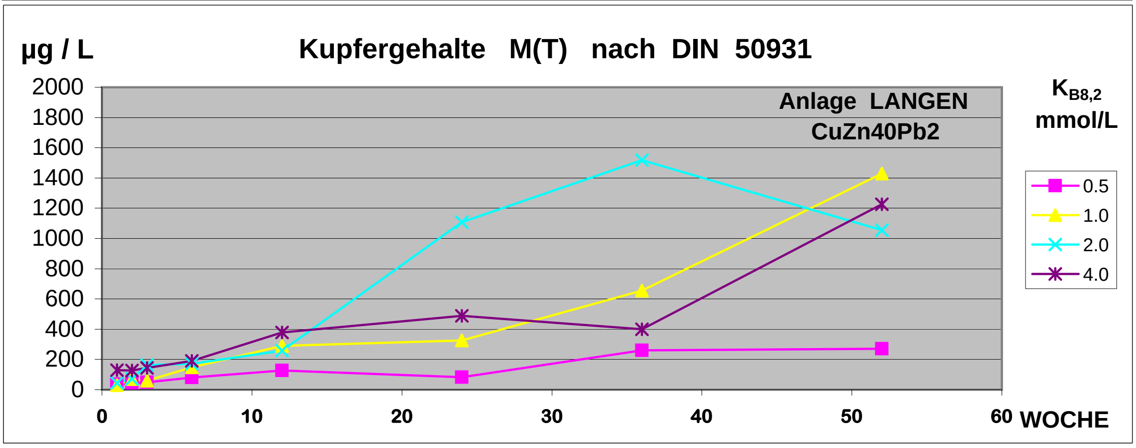


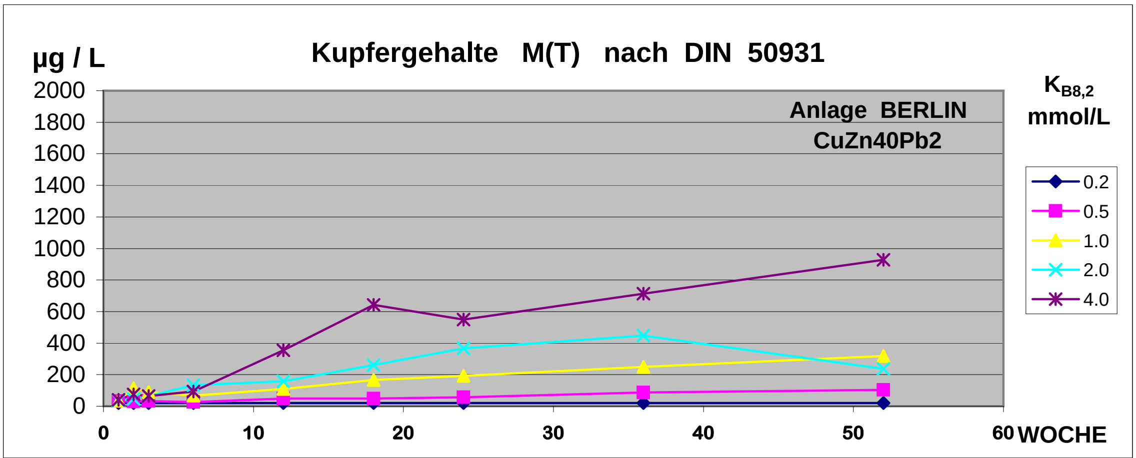


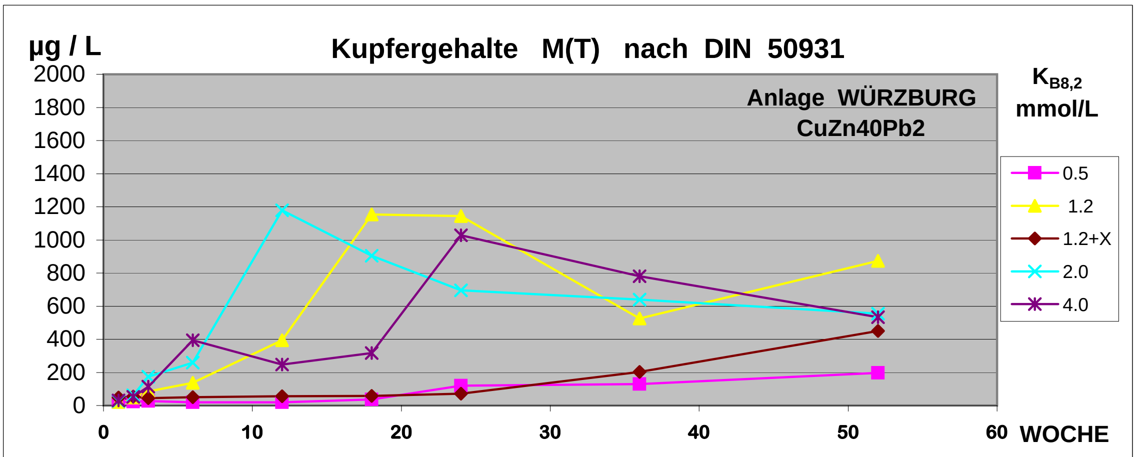
A 6 Cu

Kupfergehalte nach M (T) **Werkstoff : CuZn40Pb2**









A 6 Cu

Legierung C KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	20	20	20	20	20	20	30	20	**21**
1	0.5	20	20	20	20	20	20	20	30	**21**
1	1.0	40	40	50	50	90	130	20	300	**90**
1	2.0	20	20	30	30	40	60	70	180	**56**
1	4.0	20	20	20	20	20	20	200	20	**43**
2	0,04	20	20	20	20	20	20	20	20	**20**
2	0.5	20	20	20	20	20	30	60	50	**30**
2	1.0	20	20	30	30	30	60	100	120	**51**
2	2.0	30	30	40	40	60	90	150	230	**84**
2	4.0	50	50	80	80	140	230	280	550	**183**
3	0,04	20	20	20	20	20	20	20	20	**20**
3	0.5	20	20	20	20	20	40	40	50	**29**
3	1.0	20	20	30	30	40	60	110	150	**58**
3	2.0	40	40	50	50	80	100	170	250	**98**
3	4.0	70	70	110	110	150	240	400	610	**220**
6	0,04	20	20	20	20	20	20	20	20	**20**
6	0.5	20	20	30	30	20	20	30	50	**28**
6	1.0	40	40	50	50	30	90	180	220	**88**
6	2.0	50	50	70	70	90	160	330	470	**161**
6	4.0	100	100	140	140	220	400	780	1050	**366**
12	0,04	20	20	20	20	20	20	20	20	**20**
12	0.5	20	20	20	20	20	20	30	30	**23**
12	1.0	20	20	30	30	30	40	90	80	**43**
12	2.0	40	40	50	50	70	110	180	250	**99**
12	4.0	90	90	150	150	260	480	730	980	**366**
18	0,04	20	20	20	20	20	20	20	20	**20**
18	0.5	20	20	20	20	20	20	40	40	**25**
18	1.0	20	20	20	20	50	30	60	80	**38**
18	2.0	40	40	60	60	100	530	320	320	**184**
18	4.0	120	120	210	210	310		870	1400	**463**
24	0,04	20	20	20	20	20	20	20	20	**20**
24	0.5	20	20	20	20	20	30	30	40	**25**
24	1.0	20	20	30	30	30	40	60	90	**40**
24	2.0	50	50	90	90	110	130	380	480	**173**
24	4.0	150	150	240	240	330	510	1040	1300	**495**
36	0,04	20	20	20	20	20	20	20	20	**20**
36	0.5	20	20	20	20	20	30	40	20	**24**
36	1.0	20	20	20	20	30	40	50	90	**36**
36	2.0	50	50	80	80	120	200	270	470	**165**
36	4.0	90	90	160	160	250	340	540	600	**279**
52	0,04	20	20	20	20	20	20	20	20	**20**
52	0.5	20	20	20	20	20	30	20	20	**21**
52	1.0	20	20	20	20	30	50	60	110	**41**
52	2.0	40	40	70	70	90	150	240	360	**133**
52	4.0	130	130	170	170	360	370	640	650	**328**
	MIN	20	20	20	20	20	20	20	20	
	MAX	150	150	240	240	360	530	1040	1400	
	Mittelwer	39	39	55	55	78	115	196	265	
	50% Perc	20	20	30	30	30	40	60	90	
	90% Perc	90	90	146	146	238	361	600	634	
	95% Perc	116	116	168	168	300	468	770	1036	
THALFANG	**99% Perc**	141	141	227	227	347	521	965	1356	THALFANG

Legierung C KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	30	30	30	30	40	40	60	30	**36**
1	1.0	30	30	20	20	20	30	40	50	**30**
1	2.0	30	30	30	30	40	50	80	60	**44**
1	4.0	60	60	70	70	80	170	270	250	**129**
2	0.5	60	60	30	30	40	50	50	30	**44**
2	1.0	50	50	70	70	70	100	70	70	**69**
2	2.0	50	50	50	50	70	90	120	100	**73**
2	4.0	70	70	70	70	100	170	290	180	**128**
3	0.5	40	40	40	40	70	50	60	50	**49**
3	1.0	70	70	40	40	60	50	110	30	**59**
3	2.0	110	110	130	130	180	220	260	170	**164**
3	4.0	70	70	110	110	130	180	240	240	**144**
6	0.5	60	60	80	80	100	80	120	70	**81**
6	1.0	70	70	130	130	170	210	250	150	**148**
6	2.0	100	100	150	150	190	250	270	160	**171**
6	4.0	100	100	110	110	190	250	380	280	**190**
12	0.5	70	70	110	110	140	160	220	140	**128**
12	1.0	120	120	170	170	280	350	530	580	**290**
12	2.0	140	140	150	150	290	430	370	400	**259**
12	4.0	170	170	280	280	430	440	740	520	**379**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	60	60	70	70	80	120	100	100	**83**
24	1.0	150	150	250	250	390	480	570	360	**325**
24	2.0	340	340	590	590	1200	1300	2300	2200	**1108**
24	4.0	210	210	300	300	510	750	910	710	**488**
36	0.5	100	100	170	170	180	310	410	640	**260**
36	1.0	200	200	360	360	580	840	1500	1200	**655**
36	2.0	390	390	630	630	1200	1800	3100	4000	**1518**
36	4.0	170	170	280	280	420	700	730	450	**400**
52	0.5	130	130	240	240	260	330	540	290	**270**
52	1.0	560	560	710	710	1200	1900	3400	2400	**1430**
52	2.0	300	300	490	490	960	1100	2600	2200	**1055**
52	4.0	360	360	550	550	990	1700	2500	2800	**1226**
	MIN	30	30	20	20	20	30	40	30	
	MAX	560	560	710	710	1200	1900	3400	4000	
	Mittelwert	140	140	203	203	333	459	725	653	
	50% Perc	100	100	130	130	180	235	280	245	
	90% Perc	336	336	544	544	987	1280	2480	2200	
	95% Perc	374	374	608	608	1200	1745	2825	2580	
	99% Perc	507	507	685	685	1200	1869	3307	3628	

Legierung C   KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	20	20	20	20	20	20	30	20	**21**
1	0.5	20	20	20	20	30	50	60		**31**
1	1.0	20	20	20	20	30	70	50	50	**35**
1	2.0	30	30	30	30	30	60	60	20	**36**
1	4.0	20	20	30	30	50	60	70	40	**40**
2	0.2	20	20	20	20	20	20	20	20	**20**
2	0.5	20	20	40	40	40	30	20	40	**31**
2	1.0	70	70	140	140	280	20	100	80	**113**
2	2.0	20	20	30	30	50	70	80	80	**48**
2	4.0	40	40	50	50	90	90	90	150	**75**
3	0.2	20	20	20	20	20	20	20	20	**20**
3	0.5	20	20	40	40	20	20	80	20	**33**
3	1.0	50	50	110	110	30	130	130	100	**89**
3	2.0	40	40	60	60	80	90	80	70	**65**
3	4.0	30	30	60	60	70	80	70	120	**65**
6	0.2	20	20	20	20	20	20	20	20	**20**
6	0.5	20	20	20	20	30	30	40	30	**26**
6	1.0	40	40	50	50	80	90	100	80	**66**
6	2.0	90	90	140	140	170	160	180	100	**134**
6	4.0	60	60	90	90	110	110	110	120	**94**
12	0.2	20	20	20	20	20	20	20	20	**20**
12	0.5	40	40	40	40	50	50	80	50	**49**
12	1.0	70	70	90	90	110	120	210	120	**110**
12	2.0	90	90	130	130	210	240	230	140	**158**
12	4.0	210	210	350	350	450	420	420	420	**354**
18	0.2	20	20	20	20	20	20	20	20	**20**
18	0.5	40	40	40	40	40	50	80	60	**49**
18	1.0	90	90	120	120	140	160	320	290	**166**
18	2.0	130	130	190	190	290	440	450	270	**261**
18	4.0	440	440	580	580	820	720	780	780	**643**
24	0.2	20	20	20	20	20	20	20	20	**20**
24	0.5	30	30	50	50	50	60	90	100	**58**
24	1.0	70	70	110	110	170	250	340	420	**193**
24	2.0	160	160	240	240	380	560	650	550	**368**
24	4.0	280	280	420	420	670	720	800	810	**550**
36	0.2	20	20	20	20	20	20	20	20	**20**
36	0.5	50	50	70	70	80	110	150	110	**86**
36	1.0	110	110	190	190	250	310	490	350	**250**
36	2.0	210	210	390	390	470	520	850	550	**449**
36	4.0	350	350	800	800	770	910	910	820	**714**
52	0.2	20	20	20	20	20	20	20	20	**20**
52	0.5	70	70	90	90	110	130	140	120	**103**
52	1.0	150	150	200	200	320	430	640	460	**319**
52	2.0	130	130	150	150	280	290	420	350	**238**
52	4.0	440	440	770	770	1200	1300	1300	1200	**928**
	MIN	20	20	20	20	20	20	20	20	
	MAX	440	440	800	800	1200	1300	1300	1200	
	Mittelwe	87	87	136	136	183	203	241	210	
	50% Per	40	40	60	60	80	90	90	100	
	90% Per	210	210	374	374	462	544	728	550	
	95% Per	336	336	548	548	750	720	840	806	
BERLIN	**99% Per**	440	440	787	787	1033	1128	1128	1037	BERLIN

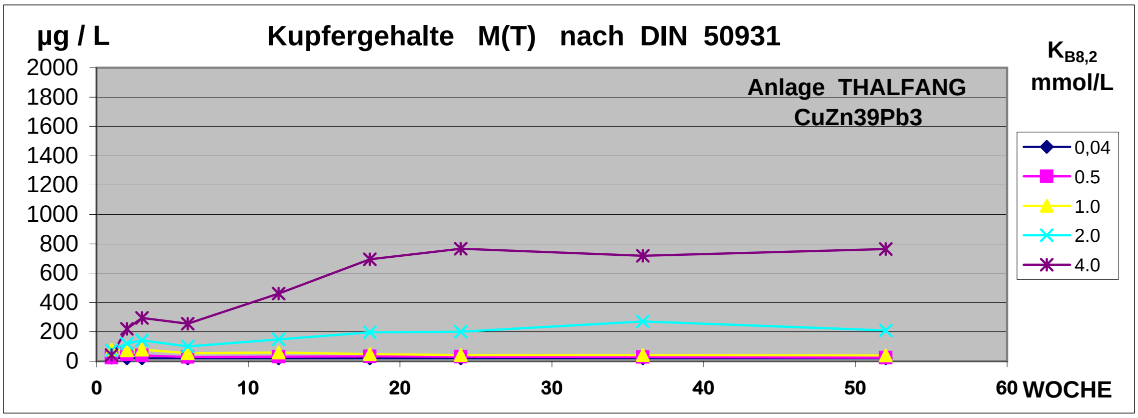
A 6 Cu

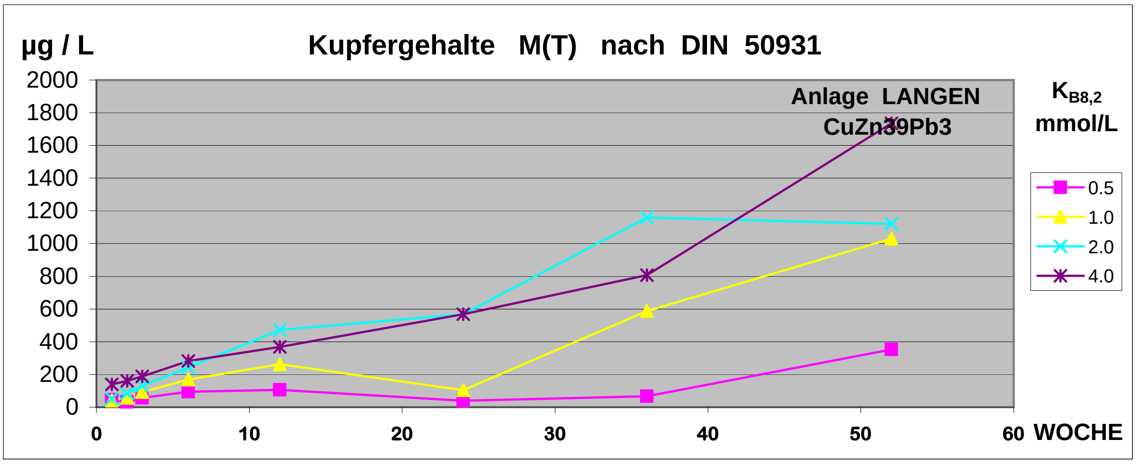
Legierung C   KUPFERKONZENTRATION NACH STAGNATION (µg / L)

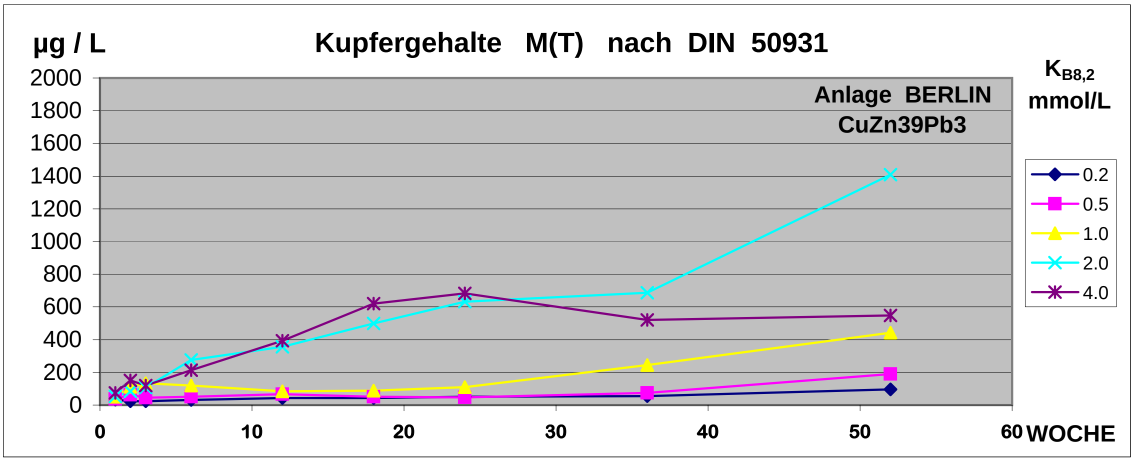
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	20	20	20	20	20	20	20	30	**21**
1	1.2	20	20	20	20	20	20	20	30	**21**
1	1.2+X	30	30	30	30	40	40	80	100	**48**
1	2.0	20	20	20	20	20	20	40	50	**26**
1	4.0	20	20	20	20	30	30	50	60	**31**
2	0.5	20	20	30	30	20	20	20	20	**23**
2	1.2	20	20	70	70	40	50	60	50	**48**
2	1.2+X	30	30	70	70	40	50	70	80	**55**
2	2.0	20	20	100	100	40	60	70	80	**61**
2	4.0	30	30	70	70	40	50	60	70	**53**
3	0.5	30	30	30	30	30	20	20	20	**26**
3	1.2	60	60	100	100	80	110	90	80	**85**
3	1.2+X	30	30	40	40	40	50	70	50	**44**
3	2.0	100	100	220	220	170	240	190	150	**174**
3	4.0	50	50	150	150	110	160	130	110	**114**
6	0.5	20	20	20	20	20	20	20	20	**20**
6	1.2	70	70	190	190	120	160	180	110	**136**
6	1.2+X	30	30	60	60	50	60	60	50	**50**
6	2.0	140	140	290	290	280	370	380	180	**259**
6	4.0	210	210	560	560	370	530	500	220	**395**
12	0.5	20	20	20	20	20	20	20	20	**20**
12	1.2	200	200	230	230	480	520	800	490	**394**
12	1.2+X	40	40	60	60	60	60	70	60	**56**
12	2.0	560	560	1010	1010	590	1800	2200	1700	**1179**
12	4.0	130	130	160	160	370	370	410	250	**248**
18	0.5	20	20	50	50	30	40	50	40	**38**
18	1.2	390	390	1600	1600	750	1200	1600	1700	**1154**
18	1.2+X	40	40	70	70	50	60	60	70	**58**
18	2.0	370	370	550	550	700	1200	1700	1800	**905**
18	4.0	150	150	360	360	310	500	430	270	**316**
24	0.5	50	50	150	150	100	120	170	170	**120**
24	1.2	290	290	1700	1700	730	1040	1700	1700	**1144**
24	1.2+X	40	40	90	90	60	70	90	90	**71**
24	2.0	190	190	320	320	480	970	1500	1600	**696**
24	4.0	230	230	780	780	610	1300	1900	2400	**1029**
36	0.5	70	70	90	90	130	200	180	210	**130**
36	1.2	200	200	280	280	460	690	1020	1080	**526**
36	1.2+X	90	90	110	110	170	240	370	440	**203**
36	2.0	190	190	280	280	450	730	1200	1800	**640**
36	4.0	240	240	310	310	660	890	1700	1900	**781**
52	0.5	100	100	130	130	190	280	370	280	**198**
52	1.2	330	330	580	580	770	1200	1700	1500	**874**
52	1.2+X	150	150	250	250	340	550	880	1030	**450**
52	2.0	170	170	280	280	380	740	1010	1400	**554**
52	4.0	140	140	240	240	330	630	1050	1500	**534**
	Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !									
	MIN	20	20	20	20	20	20	20	20	
	MAX	560	560	1700	1700	770	1800	2200	2400	
	Mittelwe	119	119	262	262	240	389	540	557	
	50% Per	70	70	130	130	120	160	180	150	
	90% Per	270	270	572	572	640	1136	1700	1700	
	95% Per	362	362	964	964	724	1200	1700	1800	
WÜRZBURG	**99% Per**	485	485	1656	1656	761	1580	2068	2180	WÜRZBURG

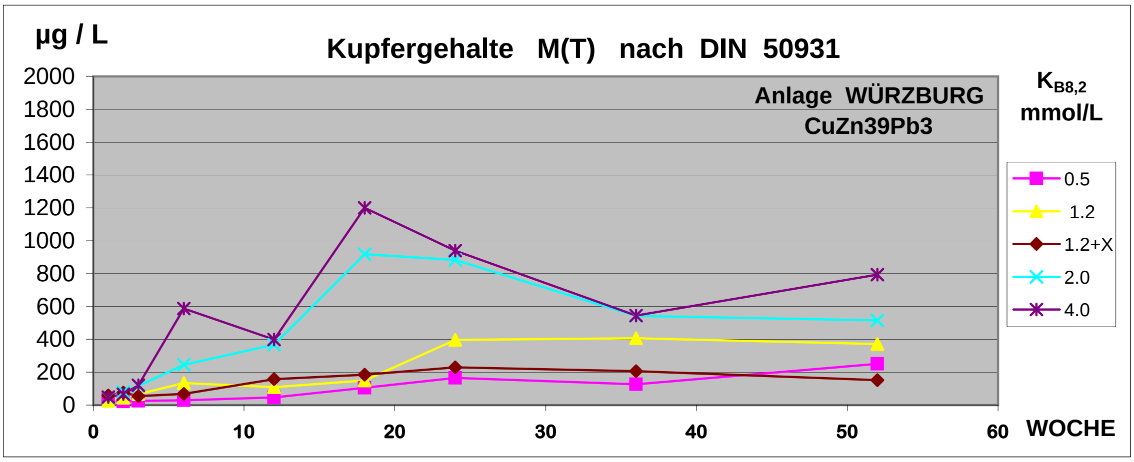
A 6 Cu

Kupfergehalte nach M (T) **Werkstoff : CuZn39Pb3**









Legierung D **KUPFERKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	20	20	20	20	20	20	50	20	**24**
1	0.5	20	20	20	20	20	20	20	50	**24**
1	1.0	20	20	50	50	90	120	20	260	**79**
1	2.0	20	20	40	40	50	80	100	240	**74**
1	4.0	20	20	20	20	20	20	160	60	**43**
2	0,04	20	20	20	20	20	20	20	20	**20**
2	0.5	20	20	30	30	30	50	100	90	**46**
2	1.0	20	20	40	40	50	90	140	200	**75**
2	2.0	30	30	60	60	90	140	190	360	**120**
2	4.0	70	70	110	110	160	270	380	590	**220**
3	0,04	20	20	20	20	20	20	20	20	**20**
3	0.5	20	20	20	20	40	60	60	80	**40**
3	1.0	20	20	40	40	50	80	160	220	**79**
3	2.0	40	40	70	70	100	150	260	410	**143**
3	4.0	70	70	120	120	430	290	500	760	**295**
6	0,04	20	20	20	20	20	20	20	20	**20**
6	0.5	20	20	20	20	20	20	50	50	**28**
6	1.0	20	20	30	30	30	50	80	170	**54**
6	2.0	30	30	40	40	60	110	220	280	**101**
6	4.0	70	70	110	110	150	300	500	730	**255**
12	0,04	20	20	20	20	20	20	20	20	**20**
12	0.5	20	20	20	20	30	30	50	60	**31**
12	1.0	20	20	40	40	40	60	120	130	**59**
12	2.0	50	50	60	60	90	150	290	440	**149**
12	4.0	120	120	180	180	320	490	980	1300	**461**
18	0,04	20	20	20	20	20	20	20	20	**20**
18	0.5	20	20	20	20	20	30	60	70	**33**
18	1.0	20	20	20	20	60		90	110	**49**
18	2.0	60	60	80	80	130	220	450	500	**198**
18	4.0	160	160	280	280	420	750	1400	2100	**694**
24	0,04	20	20	20	20	20	20	20	20	**20**
24	0.5	20	20	30	30	20	30	40	50	**30**
24	1.0	20	20	20	20	30	50	70	100	**41**
24	2.0	60	60	90	90	120	150	440	590	**200**
24	4.0	210	210	370	370	460	710	1700	2100	**766**
36	0,04	20	20	20	20	20	20	20	20	**20**
36	0.5	20	20	20	20	30	40	50	30	**29**
36	1.0	20	20	30	30	30	50	60	100	**43**
36	2.0	70	70	120	120	190	310	460	830	**271**
36	4.0	200	200	380	380	630	860	1400	1700	**719**
52	0,04	20	20	20	20	20	20	20	20	**20**
52	0.5	20	20	20	20	20	30	30	40	**25**
52	1.0	20	20	20	20	20	50	60	110	**40**
52	2.0	40	40	90	90	140	230	400	650	**210**
52	4.0	250	250	360	360	580	910	1700	1700	**764**
	MIN	20	20	20	20	20	20	20	20	
	MAX	250	250	380	380	630	910	1700	2100	
	Mittelwe	47	47	72	72	110	163	289	388	
	50% Per	20	20	30	30	40	55	90	110	
	90% Per	100	100	156	156	380	436	788	1112	
	95% Per	192	192	344	344	454	744	1400	1700	
THALFANG	**99% Per**	232	232	376	376	608	889	1700	2100	THALFANG

Legierung D KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	30	30	40	40	40	50	100	30	**45**
1	1.0	30	30	30	30	40	40	60	70	**41**
1	2.0	40	40	30	30	40	60	100	80	**53**
1	4.0	60	60	80	80	110	180	290	260	**140**
2	0.5	30	30	30	30	30	40	40	20	**31**
2	1.0	40	40	50	50	80	70	70	60	**58**
2	2.0	50	50	50	50	80	110	150	130	**84**
2	4.0	90	90	100	100	130	210	320	250	**161**
3	0.5	40	40	40	40	90	60	80	60	**56**
3	1.0	90	90	70	70	90	80	200	40	**91**
3	2.0	70	70	110	110	140	180	210	160	**131**
3	4.0	90	90	140	140	160	250	310	330	**189**
6	0.5	60	60	80	80	110	100	170	100	**95**
6	1.0	80	80	130	130	180	220	320	210	**169**
6	2.0	130	130	190	190	260	350	450	250	**244**
6	4.0	130	130	140	140	270	360	630	450	**281**
12	0.5	50	50	70	70	100	130	210	170	**106**
12	1.0	100	100	140	140	230	300	500	590	**263**
12	2.0	190	190	260	260	460	670	820	930	**473**
12	4.0	150	150	260	260	400	410	730	580	**368**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	20	20	30	30	30	50	70	70	**40**
24	1.0	50	50	70	70	90	130	180	190	**104**
24	2.0	160	160	270	270	450	630	1200	1400	**568**
24	4.0	210	210	310	310	520	770	1020	1200	**569**
36	0.5	40	40	40	40	50	70	90	160	**66**
36	1.0	160	160	280	280	440	680	1200	1500	**588**
36	2.0	290	290	470	470	850	1400	2400	3100	**1159**
36	4.0	260	260	470	470	690	1200	1600	1500	**806**
52	0.5	130	130	250	250	290	440	680	650	**353**
52	1.0	330	330	450	450	790	1400	2400	2100	**1031**
52	2.0	270	270	440	440	1040	1200	2900	2400	**1120**
52	4.0	470	470	720	720	1400	2400	3500	4200	**1735**
	MIN	20	20	30	30	30	40	40	20	
	MAX	470	470	720	720	1400	2400	3500	4200	
	Mittelwer	123	123	183	183	303	445	719	726	
	50% Perc	90	90	120	120	150	215	315	250	
	90% Perc	269	269	449	449	780	1200	2320	2040	
	95% Perc	308	308	470	470	936	1400	2625	2715	
	99% Perc	427	427	643	643	1288	2090	3314	3859	

Legierung D KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	30	30	30	30	30	40	40	30	**33**
1	0.5	20	20	20	20	40	60	80	40	**38**
1	1.0	30	30	30	30	50	110	80	50	**51**
1	2.0	40	40	40	40	60	90	70	50	**54**
1	4.0	50	50	60	60	80	110	130	60	**75**
2	0.2	20	20	20	20	20	30	30	30	**24**
2	0.5	40	40	60	60	80	60	70	90	**63**
2	1.0	60	60	70	70	190	160	180	110	**113**
2	2.0	40	40	60	60	90	110	150	120	**84**
2	4.0	80	80	130	130	150	180	150	300	**150**
3	0.2	20	20	20	20	20	30	30	30	**24**
3	0.5	30	30	40	40	40	70	50	60	**45**
3	1.0	60	60	110	110	80	200	200	250	**134**
3	2.0	70	70	80	80	120	150	150	140	**108**
3	4.0	50	50	110	110	140	140	180	170	**119**
6	0.2	20	20	20	20	30	40	50	50	**31**
6	0.5	30	30	30	30	50	60	80	90	**50**
6	1.0	60	60	80	80	110	140	210	210	**119**
6	2.0	140	140	200	200	300	350	500	370	**275**
6	4.0	110	110	160	160	230	240	390	300	**213**
12	0.2	40	40	20	20	50	50	60	70	**44**
12	0.5	40	40	50	50	60	80	100	110	**66**
12	1.0	40	40	50	50	70	100	170	160	**85**
12	2.0	140	140	200	200	320	420	730	700	**356**
12	4.0	170	170	270	270	410	390	840	620	**393**
18	0.2	30	30	30	30	40	50	60	70	**43**
18	0.5	30	30	30	30	50	60	90	90	**51**
18	1.0	50	50	50	50	70	90	170	180	**89**
18	2.0	190	190	260	260	390	700	930	1080	**500**
18	4.0	350	350	450	450	390	550	930	1500	**621**
24	0.2	30	30	40	40	50	60	70	90	**51**
24	0.5	20	20	30	30	40	60	80	100	**48**
24	1.0	50	50	70	70	80	120	180	250	**109**
24	2.0	170	170	250	250	500	810	1200	1700	**631**
24	4.0	210	210	320	320	450	760	1300	1900	**684**
36	0.2	30	30	40	40	40	70	90	100	**55**
36	0.5	40	40	50	50	80	100	110	130	**75**
36	1.0	120	120	140	140	190	310	440	490	**244**
36	2.0	230	230	380	380	470	710	1400	1700	**688**
36	4.0	190	190	320	320	350	570	1180	1050	**521**
52	0.2	70	70	70	70	90	110	130	150	**95**
52	0.5	100	100	140	140	170	260	310	300	**190**
52	1.0	190	190	290	290	370	550	780	880	**443**
52	2.0	450	450	670	670	1030	1700	3100	3200	**1409**
52	4.0	230	230	340	340	550	770	990	940	**549**
	MIN	20	20	20	20	20	30	30	30	
	MAX	450	450	670	670	1030	1700	3100	3200	
	Mittelwer	94	94	132	132	183	263	406	447	
	50% Perc	50	50	70	70	80	110	150	150	
	90% Perc	202	202	320	320	434	706	1104	1332	
	95% Perc	230	230	372	372	494	768	1280	1700	
BERLIN	**99% Perc**	406	406	573	573	819	1308	2352	2628	BERLIN

Legierung D **KUPFERKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	70	70	20	20	20	20	20	40	**35**
1	1.2	20	20	30	30	20	20	30	40	**26**
1	1.2+X	50	50	40	40	40	60	80	100	**58**
1	2.0	50	50	20	20	40	50	60	90	**48**
1	4.0	40	40	30	30	40	50	70	90	**49**
2	0.5	20	20	20	20	20	20	30	20	**21**
2	1.2	20	20	60	60	40	50	60	50	**45**
2	1.2+X	30	30	100	100	50	70	110	120	**76**
2	2.0	30	30	130	130	40	80	90	110	**80**
2	4.0	30	30	90	90	40	60	90	100	**66**
3	0.5	30	30	30	30	30	20	20	20	**26**
3	1.2	50	50	70	70	60	80	80	70	**66**
3	1.2+X	30	30	50	50	50	60	80	80	**54**
3	2.0	70	70	130	130	120	170	140	100	**116**
3	4.0	50	50	140	140	120	170	170	130	**121**
6	0.5	20	20	40	40	40	20	30	30	**30**
6	1.2	60	60	190	190	100	140	190	140	**134**
6	1.2+X	40	40	80	80	60	70	80	100	**69**
6	2.0	120	120	220	220	240	380	410	250	**245**
6	4.0	250	250	950	950	470	720	750	360	**588**
12	0.5	40	40	40	40	60	40	60	60	**48**
12	1.2	60	60	60	60	110	140	190	190	**109**
12	1.2+X	220	220	60	60	90	150	210	250	**158**
12	2.0	200	200	210	210	450	430	710	530	**368**
12	4.0	70	70	270	270	580	580	840	510	**399**
18	0.5	40	40	150	150	90	100	130	140	**105**
18	1.2	60	60	200	200	120	150	180	230	**150**
18	1.2+X	80	80	240	240	110	160	240	330	**185**
18	2.0	310	310	1200	1200	510	820	1300	1700	**919**
18	4.0	280	280	1090	1090	970	2000	2500	1400	**1201**
24	0.5	70	70	190	190	130	170	230	270	**165**
24	1.2	110	110	520	520	230	400	570	710	**396**
24	1.2+X	60	60	310	310	130	200	320	440	**229**
24	2.0	190	190	1200	1200	460	830	1500	1500	**884**
24	4.0	240	240	490	490	660	1200	1800	2400	**940**
36	0.5	80	80	100	100	120	240	120	170	**126**
36	1.2	140	140	180	180	310	490	770	1050	**408**
36	1.2+X	80	80	90	90	150	230	380	550	**206**
36	2.0	180	180	250	250	380	610	1000	1500	**544**
36	4.0	330	330	420	420	800	1200	520	340	**545**
52	0.5	140	140	180	180	300	360	440	270	**251**
52	1.2	130	130	230	230	270	440	620	920	**371**
52	1.2+X	70	70	100	100	120	170	240	340	**151**
52	2.0	150	150	270	270	340	640	900	1400	**515**
52	4.0	220	220	370	370	520	950	1800	1900	**794**

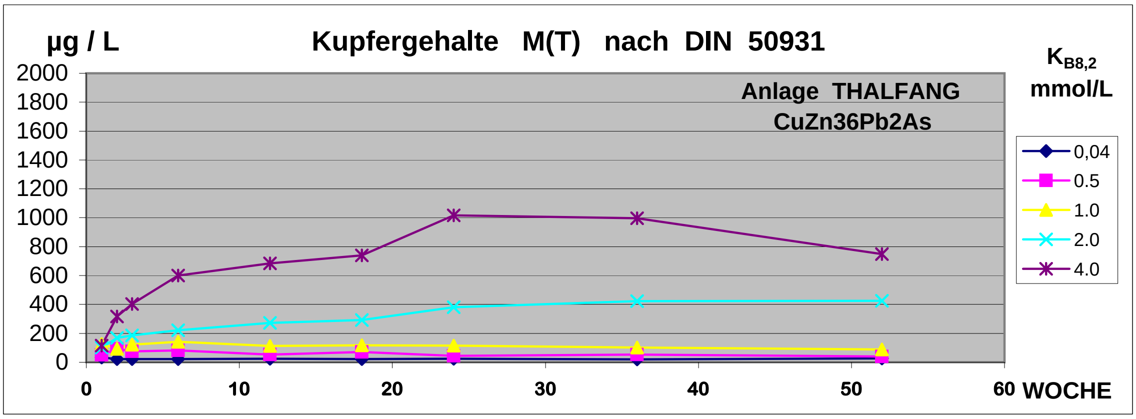
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

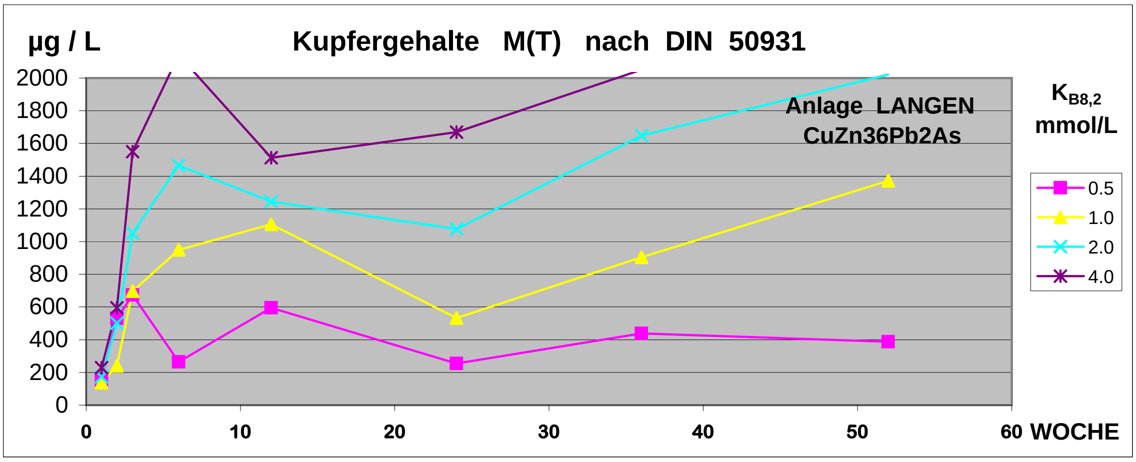
MIN	20	20	20	20	20	20	20	20
MAX	330	330	1200	1200	970	2000	2500	2400
Mittelwer	103	103	241	241	214	334	448	470
50% Perc	70	70	140	140	120	170	190	230
90% Perc	232	232	508	508	516	826	1180	1460
95% Perc	274	274	1062	1062	644	1150	1740	1660
99% Perc	321	321	1200	1200	895	1648	2192	2180

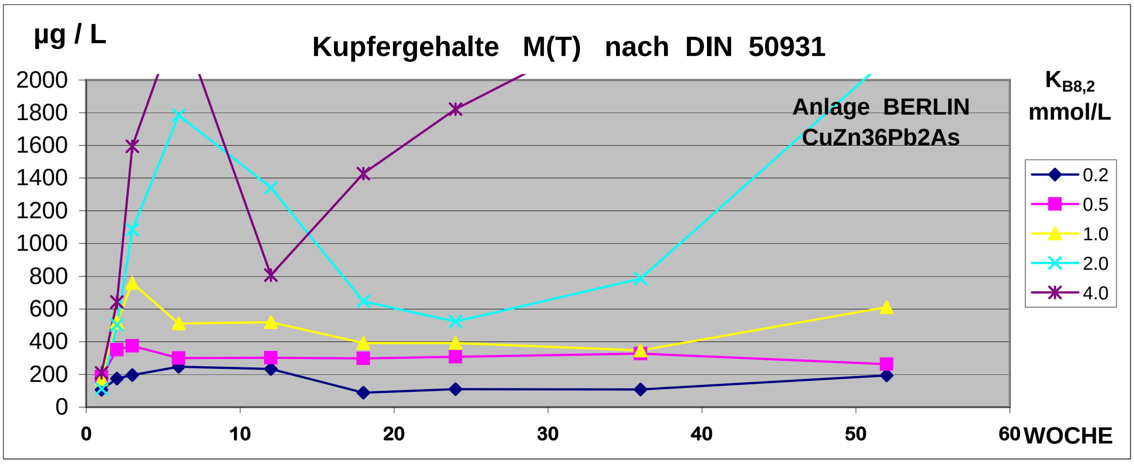
WÜRZBURG

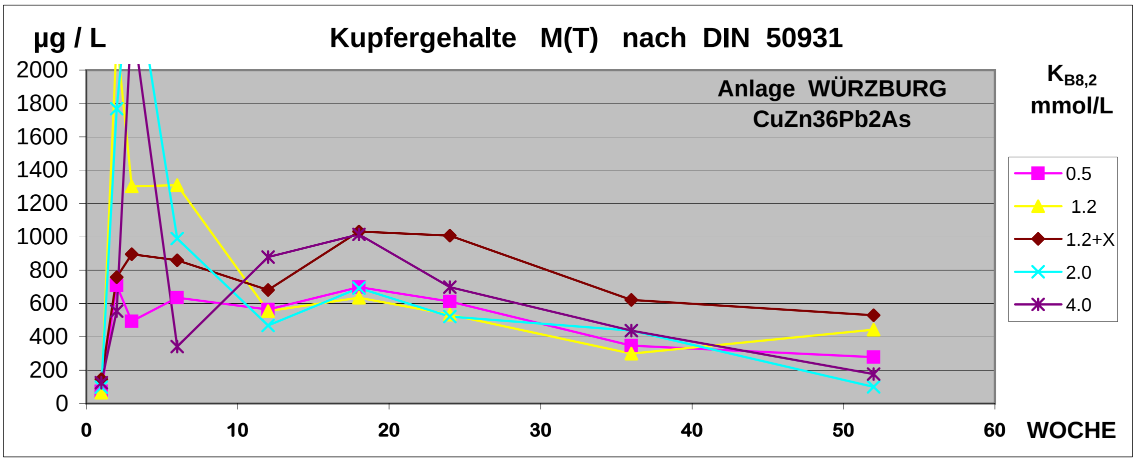
A 6 Cu

Kupfergehalte nach M (T) **Werkstoff : CuZn36Pb2As**









A 6 Cu

Legierung E **KUPFERKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	20	20	20	20	20	30	110	30	**34**
1	0.5	20	20	30	30	40	40	80	150	**51**
1	1.0	50	50	70	70	110	180	70	410	**126**
1	2.0	30	30	40	40	70	100	190	310	**101**
1	4.0	30	30	50	50	80	80	280	320	**115**
2	0,04	20	20	20	20	20	20	30	30	**23**
2	0.5	40	40	40	40	60	100	170	260	**94**
2	1.0	30	30	40	40	50	110	120	320	**93**
2	2.0	50	50	70	70	110	190	230	570	**168**
2	4.0	90	90	140	140	220	390	500	970	**318**
3	0,04	20	20	20	20	20	20	30	30	**23**
3	0.5	30	30	30	30	50	100	130	210	**76**
3	1.0	40	40	60	60	70	130	160	410	**121**
3	2.0	50	50	70	70	120	200	280	640	**185**
3	4.0	110	110	170	170	270	410	790	1200	**404**
6	0,04	20	20	20	20	20	20	20	30	**21**
6	0.5	20	20	40	40	40	70	160	260	**81**
6	1.0	50	50	80	80	70	160	180	460	**141**
6	2.0	60	60	90	90	140	260	250	820	**221**
6	4.0	130	130	200	200	350	590	1300	1900	**600**
12	0,04	20	20	20	20	20	30	30	30	**24**
12	0.5	20	20	20	20	40	60	110	140	**54**
12	1.0	30	30	60	60	70	100	190	370	**114**
12	2.0	60	60	100	100	160	270	560	870	**273**
12	4.0	150	150	250	250	410	660	1500	2100	**684**
18	0,04	20	20	20	20	20	20	20	30	**21**
18	0.5	30	30	30	30	40	60	150	200	**71**
18	1.0	30	30	50	50	120		200	340	**117**
18	2.0	80	80	100	100	180	320	650	830	**293**
18	4.0	190	190	270	270	460	830	1500	2200	**739**
24	0,04	20	20	20	20	20	30	30	40	**25**
24	0.5	20	20	30	30	30	40	70	120	**45**
24	1.0	60	60	50	50	80	110	190	320	**115**
24	2.0	80	80	150	150	210	310	760	1300	**380**
24	4.0	230	230	410	410	640	1020	2000	3200	**1018**
36	0,04	20	20	20	20	20	20	20	20	**20**
36	0.5	30	30	30	30	40	70	110	80	**53**
36	1.0	30	30	60	60	80	110	170	280	**103**
36	2.0	90	90	160	160	270	460	750	1400	**423**
36	4.0	240	240	390	390	690	1030	1900	3100	**998**
52	0,04	20	20	20	20	20	30	40	50	**28**
52	0.5	20	20	30	30	30	50	60	80	**40**
52	1.0	20	20	50	50	50	70	150	300	**89**
52	2.0	80	80	150	150	240	430	770	1500	**425**
52	4.0	170	170	280	280	440	950	1400	2300	**749**
	MIN	20	20	20	20	20	20	20	20	
	MAX	240	240	410	410	690	1030	2000	3200	
	Mittelwer	59	59	90	90	140	234	409	678	
	50% Perc	30	30	50	50	70	105	170	320	
	90% Perc	142	142	230	230	386	639	1360	2020	
	95% Perc	186	186	278	278	456	932	1500	2280	
THALFANG	**99% Perc**	236	236	401	401	668	1026	1956	3156	THALFANG

Legierung E KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	100	100	80	80	120	170	410	170	**154**
1	1.0	50	50	70	70	80	140	270	360	**136**
1	2.0	60	60	80	80	110	180	360	450	**173**
1	4.0	70	70	100	100	160	260	480	590	**229**
2	0.5	220	220	300	300	490	800	1200	710	**530**
2	1.0	120	120	120	120	200	240	490	520	**241**
2	2.0	160	160	180	180	340	460	1030	1500	**501**
2	4.0	210	210	220	220	360	640	1300	1600	**595**
3	0.5	130	130	220	220	550	740	1300	2100	**674**
3	1.0	240	240	280	280	490	740	1700	1600	**696**
3	2.0	220	220	380	380	610	1200	2000	3400	**1051**
3	4.0	320	320	520	520	920	1500	3200	5100	**1550**
6	0.5	100	100	170	170	230	310	540	500	**265**
6	1.0	200	200	400	400	640	1050	1800	2900	**949**
6	2.0	260	260	470	470	760	1400	2600	5500	**1465**
6	4.0	500	500	810	810	1900	2300	4800	5500	**2140**
12	0.5	180	180	280	280	470	670	1200	1500	**595**
12	1.0	270	270	430	430	840	1100	2200	3300	**1105**
12	2.0	340	340	520	520	1040	1700	1800	3700	**1245**
12	4.0	380	380	770	770	1400	1600	3300	3500	**1513**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	120	120	150	150	240	330	410	520	**255**
24	1.0	210	210	330	330	420	720	1000	1040	**533**
24	2.0	270	270	470	470	730	1300	2200	2900	**1076**
24	4.0	430	430	700	700	1300	2200	3200	4400	**1670**
36	0.5	140	140	230	230	260	430	680	1400	**439**
36	1.0	240	240	410	410	670	870	1900	2500	**905**
36	2.0	410	410	680	680	1300	1700	3400	4600	**1648**
36	4.0	440	440	960	960	1600	2500	4100	5400	**2050**
52	0.5	140	140	260	260	300	480	800	720	**388**
52	1.0	410	410	560	560	1030	1800	3100	3100	**1371**
52	2.0	460	460	730	730	1900	2300	5300	4300	**2023**
52	4.0	570	570	890	890	1800	3100	4700	5500	**2253**
	MIN	50	50	70	70	80	140	270	170	
	MAX	570	570	960	960	1900	3100	5300	5500	
	Mittelwer	249	249	399	399	727	1092	1962	2528	
	50% Perc	220	220	355	355	580	835	1750	2300	
	90% Perc	439	439	766	766	1580	2290	4030	5370	
	95% Perc	478	478	846	846	1845	2390	4745	5500	
	99% Perc	548	548	938	938	1900	2914	5145	5500	

Legierung E

KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	40	40	70	70	110	180	200	130	**105**
1	0.5	60	60	80	80	210	400	450	150	**186**
1	1.0	50	50	60	60	130	310	410	300	**171**
1	2.0	90	90	80	80	90	210	160	90	**111**
1	4.0	110	110	110	110	160	280	490	300	**209**
2	0.2	70	70	110	110	180	230	330	300	**175**
2	0.5	140	140	350	350	350	330	410	740	**351**
2	1.0	260	260	430	430	360	410	710	1300	**520**
2	2.0	130	130	250	250	400	670	1200	1000	**504**
2	4.0	160	160	260	260	780	850	970	1700	**643**
3	0.2	100	100	110	110	170	240	330	410	**196**
3	0.5	150	150	220	220	220	380	1060	600	**375**
3	1.0	290	290	320	320	470	780	1500	2100	**759**
3	2.0	370	370	520	520	900	2100	2000	1900	**1085**
3	4.0	250	250	490	490	660	920	7600	2100	**1595**
6	0.2	100	100	170	170	230	270	430	510	**248**
6	0.5	130	130	160	160	250	330	560	680	**300**
6	1.0	190	190	220	220	400	560	910	1400	**511**
6	2.0	470	470	720	720	1500	2000	3600	4800	**1785**
6	4.0	640	640	860	860	1800	2100	5100	7100	**2388**
12	0.2	90	90	140	140	170	230	450	550	**233**
12	0.5	120	120	150	150	220	330	600	720	**301**
12	1.0	170	170	210	210	330	560	1000	1500	**519**
12	2.0	340	340	470	470	810	1300	2700	4300	**1341**
12	4.0	280	280	410	410	610	870	1600	2000	**808**
18	0.2	40	40	50	50	60	90	150	230	**89**
18	0.5	120	120	140	140	200	350	560	750	**298**
18	1.0	150	150	170	170	260	420	770	1050	**393**
18	2.0	210	210	270	270	400	710	1200	1900	**646**
18	4.0	440	440	570	570	1000	1500	2800	4100	**1428**
24	0.2	40	40	60	60	90	120	190	270	**109**
24	0.5	90	90	140	140	220	340	570	870	**308**
24	1.0	90	90	160	160	260	440	730	1200	**391**
24	2.0	130	130	210	210	400	630	980	1500	**524**
24	4.0	350	350	590	590	1100	1900	3800	5900	**1823**
36	0.2	50	50	70	70	90	120	190	220	**108**
36	0.5	130	130	170	170	250	390	600	770	**326**
36	1.0	130	130	210	210	240	400	710	750	**348**
36	2.0	220	220	390	390	580	890	1700	1900	**786**
36	4.0	590	590	1060	1060	1500	2400	5400	6600	**2400**
52	0.2	80	80	120	120	140	230	350	430	**194**
52	0.5	140	140	160	160	230	330	460	480	**263**
52	1.0	210	210	320	320	490	740	1200	1400	**611**
52	2.0	600	600	1200	1200	1600	2700	5000	4100	**2125**
52	4.0	740	740	1200	1200	2000	3400	6200	6200	**2710**
	MIN	40	40	50	50	60	90	150	90	
	MAX	740	740	1200	1200	2000	3400	7600	7100	
	Mittelwer	208	208	316	316	503	776	1518	1718	
	50% Perc	140	140	210	210	260	410	730	1000	
	90% Perc	458	458	668	668	1340	2060	4520	4600	
	95% Perc	598	598	1020	1020	1580	2340	5340	6140	
BERLIN	**99% Perc**	696	696	1200	1200	1912	3092	6984	6880	BERLIN

Legierung E KUPFERKONZENTRATION NACH STAGNATION (µg / L)

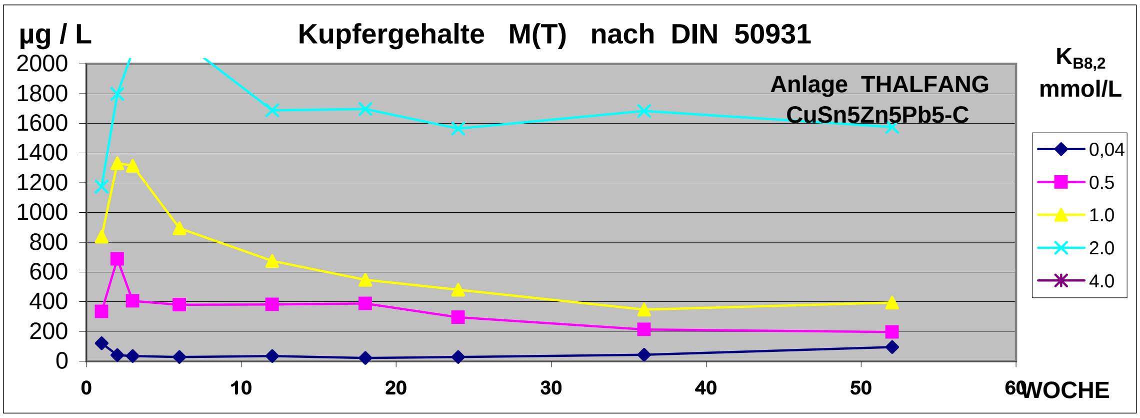
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	60	60	50	50	60	60	110	140	**74**
1	1.2	40	40	50	50	60	60	100	120	**65**
1	1.2+X	60	60	60	60	90	130	260	450	**146**
1	2.0	40	40	70	70	70	90	160	240	**98**
1	4.0	50	50	70	70	110	130	220	290	**124**
2	0.5	250	250	1060	1060	520	550	1200	770	**708**
2	1.2	360	360	3500	3500	1050	2000	2800	4000	**2196**
2	1.2+X	110	110	1400	1400	280	600	760	1400	**758**
2	2.0	130	130	3700	3700	410	1500	970	3600	**1768**
2	4.0	80	80	840	840	190	550	460	1400	**555**
3	0.5	220	220	350	350	530	520	1060	700	**494**
3	1.2	300	300	520	520	880	1400	2800	3700	**1303**
3	1.2+X	220	220	520	520	640	1040	1700	2300	**895**
3	2.0	580	580	1200	1200	1900	2800	6000	7400	**2708**
3	4.0	330	330	1400	1400	1300	2400	4300	7200	**2333**
6	0.5	200	200	1020	1020	410	480	870	870	**634**
6	1.2	230	230	1900	1900	510	910	1800	3000	**1310**
6	1.2+X	180	180	1300	1300	410	710	1090	1700	**859**
6	2.0	240	240	840	840	600	1050	1600	2500	**989**
6	4.0	130	130	280	280	300	720	490	400	**341**
12	0.5	210	210	230	230	520	570	940	1600	**564**
12	1.2	190	190	220	220	500	620	1000	1500	**555**
12	1.2+X	200	200	220	220	540	670	1400	2000	**681**
12	2.0	220	220	220	220	430	550	890	1000	**469**
12	4.0	240	240	300	300	650	900	1900	2500	**879**
18	0.5	270	270	880	880	450	600	930	1300	**698**
18	1.2	250	250	780	780	420	610	910	1080	**635**
18	1.2+X	250	250	1400	1400	520	830	1400	2200	**1031**
18	2.0	240	240	790	790	400	640	1040	1400	**693**
18	4.0	240	240	400	400	640	1300	1900	3000	**1015**
24	0.5	160	160	800	800	360	560	850	1200	**611**
24	1.2	150	150	660	660	340	510	720	1070	**533**
24	1.2+X	170	170	1500	1500	450	760	1400	2100	**1006**
24	2.0	130	130	540	540	310	510	910	1100	**521**
24	4.0	100	100	200	200	420	770	1500	2300	**699**
36	0.5	150	150	220	220	310	410	370	940	**346**
36	1.2	130	130	170	170	250	360	530	650	**299**
36	1.2+X	160	160	210	210	400	630	1200	2000	**621**
36	2.0	110	110	160	160	280	430	710	1200	**395**
36	4.0	160	160	180	180	340	550	890	1040	**438**
52	0.5	150	150	220	220	310	310	420	440	**278**
52	1.2	190	190	270	270	370	550	790	910	**443**
52	1.2+X	150	150	240	240	330	590	940	1600	**530**
52	2.0	40	40	60	60	70	150	170	210	**100**
52	4.0	60	60	130	130	130	190	320	390	**176**

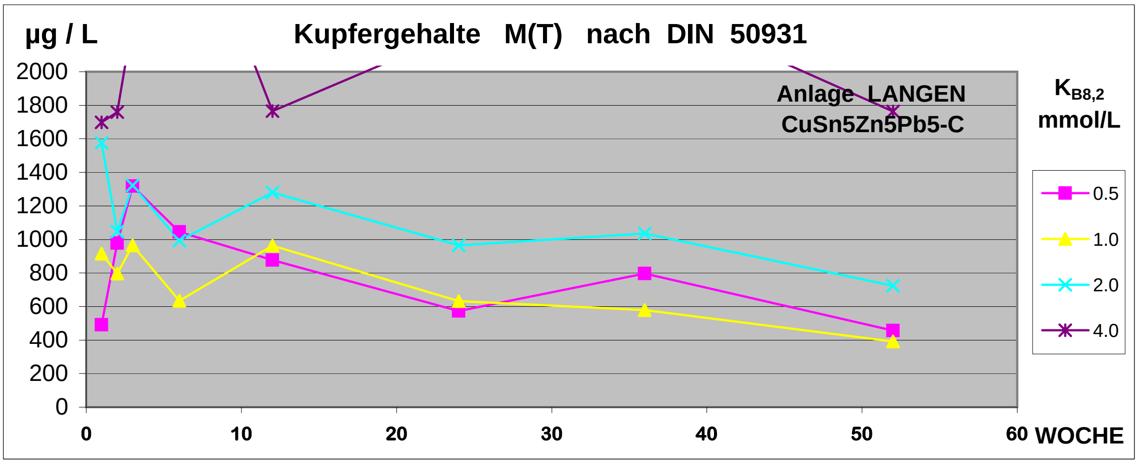
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

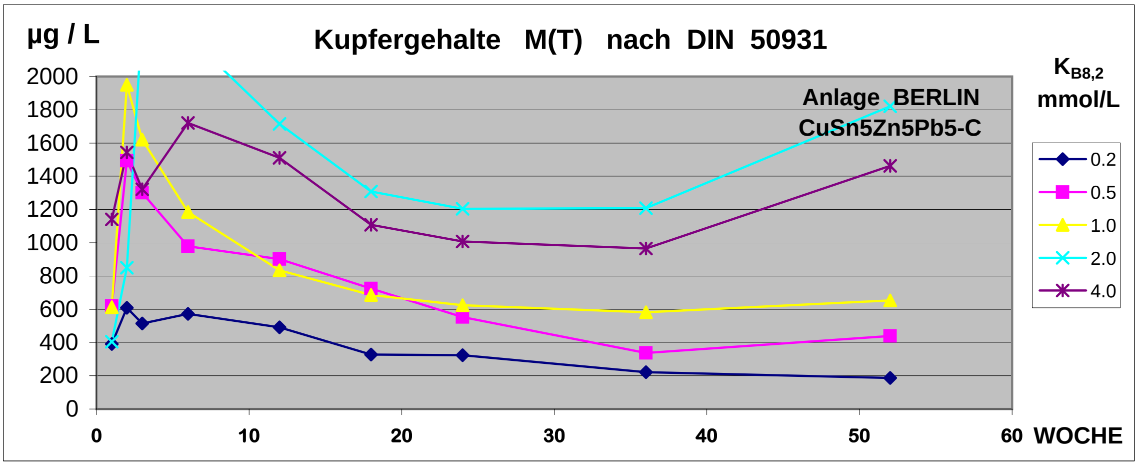
MIN	40	40	50	50	60	60	100	120
MAX	580	580	3700	3700	1900	2800	6000	7400
Mittelwer	181	181	692	692	446	717	1173	1709
50% Perc	170	170	350	350	410	590	930	1300
90% Perc	262	262	1400	1400	646	1360	1900	3360
95% Perc	324	324	1820	1820	1016	1900	2800	3940
99% Perc	483	483	3612	3612	1636	2624	5252	7312

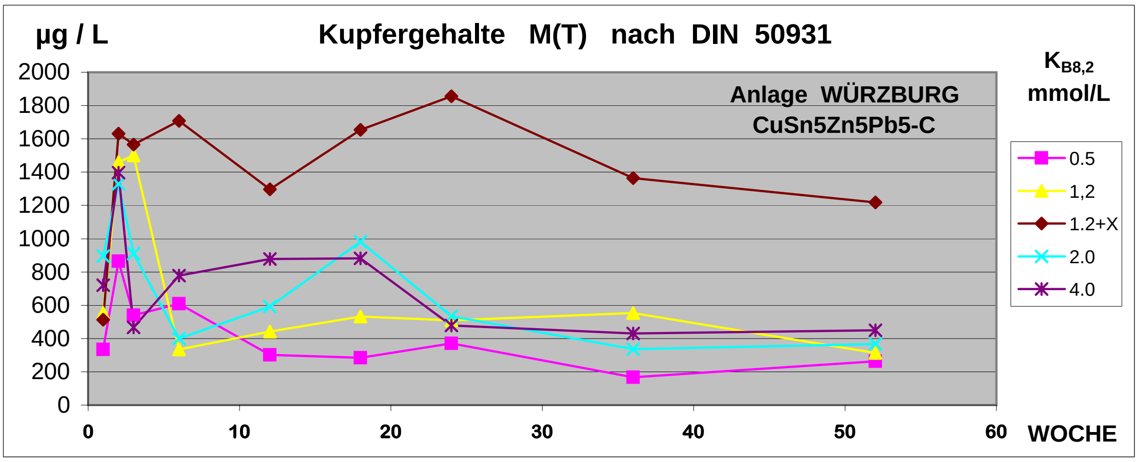
A 6 Cu

Kupfergehalte nach M (T) **Werkstoff : CuSn5Zn5Pb5-C**









Legierung F KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	30	30	40	40	30	50	660	90	**121**
1	0.5	110	110	250	250	360	290	400	910	**335**
1	1.0	210	210	490	490	680	840	780	3000	**838**
1	2.0	250	250	500	500	700	1300	1800	4100	**1175**
1	4.0	540	540	880	880	1500	2500	3800	7700	**2293**
2	0,04	30	30	30	30	30	50	70	60	**41**
2	0.5	160	160	200	200	400	780	1400	2200	**688**
2	1.0	330	330	570	570	760	1500	2800	3800	**1333**
2	2.0	420	420	670	670	1200	2000	3500	5500	**1798**
2	4.0	840	840	1400	1400	2400	4300	7300	12000	**3810**
3	0,04	20	20	20	20	40	40	40	80	**35**
3	0.5	170	170	180	180	320	550	680	990	**405**
3	1.0	330	330	550	550	760	1400	2700	3900	**1315**
3	2.0	460	460	780	780	1300	2200	4000	6700	**2085**
3	4.0	940	940	1600	1600	2600	4600	8100	13000	**4173**
6	0,04	20	20	20	20	30	20	40	60	**29**
6	0.5	90	90	200	200	190	300	570	1400	**380**
6	1.0	190	190	280	280	470	840	1700	3200	**894**
6	2.0	480	480	730	730	1200	2200	4800	6700	**2165**
6	4.0	1030	1030	1600	1600	2400	4400	8800	13000	**4233**
12	0,04	20	20	30	30	30	40	60	50	**35**
12	0.5	90	90	140	140	250	360	780	1200	**381**
12	1.0	130	130	320	320	370	720	1600	1800	**674**
12	2.0	380	380	640	640	960	1800	3500	5200	**1688**
12	4.0	730	730	1400	1400	2200	4400	6600	10000	**3433**
18	0,04	10	10	30	30	20	20	20	30	**21**
18	0.5	100	100	170	170	220	360	890	1100	**389**
18	1.0	120	120	190	190	580	480	1100	1600	**548**
18	2.0	400	400	610	610	1050	1800	3700	5000	**1696**
18	4.0	850	850	1300	1300	2200	3800	6600	10300	**3400**
24	0,04	20	20	20	20	30	30	40	40	**28**
24	0.5	110	110	140	140	160	260	490	960	**296**
24	1.0	160	160	210	210	330	520	860	1400	**481**
24	2.0	350	350	650	650	920	1300	3300	5000	**1565**
24	4.0	820	820	1400	1400	2200	3600	7200	8900	**3293**
36	0,04	20	20	30	30	40	50	70	90	**44**
36	0.5	90	90	110	110	140	270	510	380	**213**
36	1.0	100	100	200	200	290	40	640	1200	**346**
36	2.0	380	380	660	660	1080	1700	3000	5600	**1683**
36	4.0	380	380	1400	1400	8300	3500	6600	8400	**3795**
52	0,04	40	40	70	70	90	110	170	170	**95**
52	0.5	60	60	100	100	120	260	330	540	**196**
52	1.0	80	80	170	170	230	430	690	1300	**394**
52	2.0	310	310	620	620	940	1700	3000	5100	**1575**
52	4.0	920	920	1500	1500	2400	3800	7500	9100	**3455**
	MIN	10	10	20	20	20	20	20	30	
	MAX	1030	1030	1600	1600	8300	4600	8800	13000	
	Mittelwe	296	296	513	513	945	1367	2515	3841	
	50% Per	170	170	280	280	470	780	1400	2200	
	90% Per	832	832	1400	1400	2320	3800	6960	9640	
	95% Per	906	906	1480	1480	2400	4380	7460	11660	
THALFANG	**99% Per**	990	990	1600	1600	5792	4512	8492	13000	THALFANG

Legierung F KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	220	220	240	240	360	510	1200	940	**491**
1	1.0	250	250	390	390	480	860	1700	3000	**915**
1	2.0	260	260	590	590	910	1900	3500	4600	**1576**
1	4.0	290	290	500	500	900	1700	3800	5600	**1698**
2	0.5	470	470	510	510	870	1300	2100	1600	**979**
2	1.0	290	290	430	430	680	960	1400	1900	**798**
2	2.0	280	280	360	360	690	1300	2200	2900	**1046**
2	4.0	440	440	510	510	970	1800	3900	5500	**1759**
3	0.5	380	380	540	540	1300	1500	2500	3400	**1318**
3	1.0	450	450	530	530	790	1070	2200	1700	**965**
3	2.0	330	330	600	600	910	1600	2400	3800	**1321**
3	4.0	480	480	820	820	1300	2100	4500	7900	**2300**
6	0.5	370	370	650	650	920	1300	2000	2100	**1045**
6	1.0	330	330	560	560	710	760	860	970	**635**
6	2.0	540	540	750	750	970	1200	1500	1700	**994**
6	4.0	750	750	1030	1030	2100	3500	7000	9400	**3195**
12	0.5	330	330	500	500	860	1090	1600	1800	**876**
12	1.0	370	370	610	610	950	990	1700	2100	**963**
12	2.0	430	430	640	640	1200	1500	2300	3100	**1280**
12	4.0	540	540	820	820	1500	1900	3700	4300	**1765**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	190	190	260	260	530	680	880	1600	**574**
24	1.0	250	250	390	390	500	820	1060	1400	**633**
24	2.0	270	270	450	450	670	1100	1800	2700	**964**
24	4.0	750	750	1100	1100	1800	3000	4000	5400	**2238**
36	0.5	240	240	410	410	480	800	1200	2600	**798**
36	1.0	210	210	330	330	510	660	1080	1300	**579**
36	2.0	300	300	490	490	800	1200	1800	2900	**1035**
36	4.0	690	690	1400	1400	2000	2800	4600	5800	**2423**
52	0.5	200	200	350	350	400	530	850	770	**456**
52	1.0	170	170	220	220	360	510	750	730	**391**
52	2.0	180	180	320	320	660	830	1600	1700	**724**
52	4.0	470	470	730	730	1300	2000	3300	5100	**1763**
	MIN	170	170	220	220	360	510	750	730	
	MAX	750	750	1400	1400	2100	3500	7000	9400	
	Mittelw	366	366	563	563	918	1368	2343	3135	
	50% Pe	330	330	510	510	865	1200	1900	2650	
	90% Pe	540	540	820	820	1480	2090	3990	5590	
	95% Pe	717	717	1062	1062	1890	2890	4545	6745	
	99% Pe	750	750	1307	1307	2069	3345	6256	8935	

Legierung F KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	140	140	230	230	410	450	860	670	**391**
1	0.5	230	230	300	300	550	830	1600	920	**620**
1	1.0	120	120	250	250	500	1060	1200	1400	**613**
1	2.0	210	210	300	300	540	670	700	300	**404**
1	4.0	260	260	490	490	730	2600	2400	1900	**1141**
2	0.2	330	330	470	470	530	660	880	1200	**609**
2	0.5	620	620	1500	1500	1600	1600	1500	3000	**1493**
2	1.0	550	550	1300	1300	1700	2200	4000	4000	**1950**
2	2.0	260	260	430	430	860	1700	1900	960	**850**
2	4.0	480	480	740	740	1500	2300	2700	3400	**1543**
3	0.2	330	330	310	310	510	550	770	1000	**514**
3	0.5	590	590	810	810	890	1010	3200	2500	**1300**
3	1.0	660	660	720	720	1200	1700	2800	4500	**1620**
3	2.0	790	790	980	980	1400	2200	4400	7300	**2355**
3	4.0	460	460	980	980	1300	2200	1800	2400	**1323**
6	0.2	540	540	330	330	480	520	910	930	**573**
6	0.5	630	630	620	620	880	850	1700	1900	**979**
6	1.0	510	510	560	560	940	1200	2200	3000	**1185**
6	2.0	700	700	1030	1030	1700	2600	4400	5800	**2245**
6	4.0	880	880	1400	1400	1900	2300	2400	2600	**1720**
12	0.2	430	430	300	300	380	480	750	860	**491**
12	0.5	460	460	550	550	670	930	1700	1900	**903**
12	1.0	300	300	370	370	570	970	1600	2200	**835**
12	2.0	470	470	660	660	1060	2000	3200	5200	**1715**
12	4.0	790	790	1200	1200	1600	1900	2300	2300	**1510**
18	0.2	220	220	200	200	260	360	500	660	**328**
18	0.5	380	380	400	400	500	840	1100	1800	**725**
18	1.0	280	280	300	300	450	780	1200	1900	**686**
18	2.0	410	410	470	470	800	1500	2400	4000	**1308**
18	4.0	650	650	680	680	1300	1400	1700	1800	**1108**
24	0.2	130	130	230	230	280	380	520	690	**324**
24	0.5	230	230	330	330	460	670	880	1300	**554**
24	1.0	190	190	280	280	450	810	1000	1800	**625**
24	2.0	300	300	460	460	810	1400	2000	3900	**1204**
24	4.0	490	490	670	670	1040	1300	1600	1800	**1008**
36	0.2	140	140	150	150	190	270	320	410	**221**
36	0.5	140	140	160	160	190	270	330	1300	**336**
36	1.0	220	220	350	350	530	770	910	1300	**581**
36	2.0	360	360	540	540	960	1500	2100	3300	**1208**
36	4.0	530	530	770	770	1300	1400	720	1700	**965**
52	0.2	110	110	130	130	180	230	280	330	**188**
52	0.5	220	220	340	340	370	550	670	800	**439**
52	1.0	270	270	420	420	530	800	1020	1500	**654**
52	2.0	590	590	1040	1040	1300	2000	3300	4700	**1820**
52	4.0	620	620	1080	1080	1400	2000	2300	2600	**1463**
	MIN	110	110	130	130	180	230	280	300	
	MAX	880	880	1500	1500	1900	2600	4400	7300	
	Mittelwe	405	405	574	574	838	1216	1705	2216	
	50% Pe	380	380	470	470	730	1010	1600	1800	
	90% Pe	656	656	1064	1064	1560	2200	3200	4300	
	95% Pe	772	772	1280	1280	1680	2300	3860	5100	
BERLIN	**99% Pe**	840	840	1456	1456	1812	2600	4400	6640	BERLIN

Legierung F   KUPFERKONZENTRATION NACH STAGNATION (µg / L)

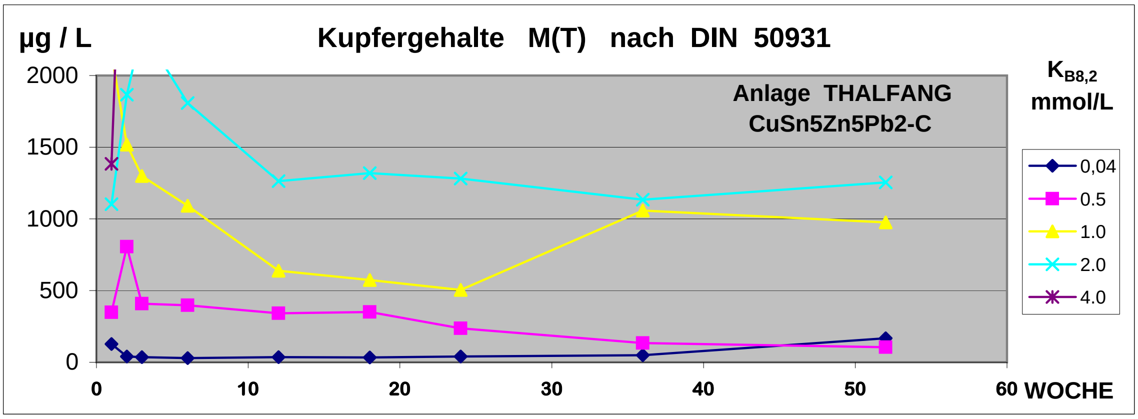
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	120	120	180	180	220	350	660	850	**335**
1	1,2	170	170	290	290	410	500	1100	1500	**554**
1	1.2+X	130	130	240	240	340	510	1010	1500	**513**
1	2.0	230	230	380	380	510	840	1700	2900	**896**
1	4.0	140	140	270	270	400	640	1400	2500	**720**
2	0.5	310	310	1060	1060	640	630	1500	1400	**864**
2	1.2	290	290	2400	2400	700	1200	1700	2700	**1460**
2	1.2+X	310	310	2600	2600	730	1300	2100	3100	**1631**
2	2.0	260	260	1900	1900	660	950	1900	2800	**1329**
2	4.0	230	230	2100	2100	660	960	1900	3000	**1398**
3	0.5	260	260	350	350	590	550	1090	870	**540**
3	1.2	530	530	920	920	1500	1500	3200	2900	**1500**
3	1.2+X	480	480	980	980	1400	1800	3000	3400	**1565**
3	2.0	430	430	690	690	860	990	1800	1400	**911**
3	4.0	320	320	360	360	480	480	670	740	**466**
6	0.5	230	230	840	840	380	390	660	1300	**609**
6	1.2	220	220	390	390	300	290	400	470	**335**
6	1.2+X	430	430	2500	2500	910	1500	2400	3000	**1709**
6	2.0	240	240	510	510	350	390	430	530	**400**
6	4.0	400	400	760	760	710	870	920	1400	**778**
12	0.5	180	180	180	180	340	280	410	660	**301**
12	1.2	400	400	350	350	360	380	630	660	**441**
12	1.2+X	430	430	460	460	1200	1400	2600	3400	**1298**
12	2.0	470	470	450	450	530	520	920	920	**591**
12	4.0	340	340	310	310	820	610	2000	2300	**879**
18	0.5	160	160	330	330	220	260	360	460	**285**
18	1.2	310	310	650	650	460	520	690	660	**531**
18	1.2+X	440	440	2100	2100	960	1500	2500	3200	**1655**
18	2.0	390	390	1080	1080	720	890	1400	1900	**981**
18	4.0	230	230	460	460	670	1010	1600	2400	**883**
24	0.5	130	130	420	420	300	370	570	620	**370**
24	1.2	210	210	660	660	480	480	650	730	**510**
24	1.2+X	360	360	2700	2700	1020	1600	2600	3500	**1855**
24	2.0	180	180	410	410	480	550	970	1100	**535**
24	4.0	80	80	140	140	240	510	840	1800	**479**
36	0.5	130	130	160	160	190	260	140	170	**168**
36	1.2	270	270	370	370	520	540	890	1200	**554**
36	1.2+X	390	390	570	570	1000	1400	2700	3900	**1365**
36	2.0	210	210	290	290	420	750	310	210	**336**
36	4.0	250	250	350	350	600	630	480	530	**430**
52	0.5	110	110	220	220	180	430	380	450	**263**
52	1.2	160	160	210	210	300	420	630	420	**314**
52	1.2+X	390	390	620	620	830	1500	2300	3100	**1219**
52	2.0	160	160	230	230	320	520	550	760	**366**
52	4.0	200	200	310	310	320	490	710	1050	**449**

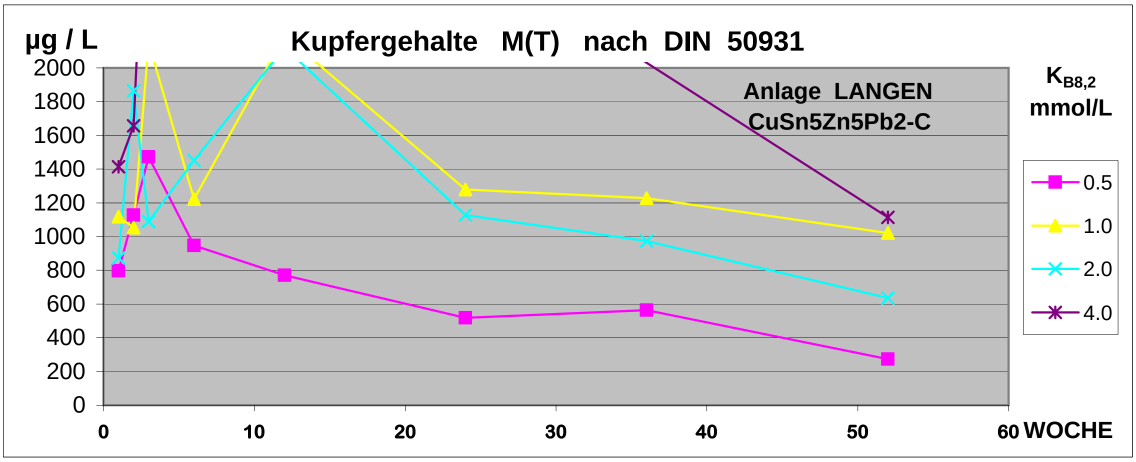
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

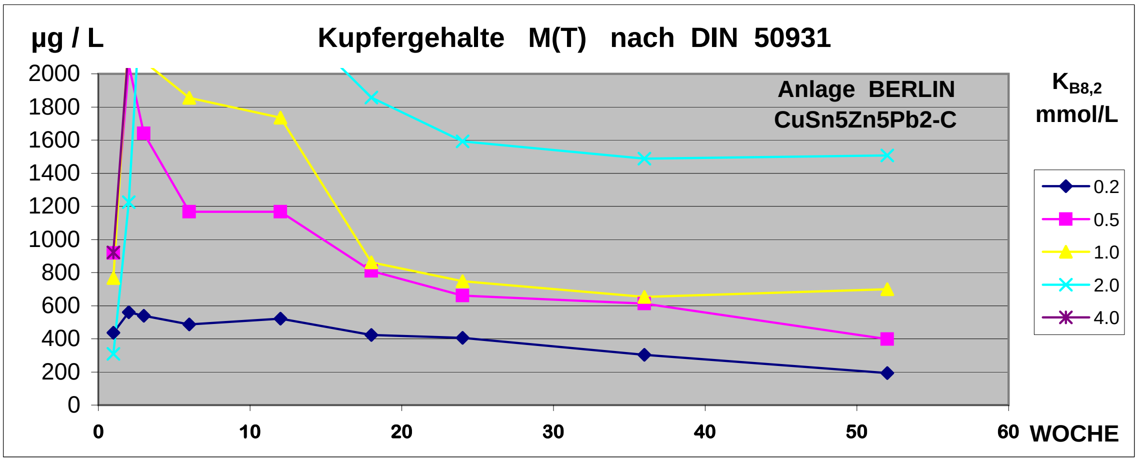
	MIN	80	80	140	140	180	260	140	170	
	MAX	530	530	2700	2700	1500	1800	3200	3900	
	Mittelwe	274	274	750	750	583	766	1275	1652	
	50% Per	250	250	420	420	510	550	970	1400	
	90% Per	430	430	2100	2100	984	1500	2560	3160	
	95% Per	464	464	2480	2480	1164	1500	2680	3400	
WÜRZBURG	**99% Per**	508	508	2656	2656	1456	1712	3112	3724	WÜRZBURG

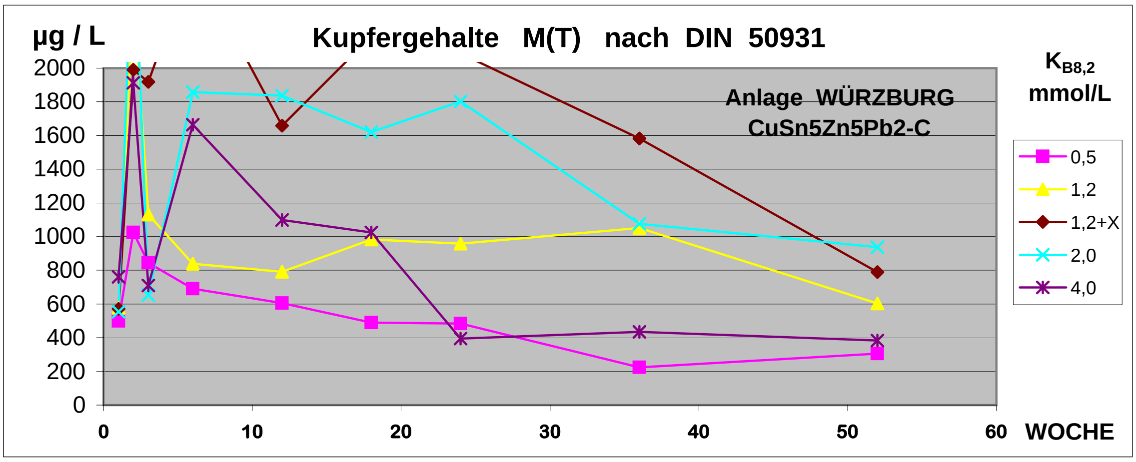
A 6 Cu

Kupfergehalte nach M (T) **Werkstoff : CuSn5Zn5Pb2-C**









Legierung G   KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	20	20	30	30	20	50	740	110	**128**
1	0.5	110	110	180	180	400	320	450	1040	**349**
1	1.0	600	600	950	950	1600	2800	750	9000	**2156**
1	2.0	260	260	480	480	660	1090	1800	3800	**1104**
1	4.0	190	190	460	460	700	870	4500	3700	**1384**
2	0,04	20	20	30	30	40	50	80	60	**41**
2	0.5	150	150	220	220	450	850	1700	2700	**805**
2	1.0	300	300	600	600	850	1800	3000	4700	**1519**
2	2.0	410	410	700	700	1200	2300	3200	6000	**1865**
2	4.0	840	840	1500	1500	2500	5000	7700	14000	**4235**
3	0,04	20	20	30	30	30	40	40	70	**35**
3	0.5	150	150	170	170	330	570	730	1000	**409**
3	1.0	320	320	560	560	840	1400	2700	3700	**1300**
3	2.0	490	490	840	840	1700	2400	4400	7400	**2320**
3	4.0	750	750	1400	1400	2400	3600	6600	11000	**3488**
6	0,04	20	20	20	20	30	20	40	60	**29**
6	0.5	90	90	200	200	200	300	800	1300	**398**
6	1.0	360	360	500	500	420	1100	2500	3000	**1093**
6	2.0	360	360	600	600	950	1900	3900	5800	**1809**
6	4.0	630	630	980	980	1700	480	6100	9500	**2625**
12	0,04	20	20	30	30	30	40	50	60	**35**
12	0.5	50	50	110	110	200	350	670	1200	**343**
12	1.0	120	120	320	320	350	670	1500	1700	**638**
12	2.0	280	280	460	460	730	1200	2600	4100	**1264**
12	4.0	450	450	740	740	1400	2600	4300	7100	**2223**
18	0,04	20	20	20	20	30	40	50	60	**33**
18	0.5	70	70	80	80	170	300	740	1300	**351**
18	1.0	120	120	180	180	650		1070	1700	**574**
18	2.0	290	290	450	450	870	1500	2300	4400	**1319**
18	4.0	460	460	840	840	1400	2700	4400	7600	**2338**
24	0,04	30	30	30	30	30	40	60	70	**40**
24	0.5	50	50	110	110	120	200	390	860	**236**
24	1.0	150	150	260	260	360	550	910	1400	**505**
24	2.0	240	240	530	530	730	980	2700	4300	**1281**
24	4.0	590	590	980	980	1700	2800	5400	8200	**2655**
36	0,04	30	30	40	40	40	60	40	120	**50**
36	0.5	60	60	70	70	90	170	330	220	**134**
36	1.0	540	540	620	620	650	1400	2000	2100	**1059**
36	2.0	250	250	420	420	630	1200	2000	3900	**1134**
36	4.0	570	570	1050	1050	1800	3000	5100	7300	**2555**
52	0,04	60	60	100	100	150	200	310	360	**168**
52	0.5	20	20	60	60	60	150	180	290	**105**
52	1.0	150	150	300	300	810	1090	2200	2800	**975**
52	2.0	210	210	500	500	720	1100	2500	4300	**1255**
52	4.0	680	680	1100	1100	1800	3400	6100	7700	**2820**
	MIN	20	20	20	20	20	20	40	60	
	MAX	840	840	1500	1500	2500	5000	7700	14000	
	Mittelwe	258	258	441	441	723	1197	2214	3580	
	50% Per	190	190	420	420	650	925	1800	2800	
	90% Per	596	596	980	980	1700	2800	5280	8000	
	95% Per	670	670	1090	1090	1800	3340	6100	9400	
THALFANG	**99% Per**	800	800	1456	1456	2456	4398	7216	12680	THALFANG

Legierung G KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	380	380	390	390	560	770	2200	1300	**796**
1	1.0	210	210	380	380	500	960	2300	4000	**1118**
1	2.0	190	190	290	290	430	890	1900	2800	**873**
1	4.0	250	250	430	430	750	1700	3000	4500	**1414**
2	0.5	690	690	720	720	990	1600	2000	1600	**1126**
2	1.0	420	420	400	400	710	970	2000	3100	**1053**
2	2.0	770	770	730	730	1400	2000	3800	4700	**1863**
2	4.0	500	500	540	540	970	1700	3300	5200	**1656**
3	0.5	530	530	660	660	1500	1700	2300	3900	**1473**
3	1.0	1100	1100	1100	1100	1700	2400	5600	3100	**2150**
3	2.0	460	460	820	820	960	1700	1500	2000	**1090**
3	4.0	870	870	1500	1500	2400	3900	6700	10700	**3555**
6	0.5	470	470	720	720	1020	980	1600	1600	**948**
6	1.0	690	690	1050	1050	1300	1200	1700	2100	**1223**
6	2.0	760	760	1050	1050	1500	1500	2100	2900	**1453**
6	4.0	1100	1100	1400	1400	2900	3900	6800	6500	**3138**
12	0.5	310	310	530	530	790	790	1500	1400	**770**
12	1.0	920	920	2000	2000	2200	2000	3300	4200	**2193**
12	2.0	680	680	1300	1300	2100	2200	3700	5000	**2120**
12	4.0	1200	1200	2500	2500	3800	3600	8300	9600	**4088**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	240	240	330	330	410	740	870	990	**519**
24	1.0	620	620	960	960	970	1800	2000	2300	**1279**
24	2.0	380	380	610	610	730	1600	2000	2700	**1126**
24	4.0	810	810	1300	1300	1500	3600	5600	7400	**2790**
36	0.5	220	220	340	340	400	560	830	1600	**564**
36	1.0	530	530	830	830	1200	1300	2100	2500	**1228**
36	2.0	310	310	510	510	820	1020	1900	2400	**973**
36	4.0	510	510	960	960	1500	2100	3800	5900	**2030**
52	0.5	120	120	200	200	240	310	470	520	**273**
52	1.0	510	510	660	660	930	1000	2000	1900	**1021**
52	2.0	180	180	300	300	570	650	1400	1500	**635**
52	4.0	340	340	500	500	930	1300	2100	2900	**1114**
	MIN	120	120	200	200	240	310	470	520	
	MAX	1200	1200	2500	2500	3800	3900	8300	10700	
	Mittelwe	540	540	813	813	1209	1639	2833	3525	
	50% Pe	505	505	690	690	970	1550	2100	2850	
	90% Pe	915	915	1390	1390	2190	3480	5600	6440	
	95% Pe	1100	1100	1725	1725	2625	3735	6745	8390	
	99% Pe	1169	1169	2345	2345	3521	3900	7835	10359	

Legierung G KUPFERKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	210	210	410	410	540	600	900	210	**436**
1	0.5	240	240	480	480	1200	1700	2500	510	**919**
1	1.0	160	160	280	280	660	1500	1600	1500	**768**
1	2.0	240	240	330	330	410	380	340	200	**309**
1	4.0	250	250	540	540	790	1200	2400	1400	**921**
2	0.2	350	350	540	540	450	600	670	990	**561**
2	0.5	770	770	1700	1700	1900	2000	1900	5700	**2055**
2	1.0	710	710	1400	1400	2400	2800	2100	6400	**2240**
2	2.0	280	280	770	770	1700	2700	2300	1000	**1225**
2	4.0	500	500	730	730	1700	3000	3700	6600	**2183**
3	0.2	360	360	370	370	610	630	670	940	**539**
3	0.5	740	740	1040	1040	1060	1500	4500	2500	**1640**
3	1.0	900	900	1500	1500	1500	2500	2600	5200	**2075**
3	2.0	1300	1300	1500	1500	2600	4400	3000	6600	**2775**
3	4.0	970	970	1700	1700	2500	4400	1600	11000	**3105**
6	0.2	260	260	310	310	520	580	820	830	**486**
6	0.5	760	760	770	770	1070	1100	2000	2100	**1166**
6	1.0	770	770	950	950	1700	2100	3300	4300	**1855**
6	2.0	1400	1400	2100	2100	3300	4400	5800	5000	**3188**
6	4.0	1200	1200	1700	1700	3100	4400	8100	10600	**4000**
12	0.2	310	310	400	400	480	520	880	880	**523**
12	0.5	580	580	710	710	950	1200	2200	2400	**1166**
12	1.0	620	620	820	820	1300	1900	3600	4200	**1735**
12	2.0	1060	1060	1400	1400	2200	3000	4700	4400	**2403**
12	4.0	1200	1200	2100	2100	3400	3900	9300	11000	**4275**
18	0.2	250	250	270	270	340	490	690	830	**424**
18	0.5	430	430	430	430	590	1060	1400	1700	**809**
18	1.0	350	350	380	380	600	1040	1600	2200	**863**
18	2.0	780	780	950	950	1400	2500	3500	4000	**1858**
18	4.0	940	940	1200	1200	2200	3700	6100	9300	**3198**
24	0.2	170	170	260	260	350	500	710	830	**406**
24	0.5	230	230	380	380	500	770	1200	1600	**661**
24	1.0	230	230	320	320	530	950	1300	2100	**748**
24	2.0	510	510	710	710	1400	2000	3200	3700	**1593**
24	4.0	700	700	1060	1060	2000	3500	6100	9700	**3103**
36	0.2	160	160	200	200	280	380	460	580	**303**
36	0.5	280	280	310	310	510	760	950	1500	**613**
36	1.0	220	220	320	320	530	820	1100	1700	**654**
36	2.0	530	530	820	820	1300	1900	2900	3100	**1488**
36	4.0	690	690	1200	1200	1800	2900	5500	8000	**2748**
52	0.2	100	100	130	130	170	240	310	370	**194**
52	0.5	210	210	300	300	340	500	600	730	**399**
52	1.0	290	290	460	460	550	840	1200	1500	**699**
52	2.0	520	520	860	860	1300	2000	3100	2900	**1508**
52	4.0	950	950	1300	1300	2000	3400	5400	7500	**2850**
	MIN	100	100	130	130	170	240	310	200	
	MAX	1400	1400	2100	2100	3400	4400	9300	11000	
	Mittelwe	548	548	809	809	1261	1850	2640	3562	
	50% Pe	500	500	710	710	1070	1500	2100	2200	
	90% Pe	1024	1024	1620	1620	2460	3820	5680	8780	
	95% Pe	1200	1200	1700	1700	3000	4400	6100	10420	
BERLIN	**99% Pe**	1356	1356	2100	2100	3356	4400	8772	11000	BERLIN

Legierung G **KUPFERKONZENTRATION NACH STAGNATION (µg / L)**

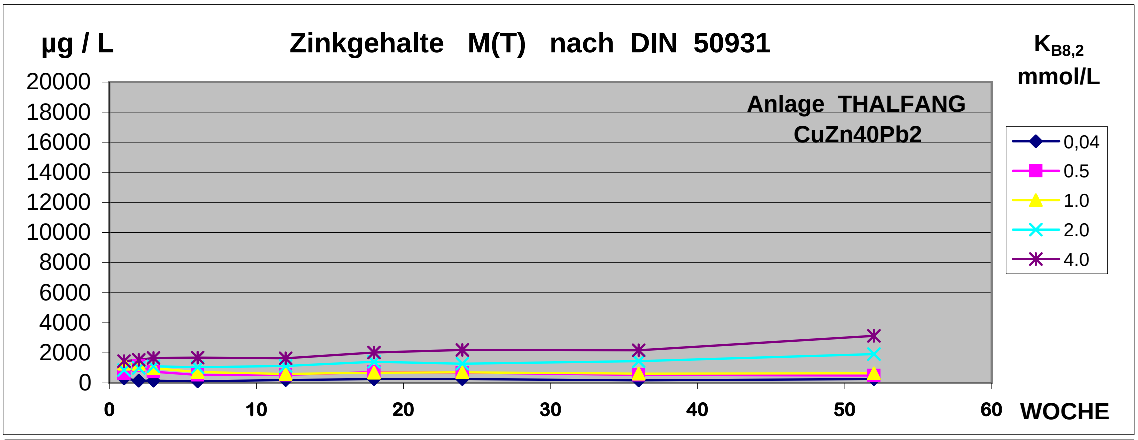
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,5	130	130	330	330	410	430	1040	1200	**500**
1	1,2	150	150	280	280	400	550	1200	1600	**576**
1	1,2+X	120	120	250	250	370	560	1100	1800	**571**
1	2,0	130	130	200	200	270	450	1060	2000	**555**
1	4,0	150	150	290	290	430	680	2000	2100	**761**
2	0.5	480	480	800	800	990	1040	1800	1800	**1024**
2	1.2	420	420	4200	4200	990	2200	2700	4700	**2479**
2	1.2+X	260	260	3400	3400	710	1800	2300	3800	**1991**
2	2.0	470	470	4000	4000	1500	2600	3900	6800	**2968**
2	4.0	450	450	1400	1400	1300	1800	3500	5000	**1913**
3	0.5	360	360	620	620	790	810	1700	1500	**845**
3	1.2	610	610	660	660	1070	1040	2200	2200	**1131**
3	1.2+X	770	770	1200	1200	2100	2300	3500	3500	**1918**
3	2.0	380	380	460	460	550	590	1200	1200	**653**
3	4.0	370	370	650	650	770	710	1060	1100	**710**
6	0.5	350	350	1000	1000	540	590	900	800	**691**
6	1.2	500	500	1200	1200	680	590	970	1070	**839**
6	1.2+X	740	740	3800	3800	1700	2200	3700	4500	**2648**
6	2.0	1080	1080	2400	2400	2000	2400	1600	1900	**1858**
6	4.0	710	710	1700	1700	1800	2500	2400	1800	**1665**
12	0.5	310	310	300	300	760	520	740	1600	**605**
12	1.2	620	620	590	590	790	730	1090	1300	**791**
12	1.2+X	720	720	710	710	1400	1800	3300	3900	**1658**
12	2.0	1300	1300	1200	1200	2300	2000	2800	2600	**1838**
12	4.0	620	620	470	470	1300	210	2200	2900	**1099**
18	0.5	260	260	620	620	400	470	600	690	**490**
18	1.2	510	510	1600	1600	660	740	1200	1050	**984**
18	1.2+X	600	600	3200	3200	1300	1900	3300	3400	**2188**
18	2.0	1000	1000	1700	1700	670	1700	2600	2600	**1621**
18	4.0	320	320	700	700	880	1080	2100	2100	**1025**
24	0.5	230	230	380	380	420	550	860	820	**484**
24	1.2	410	410	1500	1500	790	710	940	1400	**958**
24	1.2+X	450	450	3100	3100	1400	1700	2800	3700	**2088**
24	2.0	560	560	1500	1500	1800	2100	2000	4400	**1803**
24	4.0	120	120	220	220	320	430	660	1060	**394**
36	0.5	150	150	200	200	220	340	200	330	**224**
36	1.2	600	600	700	700	950	860	2000	2000	**1051**
36	1.2+X	540	540	790	790	1200	1600	2800	4400	**1583**
36	2.0	670	670	780	780	1300	1200	1200	2000	**1075**
36	4.0	250	250	290	290	460	760	340	840	**435**
52	0.5	190	190	210	210	310	420	440	480	**306**
52	1.2	430	430	480	480	520	680	720	1080	**603**
52	1.2+X	270	270	430	430	540	980	1400	2000	**790**
52	2.0	610	610	770	770	850	1400	990	1500	**938**
52	4.0	170	170	280	280	320	490	600	750	**383**

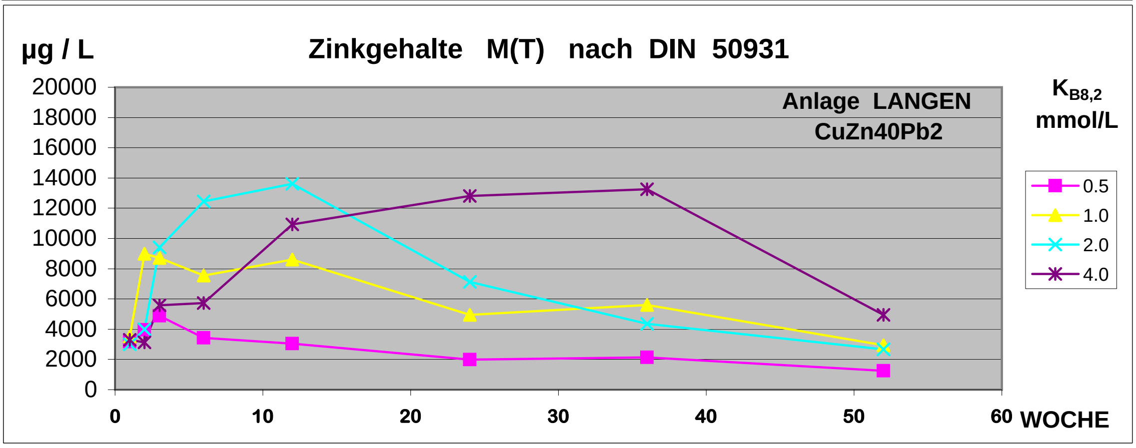
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

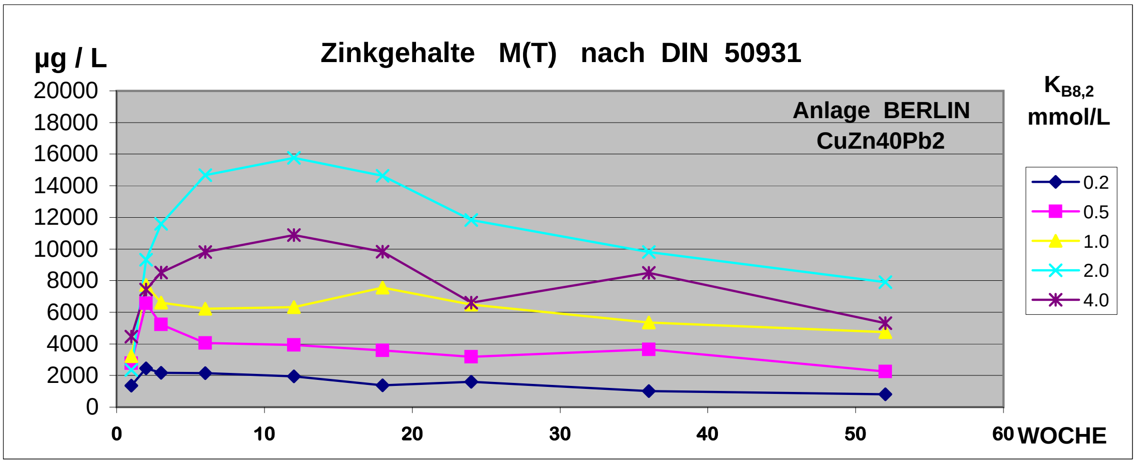
MIN	120	120	200	200	220	210	200	330
MAX	1300	1300	4200	4200	2300	2600	3900	6800
Mittelwe	456	456	1146	1146	916	1138	1727	2206
50% Per	430	430	700	700	790	810	1400	1800
90% Per	732	732	3160	3160	1760	2200	3300	4400
95% Per	954	954	3720	3720	1960	2380	3500	4660
99% Per	1203	1203	4112	4112	2212	2556	3812	6008

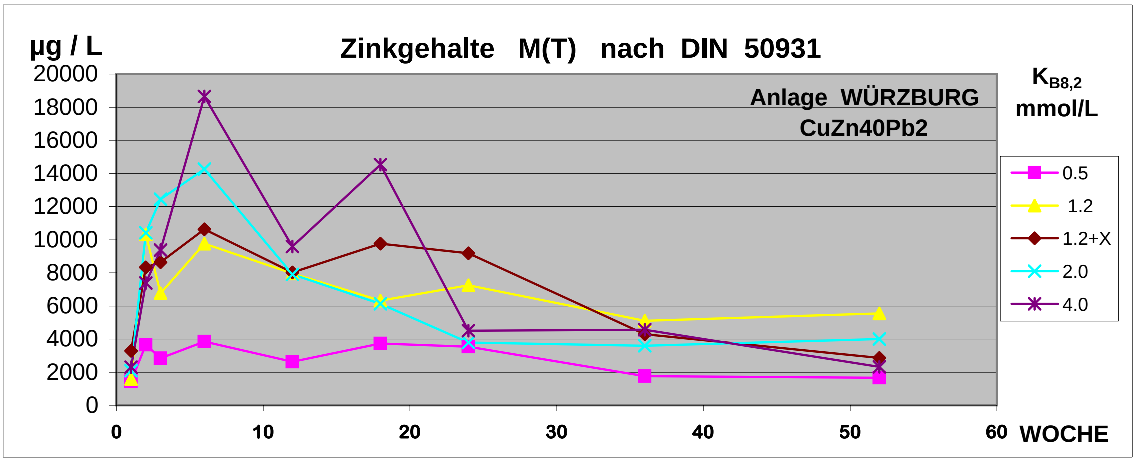
A 6 Zn

Zinkgehalte nach M (T) **Werkstoff : CuZn40Pb2**









A 6 Zn

Legierung C — ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	50	50	80	80	60	150	1600	360	**304**
1	0.5	140	140	220	220	530	560	810	2300	**615**
1	1.0	220	220	390	390	660	1400	2100	4800	**1273**
1	2.0	140	140	260	260	440	710	1700	3100	**844**
1	4.0	250	250	480	480	850	1400	2500	5300	**1439**
2	0,04	60	60	80	80	110	200	300	350	**155**
2	0.5	170	170	270	270	600	1090	2300	4400	**1159**
2	1.0	190	190	350	350	730	1400	2400	4400	**1251**
2	2.0	180	180	280	280	500	920	2000	3600	**993**
2	4.0	260	260	460	460	790	1800	2600	5600	**1529**
3	0,04	50	50	70	70	120	180	240	370	**144**
3	0.5	170	170	240	240	490	820	1400	2500	**754**
3	1.0	170	170	300	300	560	910	2000	3500	**989**
3	2.0	180	180	320	320	610	970	2200	4000	**1098**
3	4.0	270	270	500	500	890	1800	3400	5700	**1666**
6	0,04	70	70	50	50	110	100	190	280	**115**
6	0.5	90	90	190	190	260	440	990	2000	**531**
6	1.0	130	130	210	210	360	660	1600	2500	**725**
6	2.0	190	190	320	320	520	940	2300	3600	**1048**
6	4.0	300	300	520	520	780	1800	3500	5700	**1678**
12	0,04	60	60	120	120	180	230	320	390	**185**
12	0.5	80	80	160	160	290	510	1070	1900	**531**
12	1.0	100	100	190	190	290	540	1300	2000	**589**
12	2.0	190	190	320	320	550	1070	2400	4000	**1130**
12	4.0	240	240	480	480	780	1700	3500	5700	**1640**
18	0,04	80	80	140	140	200	290	410	720	**258**
18	0.5	120	120	200	200	340	650	1600	2600	**729**
18	1.0	120	120	200	200	430	620	1400	2400	**686**
18	2.0	190	190	350	350	650	2100	2800	4600	**1404**
18	4.0	280	280	570	570	970		4100	7400	**2024**
24	0,04	70	70	150	150	240	360	410	560	**251**
24	0.5	110	110	200	200	310	610	1300	2600	**680**
24	1.0	130	130	250	250	360	660	1400	2500	**710**
24	2.0	190	190	350	350	610	1300	2600	4600	**1274**
24	4.0	340	340	630	630	1040	2030	4500	8000	**2189**
36	0,04	100	100	110	110	150	210	270	340	**174**
36	0.5	120	120	190	190	300	570	1300	1400	**524**
36	1.0	100	100	200	200	330	560	1030	2400	**615**
36	2.0	220	220	400	400	710	1500	2900	5300	**1456**
36	4.0	360	360	660	660	1300	2400	4400	7200	**2168**
52	0,04	100	100	180	180	210	320	410	490	**249**
52	0.5	80	80	150	150	250	490	920	1800	**490**
52	1.0	90	90	180	180	300	580	1100	2600	**640**
52	2.0	250	250	500	500	900	1900	4100	6900	**1913**
52	4.0	390	390	790	790	2700	2800	8500	8600	**3120**
	MIN	50	50	50	50	60	100	190	280	
	MAX	390	390	790	790	2700	2800	8500	8600	
	Mittelwer	164	164	295	295	541	960	2004	3364	
	50% Perc	140	140	250	250	490	685	1600	2600	
	90% Perc	276	276	512	512	896	1870	3860	6420	
	95% Perc	332	332	618	618	1026	2090	4340	7360	
THALFANG	**99% Perc**	377	377	733	733	2084	2628	6740	8336	THALFANG

Legierung C   ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	1050	1050	1600	1600	2300	3700	8600	5400	**3163**
1	1.0	1030	1030	1070	1070	1900	3800	7400	10700	**3500**
1	2.0	470	470	850	850	1500	3500	6300	10000	**2993**
1	4.0	510	510	930	930	1600	3900	7000	11000	**3298**
2	0.5	1800	1800	2100	2100	3500	5500	7700	7100	**3950**
2	1.0	3400	3400	5000	5000	9000	10000	16000	20000	**8975**
2	2.0	980	980	1200	1200	2400	4000	8200	13000	**3995**
2	4.0	660	660	870	870	1900	3600	6500	10000	**3133**
3	0.5	1100	1100	2000	2000	5100	5700	9000	13000	**4875**
3	1.0	3100	3100	4500	4500	7400	10000	22000	15000	**8700**
3	2.0	2800	2800	3800	3800	6600	9500	19000	27000	**9413**
3	4.0	1100	1100	1900	1900	3700	6000	12000	17000	**5588**
6	0.5	830	830	1900	1900	2900	4400	7000	7600	**3420**
6	1.0	1600	1600	3400	3400	5500	8900	17000	19000	**7550**
6	2.0	3400	3400	6300	6300	10300	15000	26000	29000	**12463**
6	4.0	950	950	2200	2200	3800	6700	12000	17000	**5725**
12	0.5	860	860	1300	1300	2600	3900	6200	7400	**3053**
12	1.0	2300	2300	3600	3600	7000	10000	18000	22000	**8600**
12	2.0	4100	4100	6900	6900	13000	15000	24000	35000	**13625**
12	4.0	2600	2600	4600	4600	8500	10500	22000	32000	**10925**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	550	550	770	770	2000	2500	3300	5500	**1993**
24	1.0	830	830	1900	1900	3900	5500	9700	15000	**4945**
24	2.0	880	880	2100	2100	4900	6200	17000	23000	**7133**
24	4.0	3000	3000	5800	5800	7900	16000	25000	36000	**12813**
36	0.5	330	330	730	730	1010	2300	4100	7500	**2129**
36	1.0	740	740	1900	1900	3600	5900	12000	18000	**5598**
36	2.0	560	560	1300	1300	2600	4600	9000	15000	**4365**
36	4.0	3400	3400	6600	6600	10000	16000	26000	34000	**13250**
52	0.5	220	220	470	470	690	1700	2900	3300	**1246**
52	1.0	370	370	610	610	1600	3500	6500	9900	**2933**
52	2.0	350	350	950	950	1500	2600	5800	8800	**2663**
52	4.0	370	370	1300	1300	2700	5500	11000	17000	**4943**
	MIN	220	220	470	470	690	1700	2900	3300	
	MAX	4100	4100	6900	6900	13000	16000	26000	36000	
	Mittelwert	1445	1445	2514	2514	4466	6747	12319	16288	
	50% Perc	965	965	1900	1900	3550	5500	9350	15000	
	90% Perc	3370	3370	5720	5720	8950	14550	23800	31700	
	95% Perc	3400	3400	6435	6435	10135	15450	25450	34450	
	99% Perc	3883	3883	6807	6807	12163	16000	26000	35690	

Legierung C ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	460	460	760	760	1800	1600	3200	1800	**1355**
1	0.5	590	590	1300	1300	3200	6300	6200		**2783**
1	1.0	640	640	1400	1400	3200	7800	7300	3400	**3223**
1	2.0	730	730	1500	1500	2300	3600	7600	800	**2345**
1	4.0	1300	1300	3600	3600	4000	7000	9600	5300	**4463**
2	0.2	890	890	1600	1600	2200	3000	4300	5100	**2448**
2	0.5	2100	2100	4400	4400	6700	6700	8100	18000	**6563**
2	1.0	2600	2600	4600	4600	8900	460	18000	20000	**7720**
2	2.0	1900	1900	4000	4000	7700	12000	18000	25000	**9313**
2	4.0	1500	1500	2800	2800	4400	8500	16000	22000	**7438**
3	0.2	970	970	1300	1300	1900	2500	4100	4300	**2168**
3	0.5	2000	2000	1700	1700	3700	5300	17000	8500	**5238**
3	1.0	2100	2100	3100	3100	1020	8400	14000	19000	**6603**
3	2.0	4000	4000	4900	4900	11000	16000	21000	27000	**11600**
3	4.0	3200	3200	4800	4800	9100	16000	13000	14000	**8513**
6	0.2	680	680	950	950	1900	2200	4600	5200	**2145**
6	0.5	1700	1700	2300	2300	3600	4300	7700	8900	**4063**
6	1.0	1800	1800	2600	2600	5200	6700	13000	16000	**6213**
6	2.0	4700	4700	7500	7500	13000	18000	29000	33000	**14675**
6	4.0	4900	4900	9300	9300	12000	13000	13000	12000	**9800**
12	0.2	720	720	940	940	1500	2100	4000	4700	**1953**
12	0.5	1400	1400	1900	1900	3100	4500	8300	9000	**3938**
12	1.0	1800	1800	2800	2800	4300	7100	15000	15000	**6325**
12	2.0	5300	5300	8300	8300	13000	19000	32000	35000	**15775**
12	4.0	6100	6100	9400	9400	14000	14000	14000	14000	**10875**
18	0.2	630	630	640	640	880	1600	2400	3600	**1378**
18	0.5	1500	1500	1800	1800	2400	4300	7000	8400	**3588**
18	1.0	2200	2200	2700	2700	4900	8700	16000	21000	**7550**
18	2.0	4500	4500	6500	6500	11000	19000	27000	38000	**14625**
18	4.0	6300	6300	8100	8100	10800	13000	13000	13000	**9825**
24	0.2	490	490	750	750	1090	2000	3100	4200	**1609**
24	0.5	760	760	1400	1400	2400	3900	6200	8600	**3178**
24	1.0	1010	1010	1900	1900	4400	8700	12000	21000	**6490**
24	2.0	2600	2600	4300	4300	8900	10000	26000	36000	**11838**
24	4.0	3000	3000	5100	5100	8500	9000	9500	9700	**6613**
36	0.2	440	440	590	590	770	1020	1800	2400	**1006**
36	0.5	870	870	2000	2000	5300	4400	5800	7900	**3643**
36	1.0	1030	1030	2700	2700	5100	8000	9200	13000	**5345**
36	2.0	3000	3000	6000	6000	5500	11000	18000	26000	**9813**
36	4.0	3500	3500	8300	8300	10300	11000	11000	12000	**8488**
52	0.2	410	410	510	510	630	870	1400	1800	**818**
52	0.5	850	850	1500	1500	1500	2700	3900	5200	**2250**
52	1.0	1300	1300	2300	2300	3000	5100	8600	14000	**4738**
52	2.0	1800	1800	2800	2800	5700	8400	15000	25000	**7913**
52	4.0	2100	2100	4000	4000	7000	8100	7500	7700	**5313**
	MIN	410	410	510	510	630	460	1400	800	
	MAX	6300	6300	9400	9400	14000	19000	32000	38000	
	Mittelwe	2053	2053	3370	3370	5395	7486	11387	13761	
	50% Per	1700	1700	2700	2700	4400	7000	9500	12000	
	90% Per	4620	4620	7860	7860	11000	15200	19800	26700	
	95% Per	5220	5220	8300	8300	12800	17600	26800	34700	
BERLIN	**99% Per**	6212	6212	9356	9356	13560	19000	30680	37140	BERLIN

Legierung C ZINKKONZENTRATION NACH STAGNATION (µg / L)

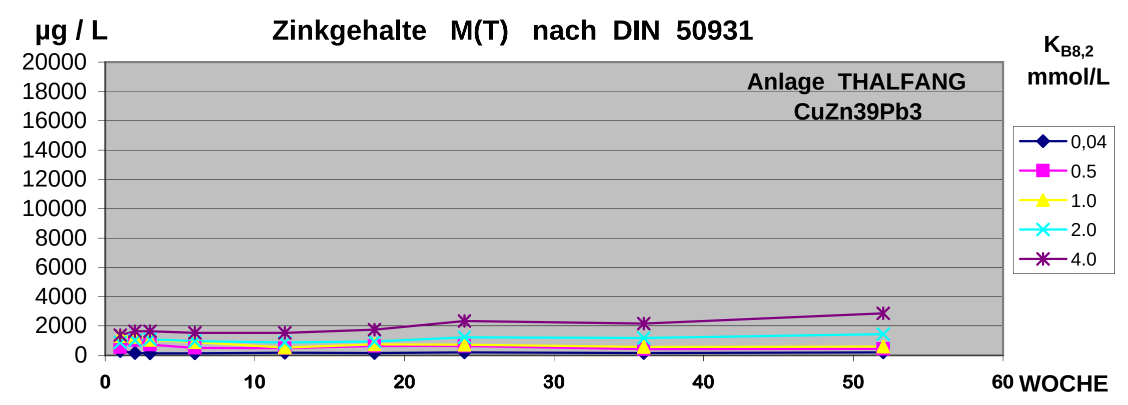
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	260	260	600	600	850	1300	3100	4700	**1459**
1	1.2	260	260	550	550	880	1500	3300	5300	**1575**
1	1.2+X	440	440	1400	1400	2400	3500	7100	9600	**3285**
1	2.0	310	310	660	660	1010	2100	4200	7500	**2094**
1	4.0	340	340	730	730	1400	2400	4400	8100	**2305**
2	0.5	950	950	5000	5000	2500	2300	6600	5900	**3650**
2	1.2	1800	1800	15000	15000	5700	9200	15000	19000	**10313**
2	1.2+X	1500	1500	12000	12000	4400	7500	10800	17000	**8338**
2	2.0	1030	1030	19000	19000	3800	8500	10000	21000	**10420**
2	4.0	730	730	13000	13000	2600	5700	7300	16000	**7383**
3	0.5	1000	1000	2100	2100	2800	2700	6200	4900	**2850**
3	1.2	2500	2500	4900	4900	6200	8100	12000	13000	**6763**
3	1.2+X	1900	1900	5100	5100	6100	16000	15000	18000	**8638**
3	2.0	4300	4300	8000	8000	12000	13000	24000	26000	**12450**
3	4.0	2300	2300	5900	5900	8600	10000	16000	24000	**9375**
6	0.5	1060	1060	5800	5800	2800	3300	5000	6000	**3853**
6	1.2	3100	3100	13000	13000	6000	8900	14000	17000	**9763**
6	1.2+X	3100	3100	15000	15000	6300	9600	15000	18000	**10638**
6	2.0	4700	4700	13000	13000	10700	16000	24000	28000	**14263**
6	4.0	2600	2600	26000	26000	11000	18000	27000	36000	**18650**
12	0.5	1040	1040	1300	1300	3100	2600	4800	5900	**2635**
12	1.2	1900	1900	2200	2200	6300	8200	20000	21000	**7963**
12	1.2+X	2500	2500	3700	3700	6200	8600	16000	21000	**8025**
12	2.0	2400	2400	5000	5000	2800	7700	16000	22000	**7913**
12	4.0	3500	3500	3600	3600	6700	9700	17000	29000	**9575**
18	0.5	1200	1200	4700	4700	2200	3100	5500	7300	**3738**
18	1.2	1400	1400	8700	8700	3200	5500	8600	13000	**6313**
18	1.2+X	2200	2200	14000	14000	5200	8400	14000	18000	**9750**
18	2.0	1300	1300	2800	2800	3900	6900	12000	18000	**6125**
18	4.0	2800	2800	20000	20000	7700	15000	24000	24000	**14538**
24	0.5	750	750	3600	3600	2200	3100	6000	8300	**3538**
24	1.2	850	850	10000	10000	3300	7000	10000	16000	**7250**
24	1.2+X	1400	1400	13000	13000	4800	7900	14000	18000	**9188**
24	2.0	530	530	1100	1100	2200	4400	8600	11800	**3783**
24	4.0	380	380	2100	2100	1600	3600	6900	19000	**4508**
36	0.5	700	700	1060	1060	2000	2900	2800	2900	**1765**
36	1.2	1030	1030	1800	1800	3300	6000	9900	16000	**5108**
36	1.2+X	1300	1300	1900	1900	3500	5800	5600	13000	**4288**
36	2.0	650	650	990	990	2100	3500	6900	13000	**3598**
36	4.0	750	750	1300	1300	2800	4600	9000	16000	**4563**
52	0.5	500	500	790	790	1080	2100	3400	4100	**1658**
52	1.2	1000	1000	2100	2100	3400	6400	10400	18000	**5550**
52	1.2+X	630	630	1090	1090	1700	3300	5700	8800	**2868**
52	2.0	670	670	1400	1400	2200	4900	7800	13000	**4005**
52	4.0	340	340	680	680	1080	2500	5000	8000	**2328**

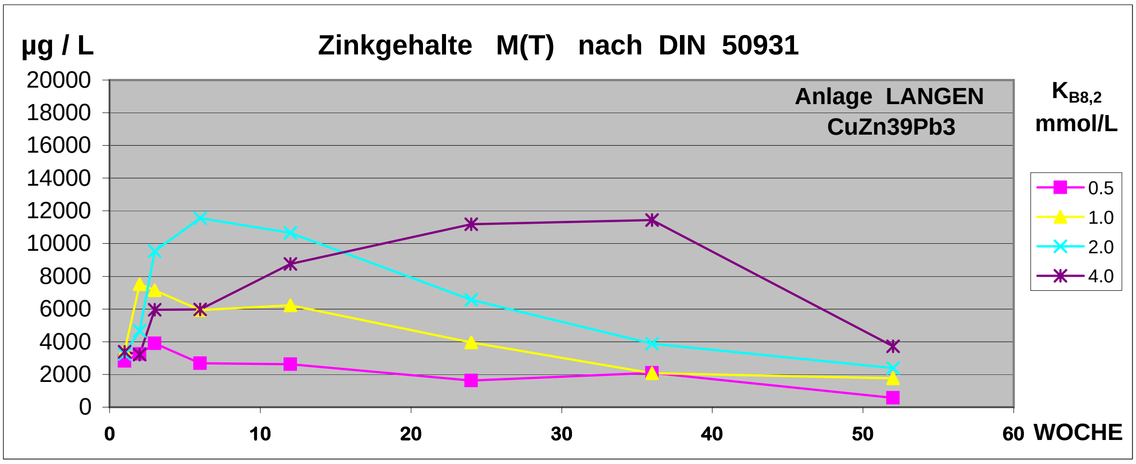
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

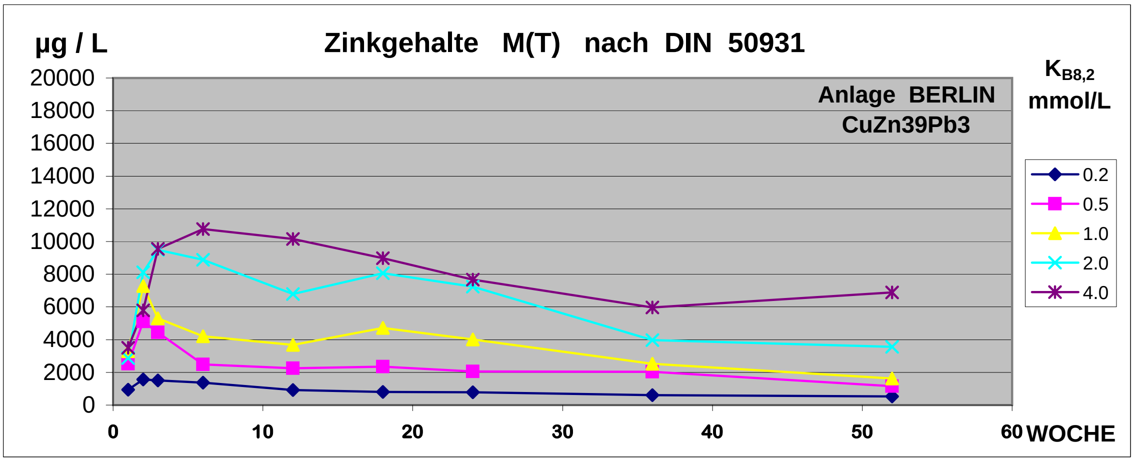
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	260	260	550	550	850	1300	2800	2900	
	MAX	4700	4700	26000	26000	12000	18000	27000	36000	
	Mittelwe	1464	1464	6126	6126	4058	6518	10664	14891	
	50% Perc	1040	1040	3600	3600	3200	5800	9000	16000	
	90% Perc	2980	2980	14600	14600	7300	11800	18800	24000	
	95% Perc	3420	3420	18200	18200	10280	15800	24000	27600	
WÜRZBURG	**99% Perc**	4524	4524	23360	23360	11560	17120	25680	32920	WÜRZBURG

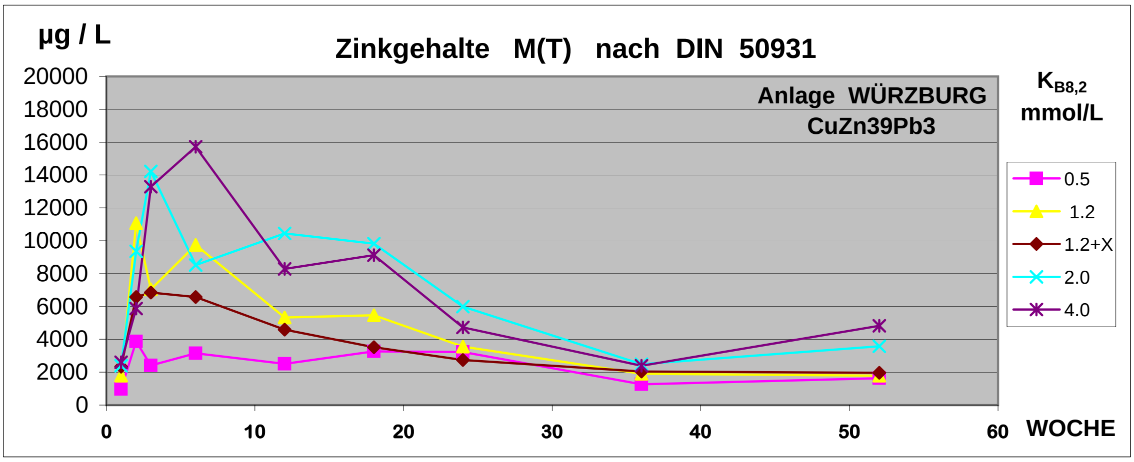
A 6 Zn

Zinkgehalte nach M (T) **Werkstoff : CuZn39Pb3**









Legierung D ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	40	40	70	70	50	160	1400	360	**274**
1	0.5	100	100	220	220	440	460	790	2000	**541**
1	1.0	220	220	410	410	670	1300	2300	4900	**1304**
1	2.0	140	140	270	270	430	730	1800	3200	**873**
1	4.0	220	220	470	470	770	1100	2600	5200	**1381**
2	0,04	60	60	90	90	110	180	280	300	**146**
2	0.5	140	140	250	250	510	950	2000	4000	**1030**
2	1.0	180	180	340	340	640	1400	2500	4300	**1235**
2	2.0	170	170	300	300	570	960	1800	3900	**1021**
2	4.0	270	270	460	460	790	1700	3200	6000	**1644**
3	0,04	50	50	70	70	120	160	220	370	**139**
3	0.5	140	140	230	230	430	750	1400	2400	**715**
3	1.0	170	170	320	320	590	990	2100	3800	**1058**
3	2.0	180	180	320	320	610	960	2300	3900	**1096**
3	4.0	260	260	470	470	900	1700	3500	5600	**1645**
6	0,04	70	70	60	60	110	110	200	290	**121**
6	0.5	90	90	170	170	250	420	930	1900	**503**
6	1.0	200	200	330	330	340	740	2600	2400	**893**
6	2.0	160	160	280	280	470	850	2100	3400	**963**
6	4.0	240	240	450	450	730	1600	3300	5200	**1526**
12	0,04	60	60	120	120	160	240	310	350	**178**
12	0.5	80	80	140	140	240	450	940	1700	**471**
12	1.0	90	90	180	180	290	530	1080	1800	**530**
12	2.0	140	140	250	250	410	820	1800	3100	**864**
12	4.0	240	240	460	460	770	1600	3200	5300	**1534**
18	0,04	60	60	90	90	140	180	250	330	**150**
18	0.5	110	110	180	180	300	570	1400	2200	**631**
18	1.0	120	120	210	210	430	840	1500	2500	**741**
18	2.0	140	140	260	260	450		1900	3400	**936**
18	4.0	270	270	480	480	860	1800	3700	6200	**1758**
24	0,04	70	70	110	110	200	240	340	430	**196**
24	0.5	110	110	310	310	270	520	960	2500	**636**
24	1.0	130	130	230	230	370	670	1400	2600	**720**
24	2.0	180	180	350	350	580	1200	2500	4500	**1230**
24	4.0	340	340	690	690	1090	2500	4900	8200	**2344**
36	0,04	80	80	90	90	130	170	230	350	**153**
36	0.5	90	90	160	160	250	480	950	1060	**405**
36	1.0	100	100	220	220	320	550	990	2100	**575**
36	2.0	180	180	340	340	580	1040	2400	4400	**1183**
36	4.0	320	320	620	620	1070	2300	4400	7600	**2156**
52	0,04	60	60	130	130	130	230	320	430	**186**
52	0.5	90	90	140	140	230	420	820	1500	**429**
52	1.0	90	90	180	180	300	560	1100	2300	**600**
52	2.0	180	180	390	390	710	1400	3100	5100	**1431**
52	4.0	430	430	840	840	1700	3100	6100	9400	**2855**
	MIN	40	40	60	60	50	110	200	290	
	MAX	430	430	840	840	1700	3100	6100	9400	
	Mittelwe	152	152	283	283	478	901	1865	3173	
	50% Per	140	140	250	250	430	745	1800	2600	
	90% Per	266	266	470	470	832	1700	3420	5840	
	95% Per	310	310	592	592	1036	2225	4260	7320	
THALFANG	**99% Per**	390	390	774	774	1432	2842	5572	8872	THALFANG

Legierung D   ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	950	950	1200	1200	1900	3200	7900	5200	**2813**
1	1.0	850	850	1070	1070	2300	3900	7100	10500	**3455**
1	2.0	520	520	910	910	1700	3900	6800	10700	**3245**
1	4.0	580	580	990	990	1800	4100	7400	10700	**3393**
2	0.5	1400	1400	1600	1600	2800	4700	6400	6100	**3250**
2	1.0	2500	2500	3000	3000	5800	8400	15000	20000	**7525**
2	2.0	1000	1000	1300	1300	2900	4800	10000	15000	**4663**
2	4.0	610	610	860	860	1600	3600	6500	11000	**3205**
3	0.5	860	860	1600	1600	4700	4700	7100	9800	**3903**
3	1.0	1600	1600	2900	2900	5200	9000	19000	15000	**7150**
3	2.0	2800	2800	4000	4000	7200	9900	19600	26000	**9538**
3	4.0	1000	1000	1900	1900	3600	6300	13000	19000	**5963**
6	0.5	520	520	990	990	1900	3500	5800	7200	**2678**
6	1.0	860	860	2200	2200	3600	6300	12500	19000	**5940**
6	2.0	2600	2600	5100	5100	9000	15500	23000	29500	**11550**
6	4.0	810	810	1900	1900	3300	6100	12500	20500	**5978**
12	0.5	500	500	780	780	1800	2900	5600	8200	**2633**
12	1.0	920	920	1800	1800	3800	5600	13000	22000	**6230**
12	2.0	2200	2200	4000	4000	7900	12000	23000	30000	**10663**
12	4.0	1500	1500	2900	2900	6000	8300	19000	28000	**8763**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	280	280	440	440	1200	1800	3000	5500	**1618**
24	1.0	680	680	1400	1400	2800	4500	8200	12000	**3958**
24	2.0	870	870	1900	1900	3500	6400	14000	23000	**6555**
24	4.0	2900	2900	5000	5000	6700	14000	22000	31000	**11188**
36	0.5	300	300	650	650	920	2100	3800	8100	**2103**
36	1.0	270	270	560	560	1010	2000	4100	7800	**2071**
36	2.0	510	510	1050	1050	2400	3800	7700	14000	**3878**
36	4.0	2200	2200	5100	5100	8000	10900	23000	35000	**11438**
52	0.5	100	100	200	200	280	560	1070	2000	**564**
52	1.0	240	240	390	390	800	1900	3800	6300	**1758**
52	2.0	300	300	760	760	1300	2300	5100	8300	**2390**
52	4.0	470	470	800	800	1900	3900	7400	14000	**3718**
	MIN	100	100	200	200	280	560	1070	2000	
	MAX	2900	2900	5100	5100	9000	15500	23000	35000	
	Mittelwer	1053	1053	1852	1852	3425	5652	10730	15325	
	50% Perc	855	855	1350	1350	2800	4600	7800	13000	
	90% Perc	2470	2470	4000	4000	7150	10800	21760	29350	
	95% Perc	2690	2690	5045	5045	7945	12900	23000	30450	
	99% Perc	2869	2869	5100	5100	8690	15035	23000	33760	

Legierung D ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	260	260	430	430	910	1500	2600	1050	**930**
1	0.5	510	510	900	900	2200	5000	6500	3700	**2528**
1	1.0	670	670	1200	1200	3200	6800	7600	4900	**3280**
1	2.0	740	740	1400	1400	3100	6200	4000	5500	**2885**
1	4.0	860	860	1900	1900	3400	6900	8600	3600	**3503**
2	0.2	440	440	690	690	1200	1800	2800	4400	**1558**
2	0.5	1400	1400	2900	2900	4600	5500	9100	13000	**5100**
2	1.0	2000	2000	2100	2100	5800	8300	14000	22000	**7288**
2	2.0	1700	1700	3100	3100	6000	8300	18000	23000	**8113**
2	4.0	1100	1100	2500	2500	3200	8000	10000	18000	**5800**
3	0.2	560	560	600	600	960	1700	3000	4000	**1498**
3	0.5	1040	1040	3100	3100	2500	4200	12000	8600	**4448**
3	1.0	1500	1500	1900	1900	2200	5700	9800	18000	**5313**
3	2.0	2900	2900	3400	3400	6600	9800	20000	27000	**9500**
3	4.0	2400	2400	3400	3400	6100	8700	21000	29000	**9550**
6	0.2	450	450	520	520	880	1300	2900	4000	**1378**
6	0.5	730	730	780	780	1800	2400	5200	7400	**2478**
6	1.0	1060	1060	1500	1500	3000	4000	8500	13000	**4203**
6	2.0	2400	2400	3800	3800	6400	8200	19000	25000	**8875**
6	4.0	3200	3200	4700	4700	8500	8800	23000	30000	**10763**
12	0.2	320	320	400	400	540	880	1900	2600	**920**
12	0.5	590	590	780	780	1500	2300	4700	6700	**2243**
12	1.0	980	980	1500	1500	2300	4000	8100	10090	**3681**
12	2.0	1900	1900	3200	3200	5500	4800	8900	25000	**6800**
12	4.0	2600	2600	4900	4900	6900	9300	22000	28000	**10150**
18	0.2	320	320	330	330	490	780	1500	2400	**809**
18	0.5	720	720	840	840	1400	2600	4700	7000	**2353**
18	1.0	1400	1400	1700	1700	2800	4900	8800	15000	**4713**
18	2.0	1700	1700	2900	2900	5200	9100	17000	24000	**8063**
18	4.0	3400	3400	4400	4400	3900	7300	14000	31000	**8975**
24	0.2	200	200	340	340	470	770	1500	2400	**778**
24	0.5	420	420	760	760	1090	2100	3900	7000	**2056**
24	1.0	730	730	1300	1300	2300	4300	7500	14000	**4020**
24	2.0	1000	1000	2000	2000	4800	8100	16000	23000	**7238**
24	4.0	1400	1400	2400	2400	4200	7500	15000	27000	**7663**
36	0.2	240	240	310	310	450	630	1000	1700	**610**
36	0.5	560	560	750	750	1400	2400	4000	5900	**2040**
36	1.0	760	760	970	970	1700	2700	4800	7600	**2533**
36	2.0	720	720	1500	1500	2100	3800	7400	14000	**3968**
36	4.0	1700	1700	3100	3100	3200	5500	10400	19000	**5963**
52	0.2	260	260	320	320	380	510	840	1300	**524**
52	0.5	410	410	600	600	640	1080	2400	3100	**1155**
52	1.0	470	470	680	680	860	1700	3000	5100	**1620**
52	2.0	650	650	1020	1020	1900	3500	6700	13000	**3555**
52	4.0	1300	1300	2300	2300	4600	8300	14000	21000	**6888**
	MIN	200	200	310	310	380	510	840	1050	
	MAX	3400	3400	4900	4900	8500	9800	23000	31000	
	Mittelwer	1126	1126	1780	1780	2959	4710	8836	12934	
	50% Perc	760	760	1500	1500	2300	4300	7600	10090	
	90% Perc	2400	2400	3400	3400	6060	8540	18600	27000	
	95% Perc	2840	2840	4280	4280	6560	9040	20800	28800	
BERLIN	**99% Perc**	3312	3312	4812	4812	7796	9580	22560	30560	BERLIN

Legierung D ZINKKONZENTRATION NACH STAGNATION (µg / L)

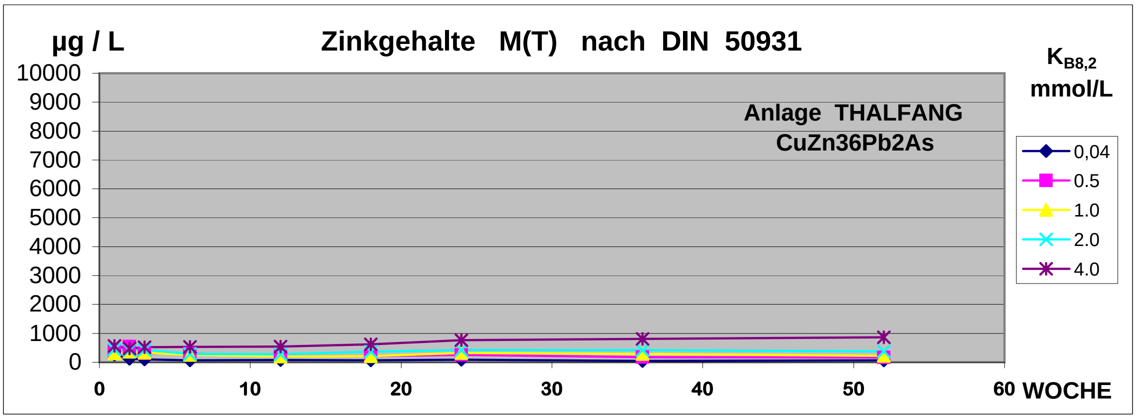
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	250	250	340	340	490	780	2000	3400	**981**
1	1.2	280	280	590	590	960	1700	3800	6100	**1788**
1	1.2+X	380	380	830	830	1500	2400	4900	7400	**2328**
1	2.0	370	370	720	720	1200	2500	4800	8500	**2398**
1	4.0	380	380	810	810	1500	2800	5300	8800	**2598**
2	0.5	970	970	5000	5000	2500	2700	6700	7100	**3868**
2	1.2	1700	1700	17000	17000	5700	9500	16000	20000	**11075**
2	1.2+X	890	890	9400	9400	2800	5700	8500	15000	**6573**
2	2.0	810	810	18000	18000	2800	7500	7900	19000	**9353**
2	4.0	610	610	9500	9500	2000	4600	6200	14000	**5878**
3	0.5	780	780	1700	1700	2100	2700	5000	4600	**2420**
3	1.2	1700	1700	3900	3900	5600	7600	15000	17000	**7050**
3	1.2+X	1400	1400	3800	3800	4700	7700	14000	18000	**6850**
3	2.0	4000	4000	8900	8900	13000	16000	32000	27000	**14225**
3	4.0	2200	2200	5700	5700	8400	9100	22000	51000	**13288**
6	0.5	900	900	4400	4400	2100	2600	4100	5800	**3150**
6	1.2	1700	1700	13000	13000	4000	6500	18000	20000	**9738**
6	1.2+X	1200	1200	8800	8800	2900	5000	8700	16000	**6575**
6	2.0	2900	2900	6300	6300	6700	12000	21000	10000	**8513**
6	4.0	3700	3700	22000	22000	8400	15000	22000	29000	**15725**
12	0.5	910	910	980	980	3300	2400	4200	6400	**2510**
12	1.2	1060	1060	1400	1400	3700	5100	12000	17000	**5340**
12	1.2+X	2300	2300	1000	1000	2900	4100	8100	15000	**4588**
12	2.0	3000	3000	3200	3200	10000	9200	22000	30000	**10450**
12	4.0	880	880	2400	2400	6100	7700	16000	30000	**8295**
18	0.5	810	810	4000	4000	1700	2600	4900	7300	**3265**
18	1.2	910	910	6000	6000	2700	4700	8500	14000	**5465**
18	1.2+X	630	630	4900	4900	1500	2700	5200	7700	**3520**
18	2.0	1700	1700	14000	14000	4000	7200	14000	22000	**9825**
18	4.0	1200	1200	5700	5700	5700	9500	20000	24000	**9125**
24	0.5	640	640	2900	2900	1900	2900	5700	8200	**3223**
24	1.2	380	380	5000	5000	1400	2600	5300	8500	**3570**
24	1.2+X	400	400	3900	3900	1000	2000	4000	6400	**2750**
24	2.0	700	700	8100	8100	2500	4600	9300	14000	**6000**
24	4.0	230	230	1400	1400	1700	3900	6900	22000	**4720**
36	0.5	620	620	890	890	1600	3000	1070	1400	**1261**
36	1.2	360	360	530	530	1000	1900	3900	6700	**1910**
36	1.2+X	470	470	620	620	1300	2000	4100	6700	**2035**
36	2.0	550	550	770	770	1500	2500	5100	8200	**2493**
36	4.0	1070	1070	1800	1800	3800	6400	2200	1030	**2396**
52	0.5	430	430	710	710	1070	1900	3500	4300	**1631**
52	1.2	330	330	610	610	830	1900	3700	6000	**1789**
52	1.2+X	500	500	820	820	1060	1300	4000	6700	**1963**
52	2.0	600	600	1500	1500	1800	4100	6500	12000	**3575**
52	4.0	640	640	1500	1500	2300	4700	9300	18000	**4823**

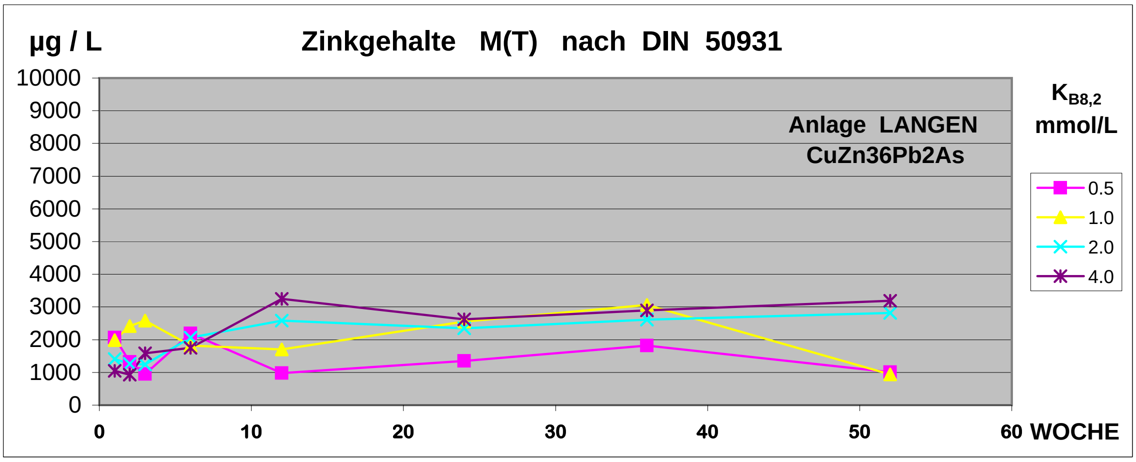
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

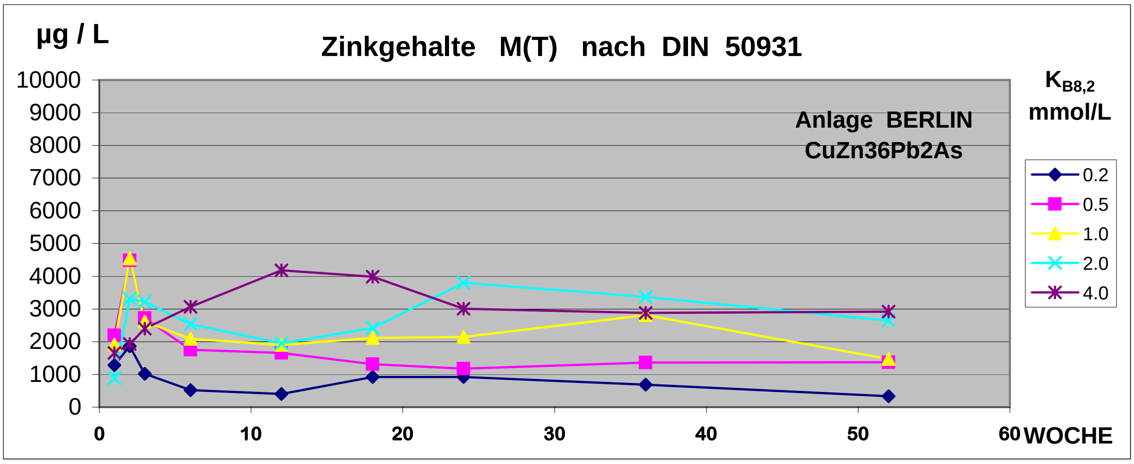
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	230	230	340	340	490	780	1070	1030	
	MAX	4000	4000	22000	22000	13000	16000	32000	51000	
	Mittelwer	1076	1076	4785	4785	3238	5006	9275	13583	
	50% Perc	810	810	3200	3200	2300	4100	6500	10000	
	90% Perc	2260	2260	11600	11600	6460	9380	20600	25800	
	95% Perc	2980	2980	16400	16400	8400	11500	22000	29800	
WÜRZBURG	**99% Perc**	3868	3868	20240	20240	11680	15560	27600	41760	WÜRZBURG

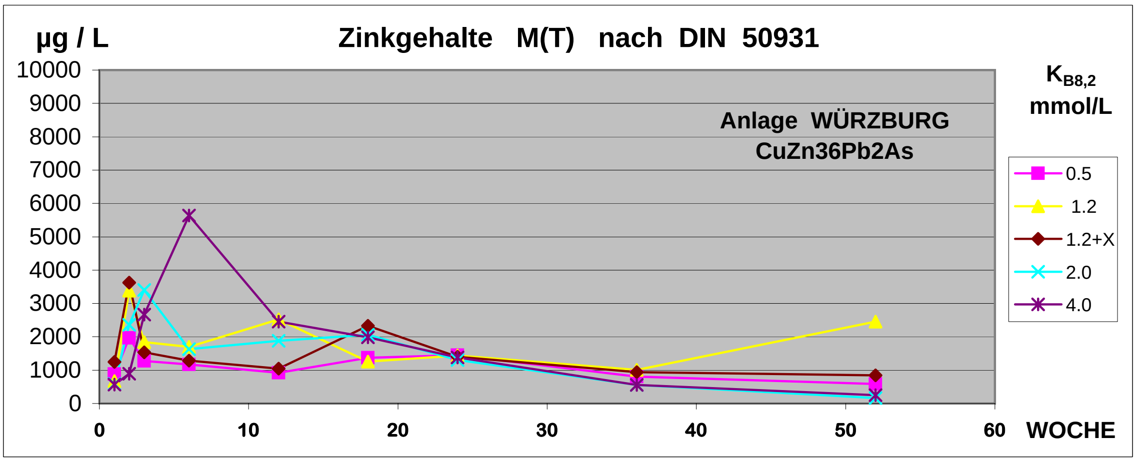
A 6 Zn

Zinkgehalte nach M (T) **Werkstoff : CuZn36Pb2As**









Legierung E **ZINKKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	40	40	70	70	50	120	1400	300	**261**
1	0.5	70	70	130	130	260	380	710	1400	**394**
1	1.0	100	100	180	180	320	480	70	1070	**313**
1	2.0	100	100	180	180	320	530	190	1900	**438**
1	4.0	90	90	180	180	380	590	840	2200	**569**
2	0,04	50	50	60	60	90	140	220	280	**119**
2	0.5	90	90	140	140	270	540	940	2100	**539**
2	1.0	80	80	130	130	230	460	120	1700	**366**
2	2.0	100	100	150	150	260	500	230	1900	**424**
2	4.0	100	100	180	180	310	530	730	1700	**479**
3	0,04	30	30	50	50	90	120	170	290	**104**
3	0.5	60	60	100	100	180	330	610	1070	**314**
3	1.0	70	70	120	120	230	400	160	1500	**334**
3	2.0	90	90	160	160	300	480	280	1900	**433**
3	4.0	100	100	180	180	350	570	940	1700	**515**
6	0,04	40	40	30	30	60	50	130	180	**70**
6	0.5	50	50	90	90	150	290	640	1040	**300**
6	1.0	80	80	140	140	160	340	180	950	**259**
6	2.0	70	70	110	110	200	350	320	1100	**291**
6	4.0	120	120	230	230	300	560	1030	1700	**536**
12	0,04	30	30	40	40	60	110	160	190	**83**
12	0.5	40	40	70	70	100	210	400	700	**204**
12	1.0	50	50	70	70	130	220	190	800	**198**
12	2.0	60	60	90	90	150	290	520	970	**279**
12	4.0	90	90	170	170	280	580	1300	1700	**548**
18	0,04	30	30	40	40	60	80	110	160	**69**
18	0.5	40	40	60	60	110	200	430	730	**209**
18	1.0	50	50	90	90	140		200	820	**206**
18	2.0	60	60	140	140	170	310	540	1500	**365**
18	4.0	110	110	190	190	300	530	1300	2200	**616**
24	0,04	20	20	40	40	70	110	150	220	**84**
24	0.5	40	40	80	80	140	250	490	890	**251**
24	1.0	70	70	110	110	180	340	190	1500	**321**
24	2.0	70	70	120	120	200	420	690	1700	**424**
24	4.0	140	140	200	200	340	660	1500	2900	**760**
36	0,04	30	30	30	30	30	40	80	80	**44**
36	0.5	40	40	60	60	100	180	370	590	**180**
36	1.0	60	60	110	110	180	340	170	1300	**291**
36	2.0	60	60	120	120	220	410	760	1600	**419**
36	4.0	120	120	210	210	400	780	1600	3000	**805**
52	0,04	20	20	40	40	40	70	120	150	**63**
52	0.5	30	30	50	50	80	170	340	550	**163**
52	1.0	50	50	100	100	150	210	150	1000	**226**
52	2.0	60	60	110	110	200	350	640	1500	**379**
52	4.0	110	110	210	210	390	650	2000	3200	**860**
	MIN	20	20	30	30	30	40	70	80	
	MAX	140	140	230	230	400	780	2000	3200	
	Mittelwer	67	67	115	115	194	347	540	1243	
	50% Perc	60	60	110	110	180	340	370	1100	
	90% Perc	106	106	186	186	332	577	1300	2160	
	95% Perc	118	118	208	208	374	641	1480	2760	
THALFANG	**99% Perc**	131	131	221	221	396	728	1824	3112	THALFANG

Legierung E **ZINKKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	540	540	670	670	1200	2300	5200	5400	**2065**
1	1.0	300	300	520	520	880	2100	4200	7100	**1990**
1	2.0	210	210	350	350	680	1400	2900	5200	**1413**
1	4.0	150	150	250	250	480	930	2200	4000	**1051**
2	0.5	210	210	370	370	670	1900	2800	4000	**1316**
2	1.0	470	470	650	650	1200	2600	4900	8400	**2418**
2	2.0	210	210	310	310	610	1040	2200	5200	**1261**
2	4.0	230	230	260	260	450	790	1800	3400	**928**
3	0.5	140	140	260	260	540	880	1900	3500	**953**
3	1.0	330	330	670	670	1500	3000	5500	8700	**2588**
3	2.0	210	210	360	360	600	1300	2400	4500	**1243**
3	4.0	270	270	500	500	840	1500	3300	5500	**1585**
6	0.5	340	340	720	720	1100	2600	4700	7000	**2190**
6	1.0	250	250	520	520	850	1900	3500	6800	**1824**
6	2.0	330	330	650	650	1040	2000	4200	7300	**2063**
6	4.0	220	220	420	420	720	1600	3100	7300	**1750**
12	0.5	170	170	300	300	560	850	2000	3500	**981**
12	1.0	270	270	440	440	890	1600	3300	6400	**1701**
12	2.0	490	490	790	790	1800	3000	4100	9200	**2583**
12	4.0	560	560	1100	1100	2100	3400	6600	10600	**3253**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	210	210	360	360	780	1400	2500	5000	**1353**
24	1.0	400	400	730	730	1600	2800	5100	8700	**2558**
24	2.0	330	330	620	620	1400	2400	4600	8500	**2350**
24	4.0	400	400	720	720	1600	2800	5200	9100	**2618**
36	0.5	230	230	530	530	840	1800	3400	7000	**1820**
36	1.0	430	430	960	960	1800	3800	6600	9500	**3060**
36	2.0	370	370	820	820	1700	2900	5400	8500	**2610**
36	4.0	430	430	940	940	1800	3100	5800	9700	**2893**
52	0.5	150	150	310	310	480	1050	2200	3400	**1006**
52	1.0	100	100	150	150	380	1020	1800	3800	**938**
52	2.0	470	470	1070	1070	1500	3300	6000	8700	**2823**
52	4.0	530	530	910	910	2000	3800	6800	10000	**3185**
	MIN	100	100	150	150	380	790	1800	3400	
	MAX	560	560	1100	1100	2100	3800	6800	10600	
	Mittelwer	311	311	570	570	1081	2089	3944	6716	
	50% Perc	285	285	525	525	885	1950	3800	7000	
	90% Perc	488	488	937	937	1800	3280	5980	9470	
	95% Perc	535	535	1010	1010	1890	3580	6600	9835	
	99% Perc	554	554	1091	1091	2069	3800	6738	10414	

Legierung E **ZINKKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	380	380	640	640	1300	2100	3100	1700	**1280**
1	0.5	470	470	790	790	2200	4000	5700	3100	**2190**
1	1.0	370	370	610	610	1400	3200	4700	4000	**1908**
1	2.0	390	390	640	640	720	2200	1400	710	**886**
1	4.0	360	360	670	670	1300	2400	4300	3200	**1658**
2	0.2	510	510	790	790	1060	2300	3400	5500	**1858**
2	0.5	1050	1050	2500	2500	2900	4300	6600	15000	**4488**
2	1.0	1040	1040	2100	2100	2300	4500	7300	16000	**4548**
2	2.0	630	630	1400	1400	2500	4200	8600	7100	**3308**
2	4.0	350	350	520	520	980	2000	4200	6500	**1928**
3	0.2	390	390	390	390	600	960	2200	2800	**1015**
3	0.5	780	780	900	900	1500	3000	6400	7500	**2720**
3	1.0	750	750	770	770	1400	2600	5400	8500	**2618**
3	2.0	920	920	1070	1070	2300	4600	6700	8200	**3223**
3	4.0	660	660	830	830	1800	3200	1090	10100	**2396**
6	0.2	210	210	220	220	350	600	840	1500	**519**
6	0.5	450	450	580	580	1000	1900	3500	5600	**1758**
6	1.0	520	520	660	660	1400	2100	4000	6800	**2083**
6	2.0	630	630	920	920	1800	2800	5200	7400	**2538**
6	4.0	770	770	1050	1050	2200	2800	6600	9300	**3068**
12	0.2	170	170	200	200	250	420	750	1080	**405**
12	0.5	400	400	550	550	880	1800	3300	5400	**1660**
12	1.0	460	460	570	570	950	2100	3700	6400	**1901**
12	2.0	480	480	630	630	1050	2100	3900	6300	**1946**
12	4.0	980	980	1600	1600	2700	4300	8300	13000	**4183**
18	0.2	310	310	310	310	500	860	1700	3100	**925**
18	0.5	350	350	390	390	650	1400	2500	4500	**1316**
18	1.0	470	470	590	590	1030	2300	4100	7400	**2119**
18	2.0	570	570	720	720	1500	2800	4800	7700	**2423**
18	4.0	950	950	1400	1400	2100	4100	7000	14000	**3988**
24	0.2	180	180	310	310	500	880	1800	3200	**920**
24	0.5	210	210	360	360	610	1050	2300	4300	**1175**
24	1.0	320	320	580	580	1070	2300	4300	7700	**2146**
24	2.0	600	600	1070	1070	2400	4400	7300	13000	**3805**
24	4.0	430	430	800	800	1700	3100	5800	11000	**3008**
36	0.2	230	230	290	290	480	700	1200	2100	**690**
36	0.5	290	290	420	420	690	1500	2700	4600	**1364**
36	1.0	580	580	950	950	1600	3200	5800	8800	**2808**
36	2.0	780	780	1400	1400	2100	3900	6600	10000	**3370**
36	4.0	530	530	930	930	1500	3000	5800	9800	**2878**
52	0.2	210	210	230	230	260	280	470	740	**329**
52	0.5	380	380	560	560	710	1400	2600	4400	**1374**
52	1.0	350	350	520	520	750	1500	2700	5100	**1474**
52	2.0	590	590	980	980	1900	3100	5100	7900	**2643**
52	4.0	570	570	920	920	1800	3100	5600	9900	**2923**
	MIN	170	170	200	200	250	280	470	710	
	MAX	1050	1050	2500	2500	2900	4600	8600	16000	
	Mittelwer	512	512	785	785	1349	2474	4252	6710	
	50% Perc	470	470	660	660	1300	2300	4200	6500	
	90% Perc	864	864	1400	1400	2300	4260	6880	12200	
	95% Perc	974	974	1560	1560	2480	4380	7300	13800	
BERLIN	**99% Perc**	1046	1046	2324	2324	2812	4556	8468	15560	BERLIN

Legierung E ZINKKONZENTRATION NACH STAGNATION (µg / L)

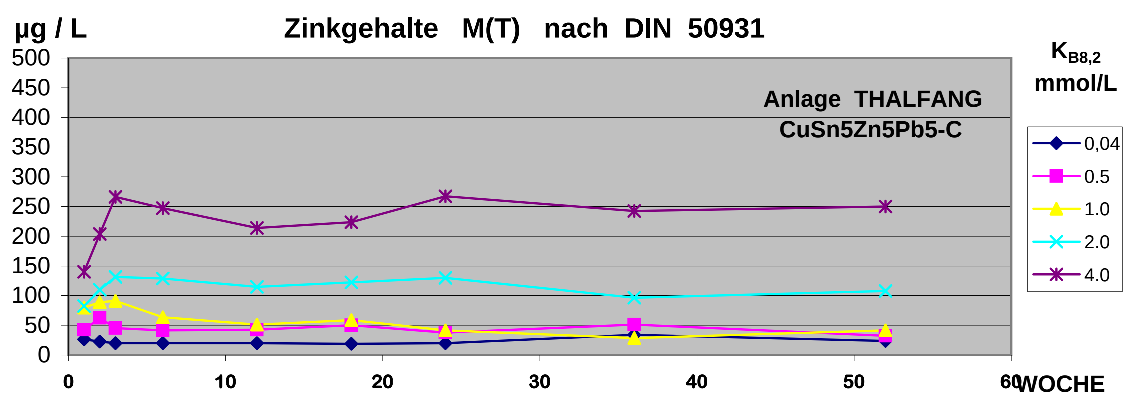
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	140	140	280	280	440	570	2300	2900	**881**
1	1.2	110	110	220	220	350	530	1400	2400	**668**
1	1.2+X	200	200	420	420	670	1060	2700	4300	**1246**
1	2.0	110	110	170	170	250	500	980	2400	**586**
1	4.0	110	110	160	160	270	490	1060	2200	**570**
2	0.5	440	440	2900	2900	1040	1500	3400	3100	**1965**
2	1.2	390	390	5400	5400	1500	2700	4300	7000	**3385**
2	1.2+X	500	500	5300	5300	1500	2400	5500	8000	**3625**
2	2.0	200	200	4800	4800	590	1800	1800	4700	**2361**
2	4.0	130	130	1050	1050	370	740	1100	2600	**896**
3	0.5	370	370	690	690	980	1500	2900	2700	**1275**
3	1.2	330	330	640	640	1050	1800	4200	5700	**1836**
3	1.2+X	340	340	710	710	850	1800	3000	4500	**1531**
3	2.0	610	610	1400	1400	2300	3400	7700	9800	**3403**
3	4.0	380	380	1500	1500	1500	2700	5100	8300	**2670**
6	0.5	290	290	1800	1800	630	910	1900	1700	**1165**
6	1.2	320	320	2300	2300	670	1400	2300	4000	**1701**
6	1.2+X	360	360	1800	1800	600	990	1900	2500	**1289**
6	2.0	410	410	1200	1200	890	1600	3100	4200	**1626**
6	4.0	2800	2800	4000	4000	5000	7400	13000	6100	**5638**
12	0.5	230	230	250	250	620	770	1800	3200	**919**
12	1.2	660	660	790	790	2200	2900	5000	7200	**2525**
12	1.2+X	330	330	360	360	910	900	1900	3300	**1049**
12	2.0	500	500	550	550	1500	2000	4100	5300	**1875**
12	4.0	620	620	700	700	1900	2400	5800	6900	**2455**
18	0.5	300	300	1600	1600	630	960	3600	2000	**1374**
18	1.2	290	290	1400	1400	610	990	2000	3100	**1260**
18	1.2+X	3900	3900	1900	1900	670	1040	2000	3300	**2326**
18	2.0	430	430	1900	1900	900	1700	3400	5800	**2058**
18	4.0	330	330	2000	2000	980	1900	3300	5000	**1980**
24	0.5	210	210	2000	2000	620	950	2100	3500	**1449**
24	1.2	240	240	1500	1500	620	1300	2300	3800	**1438**
24	1.2+X	320	320	2100	2100	610	970	1900	2900	**1403**
24	2.0	200	200	890	890	570	1080	2600	4000	**1304**
24	4.0	160	160	350	350	720	1500	3000	4800	**1380**
36	0.5	240	240	350	350	540	810	680	3200	**801**
36	1.2	250	250	340	340	620	960	2000	3300	**1008**
36	1.2+X	310	310	370	370	580	860	1800	2900	**938**
36	2.0	170	170	260	260	470	820	1800	3100	**881**
36	4.0	190	190	250	250	480	780	1300	1040	**560**
52	0.5	200	200	340	340	410	650	1050	1500	**586**
52	1.2	530	530	1040	1040	1600	3200	4600	7100	**2455**
52	1.2+X	280	280	410	410	510	870	1400	2600	**845**
52	2.0	60	60	110	110	110	190	260	410	**164**
52	4.0	80	80	170	170	180	330	570	390	**246**

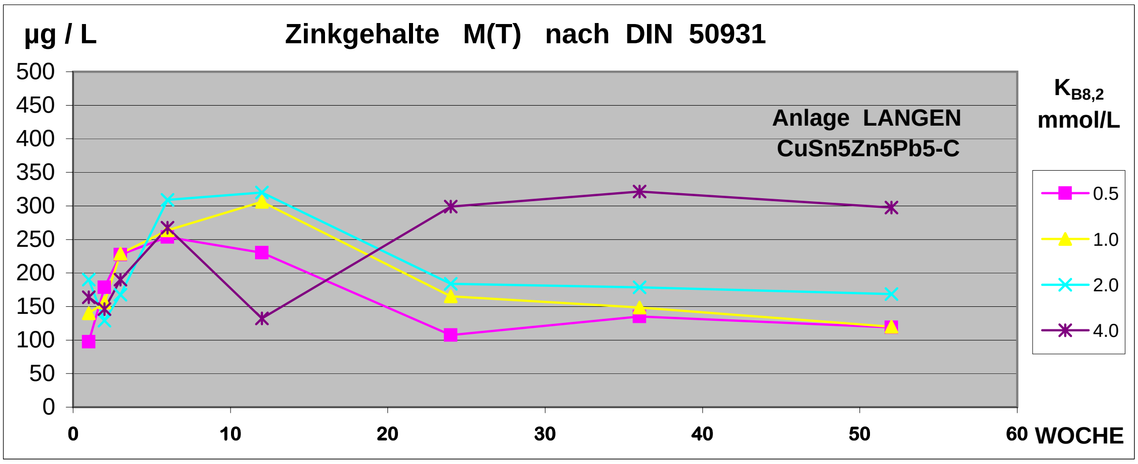
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

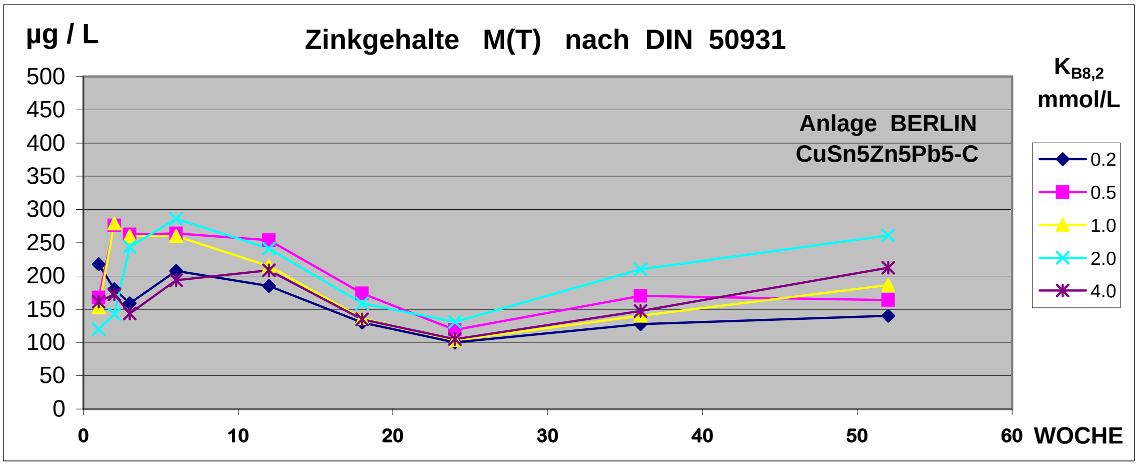
		0,5H	0,5H	1H	1H	2H	4H	8H	16H
	MIN	60	60	110	110	110	190	260	390
	MAX	3900	3900	5400	5400	5000	7400	13000	9800
	Mittelwer	435	435	1304	1304	911	1480	2887	3972
	50% Perc	300	300	790	790	630	1040	2300	3300
	90% Perc	578	578	2660	2660	1560	2700	5060	7060
	95% Perc	652	652	4640	4640	2140	3140	5740	7840
WÜRZBURG	**99% Perc**	3416	3416	5356	5356	3812	5640	10668	9140

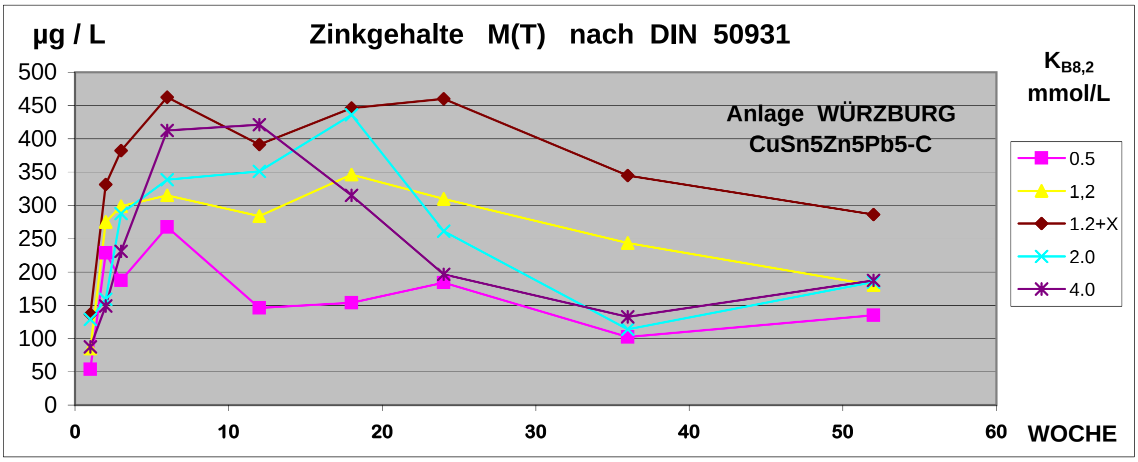
A 6 Zn

Zinkgehalte nach M (T) **Werkstoff : CuSn5Zn5Pb5-C**









Legierung F ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	20	20	20	20	20	20	70	20	**26**
1	0.5	20	20	30	30	40	40	60	100	**43**
1	1.0	30	30	50	50	60	80	120	220	**80**
1	2.0	30	30	40	40	60	90	130	240	**83**
1	4.0	40	40	60	60	100	160	230	430	**140**
2	0,04	30	30	20	20	20	20	20	20	**23**
2	0.5	20	20	40	40	40	70	100	170	**63**
2	1.0	30	30	40	40	60	100	170	240	**89**
2	2.0	40	40	50	50	70	120	200	310	**110**
2	4.0	60	60	90	90	150	260	240	680	**204**
3	0,04	20	20	20	20	20	20	20	20	**20**
3	0.5	20	20	20	20	30	50	80	120	**45**
3	1.0	30	30	40	40	60	100	180	250	**91**
3	2.0	40	40	60	60	90	130	250	380	**131**
3	4.0	70	70	120	120	170	300	520	760	**266**
6	0,04	20	20	20	20	20	20	20	20	**20**
6	0.5	20	20	30	30	30	40	50	110	**41**
6	1.0	20	20	30	30	40	60	120	190	**64**
6	2.0	40	40	50	50	80	130	270	370	**129**
6	4.0	60	60	100	100	170	280	530	680	**248**
12	0,04	20	20	20	20	20	20	20	20	**20**
12	0.5	20	20	30	30	30	40	70	100	**43**
12	1.0	20	20	30	30	30	60	100	120	**51**
12	2.0	40	40	50	50	70	120	230	320	**115**
12	4.0	50	50	80	80	140	250	440	620	**214**
18	0,04	20	20	20	20	20	20	10	20	**19**
18	0.5	30	30	30	30	30	50	90	110	**50**
18	1.0	30	30	40	40	50	60	90	130	**59**
18	2.0	40	40	50	50	70	120	260	350	**123**
18	4.0	60	60	90	90	140	240	420	690	**224**
24	0,04	20	20	20	20	20	20	20	20	**20**
24	0.5	20	20	20	20	20	30	60	110	**38**
24	1.0	20	20	20	20	30	40	70	110	**41**
24	2.0	40	40	90	90	70	110	230	370	**130**
24	4.0	70	70	100	100	160	270	490	880	**268**
36	0,04	70	70	20	20	20	20	20	30	**34**
36	0.5	120	120	20	20	20	20	30	60	**51**
36	1.0	20	20	20	20	20	20	40	70	**29**
36	2.0	20	20	40	40	60	100	180	310	**96**
36	4.0	40	40	70	70	580	190	380	570	**243**
52	0,04	20	20	20	20	20	20	30	40	**24**
52	0.5	20	20	20	20	20	30	50	80	**33**
52	1.0	20	20	20	20	20	40	70	120	**41**
52	2.0	20	20	40	40	60	110	210	360	**108**
52	4.0	50	50	90	90	140	250	560	770	**250**
	MIN	20	20	20	20	20	20	10	20	
	MAX	120	120	120	120	580	300	560	880	
	Mittelwe	35	35	44	44	71	96	168	260	
	50% Pe	30	30	40	40	40	60	100	170	
	90% Pe	60	60	90	90	146	250	432	680	
	95% Pe	70	70	98	98	168	268	514	746	
THALFANG	**99% Pe**	98	98	111	111	400	291	547	832	THALFANG

Legierung F ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	60	60	50	50	70	90	190	210	**98**
1	1.0	60	60	60	60	80	130	250	420	**140**
1	2.0	40	40	70	70	100	210	400	590	**190**
1	4.0	60	60	70	70	110	170	310	460	**164**
2	0.5	70	70	80	80	120	200	350	460	**179**
2	1.0	60	60	70	70	100	150	270	470	**156**
2	2.0	50	50	60	60	110	130	230	340	**129**
2	4.0	60	60	70	70	100	150	270	390	**146**
3	0.5	60	60	90	90	160	230	430	700	**228**
3	1.0	80	80	100	100	160	230	490	590	**229**
3	2.0	50	50	80	80	100	190	300	490	**168**
3	4.0	60	60	90	90	120	190	340	570	**190**
6	0.5	90	90	130	130	180	280	480	650	**254**
6	1.0	100	100	180	180	240	310	430	570	**264**
6	2.0	120	120	190	190	260	390	530	670	**309**
6	4.0	70	70	110	110	180	270	530	800	**268**
12	0.5	80	80	100	100	170	240	440	630	**230**
12	1.0	140	140	120	120	220	310	550	850	**306**
12	2.0	90	90	120	120	220	350	620	950	**320**
12	4.0	60	60	70	70	90	120	230	360	**133**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	40	40	50	50	90	110	170	310	**108**
24	1.0	50	50	80	80	110	170	290	490	**165**
24	2.0	50	50	70	70	120	180	330	600	**184**
24	4.0	80	80	120	120	220	350	560	860	**299**
36	0.5	40	40	60	60	80	130	210	460	**135**
36	1.0	50	50	70	70	100	150	260	440	**149**
36	2.0	50	50	80	80	120	190	320	540	**179**
36	4.0	80	80	140	140	220	370	610	930	**321**
52	0.5	50	50	80	80	90	130	200	270	**119**
52	1.0	50	50	60	60	90	140	210	300	**120**
52	2.0	60	60	90	90	110	170	300	470	**169**
52	4.0	90	90	110	110	180	310	540	950	**298**
	MIN	40	40	50	50	70	90	170	210	
	MAX	140	140	190	190	260	390	620	950	
	Mittelw	67	67	91	91	138	211	364	556	
	50% Pe	60	60	80	80	115	190	325	515	
	90% Pe	90	90	129	129	220	346	549	859	
	95% Pe	109	109	158	158	229	359	583	939	
	99% Pe	134	134	187	187	254	384	617	950	

Legierung F ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	370	370	100	100	130	160	250	260	**218**
1	0.5	110	110	90	90	140	200	330	270	**168**
1	1.0	90	90	90	90	130	210	230	290	**153**
1	2.0	120	120	100	100	130	140	140	110	**120**
1	4.0	110	110	140	140	170	100	260	260	**161**
2	0.2	110	110	110	110	150	180	270	400	**180**
2	0.5	120	120	180	180	290	310	390	620	**276**
2	1.0	100	100	150	150	210	290	600	630	**279**
2	2.0	90	90	150	150	160	180	200	120	**143**
2	4.0	140	140	100	100	170	200	240	290	**173**
3	0.2	110	110	90	90	120	170	230	350	**159**
3	0.5	130	130	130	130	160	220	520	680	**263**
3	1.0	130	130	110	110	170	270	420	740	**260**
3	2.0	120	120	130	130	160	250	400	640	**244**
3	4.0	140	140	100	100	120	200	160	190	**144**
6	0.2	130	130	140	140	160	260	290	410	**208**
6	0.5	140	140	160	160	210	290	420	590	**264**
6	1.0	130	130	140	140	180	310	420	630	**260**
6	2.0	170	170	160	160	210	360	470	590	**286**
6	4.0	160	160	160	160	190	290	220	210	**194**
12	0.2	180	180	120	120	150	170	260	300	**185**
12	0.5	190	190	130	130	180	220	450	540	**254**
12	1.0	180	180	110	110	150	190	340	460	**215**
12	2.0	190	190	120	120	160	220	420	510	**241**
12	4.0	300	300	130	130	180	180	270	180	**209**
18	0.2	130	130	90	90	100	120	170	210	**130**
18	0.5	130	130	100	100	120	180	240	390	**174**
18	1.0	120	120	80	80	100	120	190	280	**136**
18	2.0	120	120	90	90	110	160	240	340	**159**
18	4.0	150	150	110	110	120	140	150	150	**135**
24	0.2	50	50	100	100	110	90	130	170	**100**
24	0.5	50	50	100	100	90	120	170	270	**119**
24	1.0	50	50	90	90	90	90	140	230	**104**
24	2.0	50	50	100	100	130	120	190	310	**131**
24	4.0	60	60	120	120	120	110	120	130	**105**
36	0.2	130	130	110	110	110	120	150	160	**128**
36	0.5	130	130	120	120	150	190	220	300	**170**
36	1.0	110	110	110	110	110	140	190	240	**140**
36	2.0	130	130	230	230	140	170	280	370	**210**
36	4.0	130	130	150	150	150	160	130	180	**148**
52	0.2	160	160	140	140	150	90	110	170	**140**
52	0.5	160	160	170	170	160	120	140	230	**164**
52	1.0	170	170	170	170	170	140	200	300	**186**
52	2.0	190	190	200	200	210	200	350	550	**261**
52	4.0	210	210	190	190	250	180	190	280	**213**
	MIN	50	50	80	80	90	90	110	110	
	MAX	370	370	230	230	290	360	600	740	
	Mittelwe	138	138	127	127	153	185	264	345	
	50% Pe	130	130	120	120	150	180	240	290	
	90% Pe	190	190	170	170	210	290	420	626	
	95% Pe	206	206	188	188	210	306	466	638	
BERLIN	**99% Pe**	339	339	217	217	272	338	565	714	BERLIN

Legierung F ZINKKONZENTRATION NACH STAGNATION (µg / L)

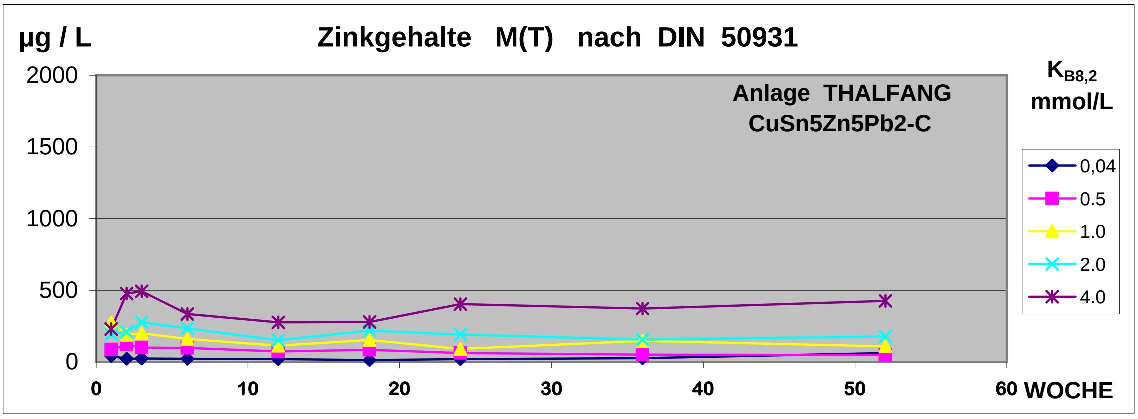
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	30	30	30	30	40	50	90	130	**54**
1	1,2	30	30	50	50	60	70	150	240	**85**
1	1.2+X	90	90	100	100	120	120	210	260	**136**
1	2.0	40	40	70	70	70	120	210	410	**129**
1	4.0	30	30	40	40	50	80	170	260	**88**
2	0.5	70	70	250	250	140	190	370	490	**229**
2	1.2	60	60	420	420	120	210	330	580	**275**
2	1.2+X	120	120	480	480	170	270	400	610	**331**
2	2.0	50	50	220	220	80	120	200	330	**159**
2	4.0	40	40	210	210	70	110	180	330	**149**
3	0.5	70	70	120	120	160	200	370	390	**188**
3	1.2	70	70	200	200	200	300	570	780	**299**
3	1.2+X	170	170	290	290	300	420	630	790	**383**
3	2.0	90	90	210	210	200	300	500	700	**288**
3	4.0	130	130	180	180	210	250	350	420	**231**
6	0.5	90	90	370	370	140	180	320	580	**268**
6	1.2	160	160	390	390	200	270	410	540	**315**
6	1.2+X	250	250	570	570	300	420	570	770	**463**
6	2.0	170	170	430	430	230	340	390	550	**339**
6	4.0	190	190	350	350	320	510	610	780	**413**
12	0.5	70	70	70	70	140	140	230	380	**146**
12	1.2	140	140	150	150	230	290	500	670	**284**
12	1.2+X	220	220	230	230	420	400	580	830	**391**
12	2.0	160	160	170	170	310	360	650	830	**351**
12	4.0	120	120	170	170	310	360	720	1400	**421**
18	0.5	70	70	160	160	90	130	200	350	**154**
18	1.2	120	120	460	460	200	290	480	640	**346**
18	1.2+X	220	220	570	570	280	390	560	760	**446**
18	2.0	140	140	380	380	270	410	720	1050	**436**
18	4.0	80	80	160	160	220	330	570	920	**315**
24	0.5	60	60	180	180	120	160	300	410	**184**
24	1.2	90	90	410	410	170	260	430	620	**310**
24	1.2+X	200	200	590	590	300	390	600	810	**460**
24	2.0	80	80	140	140	160	270	500	720	**261**
24	4.0	50	50	70	70	90	190	320	730	**196**
36	0.5	70	70	80	80	110	190	80	140	**103**
36	1.2	90	90	110	110	180	250	440	680	**244**
36	1.2+X	200	200	210	210	290	330	540	780	**345**
36	2.0	70	70	90	90	130	250	110	100	**114**
36	4.0	80	80	100	100	160	210	150	180	**133**
52	0.5	60	60	90	90	90	210	190	290	**135**
52	1.2	70	70	120	120	140	210	280	430	**180**
52	1.2+X	170	170	190	190	210	330	420	610	**286**
52	2.0	70	70	110	110	130	220	290	480	**185**
52	4.0	70	70	130	130	120	200	290	490	**188**

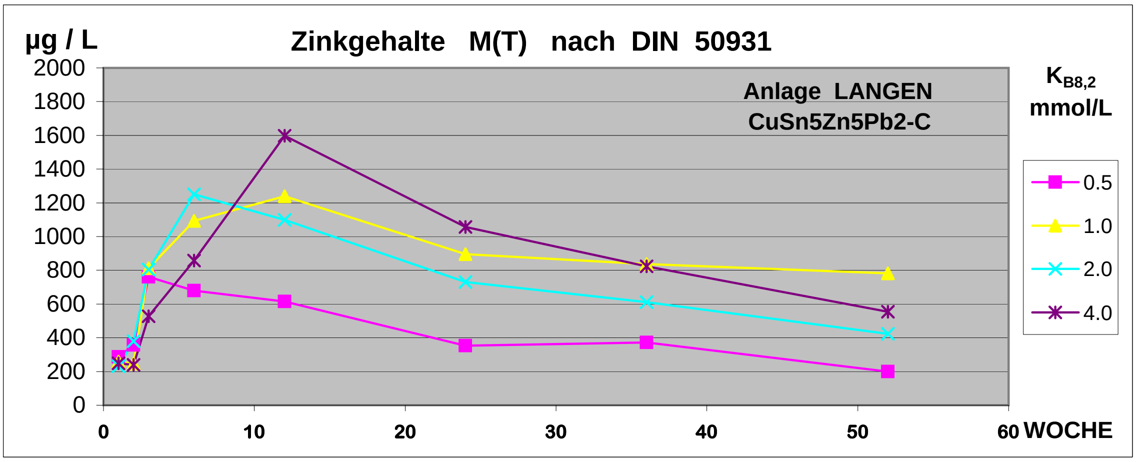
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

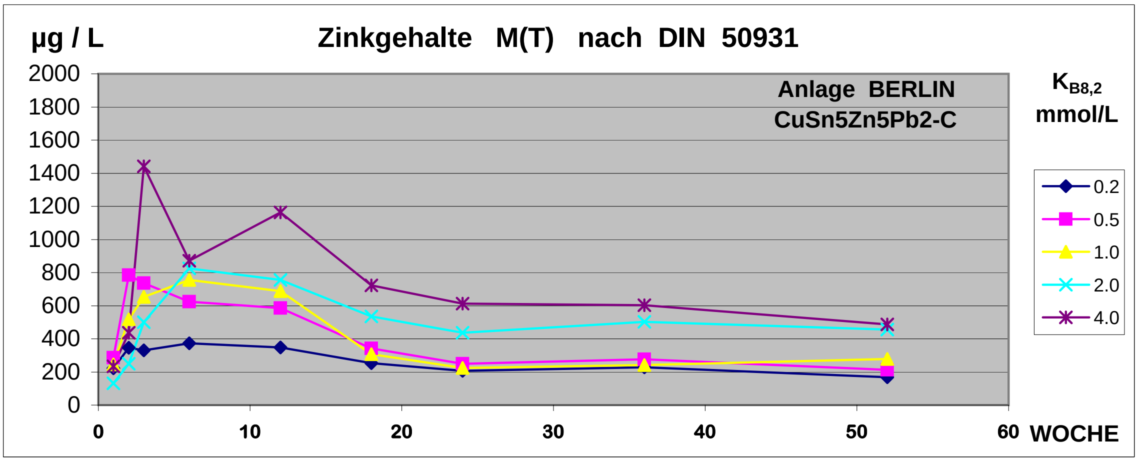
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	30	30	30	30	40	50	80	100	
	MAX	250	250	590	590	420	510	720	1400	
	Mittelwe	105	105	225	225	179	251	382	561	
	50% Per	80	80	180	180	160	250	370	580	
	90% Per	196	196	448	448	300	396	606	822	
	95% Per	216	216	552	552	310	418	646	902	
WÜRZBURG	**99% Per**	237	237	581	581	376	470	720	1246	WÜRZBURG

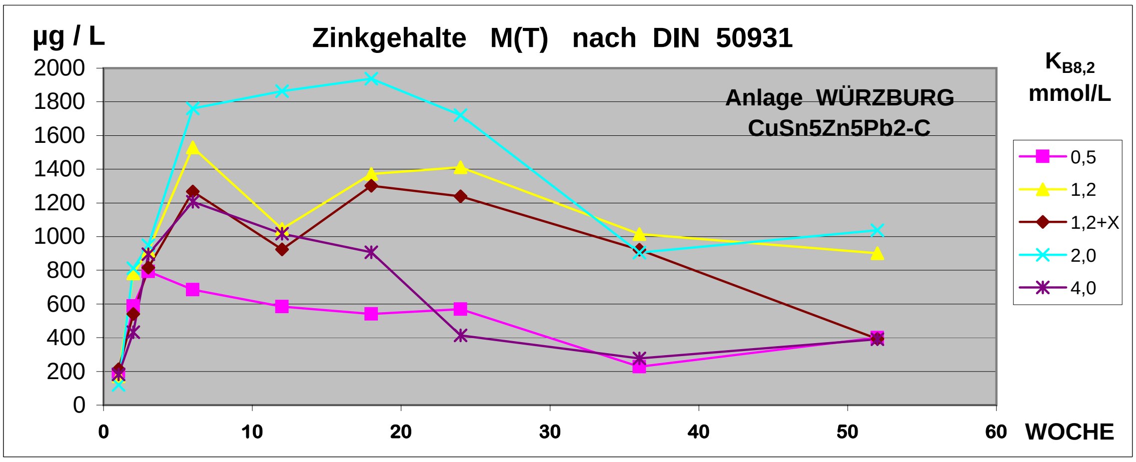
A 6 Zn

Zinkgehalte nach M (T) **Werkstoff : CuSn5Zn5Pb2-C**









Legierung G ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	20	20	20	20	20	30	140	70	**43**
1	0.5	30	30	40	40	70	80	140	270	**88**
1	1.0	80	80	120	120	200	320	360	930	**276**
1	2.0	50	50	90	90	130	200	350	590	**194**
1	4.0	40	40	80	80	140	210	510	740	**230**
2	0,04	20	20	20	20	20	20	30	30	**23**
2	0.5	30	30	40	40	70	120	210	430	**121**
2	1.0	40	40	70	70	100	210	340	650	**190**
2	2.0	50	50	90	90	150	250	350	650	**210**
2	4.0	140	140	170	170	340	570	790	1500	**478**
3	0,04	20	20	20	20	20	20	30	40	**24**
3	0.5	30	30	40	40	60	110	180	320	**101**
3	1.0	50	50	80	80	120	210	410	610	**201**
3	2.0	70	70	110	110	190	280	570	820	**278**
3	4.0	110	110	180	180	360	570	840	1600	**494**
6	0,04	20	20	20	20	20	20	20	30	**21**
6	0.5	30	30	40	40	50	80	210	310	**99**
6	1.0	50	50	70	70	70	150	410	420	**161**
6	2.0	60	60	80	80	130	230	540	700	**235**
6	4.0	80	80	130	130	210	340	710	1000	**335**
12	0,04	20	20	20	20	20	20	20	20	**20**
12	0.5	20	20	40	40	50	90	130	200	**74**
12	1.0	40	40	50	50	70	110	240	310	**114**
12	2.0	40	40	60	60	80	150	330	460	**153**
12	4.0	60	60	90	90	150	300	550	910	**276**
18	0,04	10	10	10	10	10	10	20	30	**14**
18	0.5	10	10	20	20	40	80	180	320	**85**
18	1.0	50	50	50	50	100		290	490	**154**
18	2.0	40	40	70	70	110	220	530	670	**219**
18	4.0	40	40	90	90	140	270	580	980	**279**
24	0,04	20	20	20	20	20	20	20	20	**20**
24	0.5	20	20	50	50	30	50	90	190	**63**
24	1.0	20	20	50	50	50	90	170	280	**91**
24	2.0	30	30	100	100	90	160	390	630	**191**
24	4.0	70	70	120	120	190	350	720	1600	**405**
36	0,04	20	20	20	20	20	30	20	60	**26**
36	0.5	20	20	20	20	30	60	100	140	**51**
36	1.0	60	60	80	80	80	160	250	400	**146**
36	2.0	50	50	60	60	120	140	270	500	**156**
36	4.0	60	60	120	120	210	400	720	1300	**374**
52	0,04	20	20	40	40	50	80	110	140	**63**
52	0.5	20	20	20	20	20	50	90	150	**49**
52	1.0	20	20	30	30	80	110	270	310	**109**
52	2.0	30	30	60	60	90	240	320	600	**179**
52	4.0	70	70	110	110	240	430	880	1500	**426**
	MIN	10	10	10	10	10	10	20	20	
	MAX	140	140	180	180	360	570	880	1600	
	Mittelwe	42	42	65	65	101	174	321	532	
	50% Pe	40	40	60	60	80	145	270	430	
	90% Pe	70	70	120	120	206	347	716	1180	
	95% Pe	80	80	128	128	234	426	776	1500	
THALFANG	**99% Pe**	127	127	176	176	351	570	862	1600	THALFANG

Legierung G ZINKKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	110	110	130	130	210	260	680	660	**286**
1	1.0	60	60	90	90	130	250	490	900	**259**
1	2.0	60	60	80	80	190	270	480	630	**231**
1	4.0	60	60	90	90	180	260	480	770	**249**
2	0.5	180	180	210	210	330	500	290	960	**358**
2	1.0	120	120	100	100	160	230	440	710	**248**
2	2.0	180	180	150	150	250	330	820	970	**379**
2	4.0	90	90	90	90	150	240	440	720	**239**
3	0.5	180	180	270	270	540	740	1400	2500	**760**
3	1.0	280	280	380	380	630	850	1900	1800	**813**
3	2.0	270	270	420	420	620	940	1500	2000	**805**
3	4.0	170	170	190	190	330	490	980	1700	**528**
6	0.5	180	180	320	320	480	650	1400	1900	**679**
6	1.0	280	280	590	590	810	1200	2100	2900	**1094**
6	2.0	310	310	570	570	850	1400	2200	3800	**1251**
6	4.0	220	220	400	400	620	900	1800	2300	**858**
12	0.5	170	170	270	270	450	590	1300	1700	**615**
12	1.0	340	340	560	560	920	1300	2300	3600	**1240**
12	2.0	240	240	430	430	810	1040	2300	3300	**1099**
12	4.0	400	400	690	690	1400	1900	3200	4100	**1598**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	110	110	150	150	250	390	580	1080	**353**
24	1.0	210	210	350	350	470	870	1800	2900	**895**
24	2.0	130	130	230	230	340	690	1500	2600	**731**
24	4.0	210	210	360	360	510	1300	2300	3200	**1056**
36	0.5	90	90	160	160	200	320	560	1400	**373**
36	1.0	180	180	320	320	510	690	1700	2800	**838**
36	2.0	110	110	200	200	350	520	1300	2100	**611**
36	4.0	150	150	300	300	490	700	1700	2800	**824**
52	0.5	70	70	110	110	130	210	350	550	**200**
52	1.0	190	190	270	270	460	670	1700	2500	**781**
52	2.0	90	90	180	180	260	380	810	1400	**424**
52	4.0	120	120	180	180	360	570	1000	1900	**554**
	MIN	60	60	80	80	130	210	290	550	
	MAX	400	400	690	690	1400	1900	3200	4100	
	Mittelwe	174	174	276	276	450	677	1306	1973	
	50% Pe	175	175	250	250	405	620	1350	1900	
	90% Pe	280	280	547	547	810	1290	2290	3290	
	95% Pe	324	324	579	579	882	1345	2300	3690	
	99% Pe	381	381	659	659	1251	1745	2921	4007	

Legierung G **ZINKKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	110	110	170	170	240	310	470	200	**223**
1	0.5	140	140	180	180	300	460	700	190	**286**
1	1.0	120	120	130	130	220	350	460	440	**246**
1	2.0	130	130	120	120	140	150	140	120	**131**
1	4.0	130	130	160	160	200	250	460	380	**234**
2	0.2	160	160	220	220	270	390	490	850	**345**
2	0.5	220	220	360	360	580	760	970	2800	**784**
2	1.0	160	160	250	250	420	580	430	1900	**519**
2	2.0	140	140	150	150	360	450	400	200	**249**
2	4.0	130	130	150	150	280	510	640	1500	**436**
3	0.2	190	190	200	200	280	380	500	710	**331**
3	0.5	240	240	320	320	390	680	1800	1900	**736**
3	1.0	260	260	350	350	420	760	630	2200	**654**
3	2.0	270	270	310	310	490	800	520	1040	**501**
3	4.0	210	210	220	220	370	710	7400	2200	**1443**
6	0.2	170	170	230	230	330	410	600	840	**373**
6	0.5	250	250	330	330	490	610	1040	1700	**625**
6	1.0	260	260	320	320	520	760	1400	2200	**755**
6	2.0	360	360	500	500	780	1200	1500	1400	**825**
6	4.0	260	260	370	370	610	900	1700	2500	**871**
12	0.2	180	180	200	200	260	390	650	720	**348**
12	0.5	230	230	270	270	440	580	970	1700	**586**
12	1.0	230	230	280	280	400	690	1300	2100	**689**
12	2.0	360	360	430	430	640	930	1600	1300	**756**
12	4.0	430	430	540	540	800	970	2600	3000	**1164**
18	0.2	170	170	150	150	190	280	400	520	**254**
18	0.5	190	190	160	160	230	420	560	830	**343**
18	1.0	160	160	130	130	190	320	500	870	**308**
18	2.0	270	270	280	280	410	690	1000	1080	**535**
18	4.0	240	240	270	270	480	480	1500	2300	**723**
24	0.2	80	80	140	140	160	230	360	460	**206**
24	0.5	80	80	150	150	170	280	420	670	**250**
24	1.0	70	70	120	120	140	250	360	670	**225**
24	2.0	130	130	220	220	350	520	930	1000	**438**
24	4.0	120	120	220	220	360	660	1200	2000	**613**
36	0.2	150	150	170	170	210	260	330	390	**229**
36	0.5	150	150	160	160	230	320	410	630	**276**
36	1.0	140	140	140	140	180	260	370	570	**243**
36	2.0	210	210	270	270	420	650	970	1020	**503**
36	4.0	190	190	250	250	380	560	1200	1800	**603**
52	0.2	170	170	170	170	170	120	160	220	**169**
52	0.5	190	190	200	200	190	170	240	320	**213**
52	1.0	200	200	210	210	220	230	390	560	**278**
52	2.0	250	250	300	300	390	490	790	880	**456**
52	4.0	250	250	230	230	370	410	650	1500	**486**
	MIN	70	70	120	120	140	120	140	120	
	MAX	430	430	540	540	800	1200	7400	3000	
	Mittelwe	194	194	238	238	348	502	936	1164	
	50% Pe	190	190	220	220	350	460	630	880	
	90% Pe	266	266	356	356	556	784	1560	2200	
	95% Pe	342	342	418	418	634	924	1780	2460	
BERLIN	**99% Pe**	399	399	522	522	791	1099	5288	2912	BERLIN

A 6 Zn

Legierung G **ZINKKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,5	40	40	100	100	140	150	390	500	**183**
1	1,2	60	60	80	80	110	140	330	500	**170**
1	1,2+X	90	90	120	120	160	190	380	550	**213**
1	2,0	40	40	60	60	70	130	190	360	**119**
1	4,0	50	50	70	70	90	140	560	430	**183**
2	0.5	180	180	440	440	400	600	860	1600	**588**
2	1.2	120	120	1400	1400	290	610	710	1600	**781**
2	1.2+X	140	140	830	830	240	430	660	1050	**540**
2	2.0	100	100	1400	1400	280	700	710	1800	**811**
2	4.0	80	80	360	360	200	450	530	1400	**433**
3	0.5	250	250	450	450	590	760	1600	2000	**794**
3	1.2	310	310	530	530	680	870	1800	2300	**916**
3	1.2+X	290	290	550	550	690	860	1500	1800	**816**
3	2.0	390	390	710	710	680	810	1700	2200	**949**
3	4.0	260	260	670	670	640	770	1700	2200	**896**
6	0.5	250	250	990	990	430	630	1040	900	**685**
6	1.2	430	430	2300	2300	810	1070	2400	2500	**1530**
6	1.2+X	390	390	1700	1700	660	1200	1800	2300	**1268**
6	2.0	640	640	1500	1500	1500	2600	2400	3300	**1760**
6	4.0	500	500	890	890	1300	2100	2700	780	**1208**
12	0.5	220	220	230	230	660	510	900	1700	**584**
12	1.2	360	360	380	380	860	920	2100	3000	**1045**
12	1.2+X	390	390	420	420	710	960	1800	2300	**924**
12	2.0	650	650	650	650	1700	1900	3900	4800	**1863**
12	4.0	350	350	310	310	870	250	2200	3500	**1018**
18	0.5	200	200	570	570	330	450	710	1300	**541**
18	1.2	340	340	2100	2100	610	890	2000	2600	**1373**
18	1.2+X	370	370	1700	1700	650	920	2600	2100	**1301**
18	2.0	550	550	1800	1800	1200	1700	3300	4600	**1938**
18	4.0	190	190	390	390	610	880	2000	2600	**906**
24	0.5	190	190	330	330	360	540	1010	1600	**569**
24	1.2	260	260	2100	2100	670	910	2000	3000	**1413**
24	1.2+X	320	320	1800	1800	680	990	1700	2300	**1239**
24	2.0	350	350	740	740	890	1700	2500	6500	**1721**
24	4.0	80	80	130	130	210	430	750	1500	**414**
36	0.5	120	120	170	170	230	490	160	360	**228**
36	1.2	350	350	440	440	720	920	2100	2800	**1015**
36	1.2+X	350	350	440	440	630	870	1700	2600	**923**
36	2.0	450	450	540	540	880	1030	850	2500	**905**
36	4.0	130	130	160	160	290	550	170	630	**278**
52	0.5	180	180	220	220	330	570	680	830	**401**
52	1.2	300	300	460	460	570	920	1600	2600	**901**
52	1.2+X	200	200	240	240	270	480	610	900	**393**
52	2.0	370	370	570	570	720	1400	1600	2700	**1038**
52	4.0	130	130	240	240	260	500	670	950	**390**

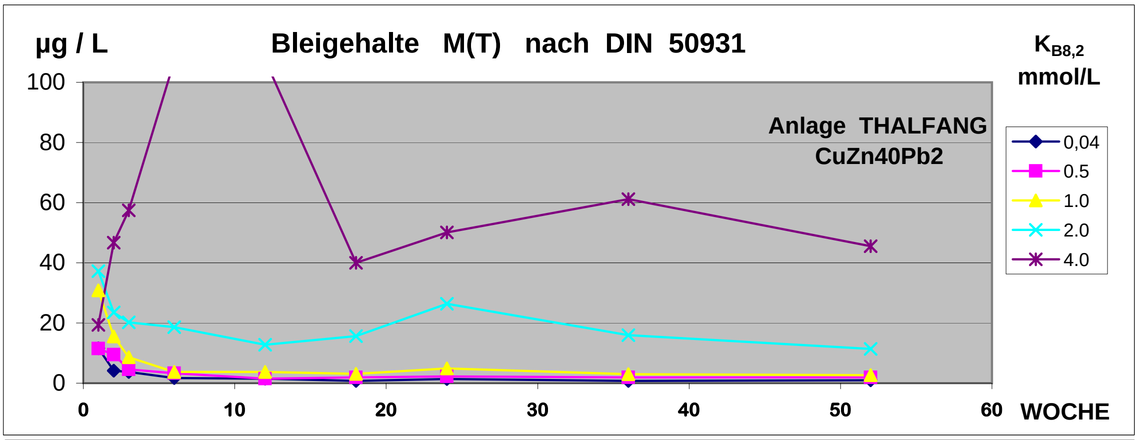
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

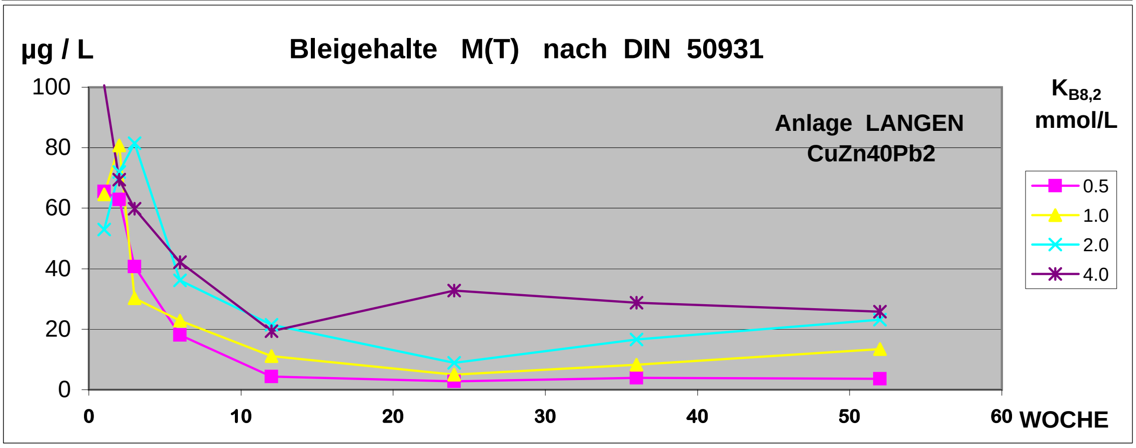
	0,5H	0,5H	1H	1H	2H	4H	8H	16H
MIN	40	40	60	60	70	130	160	360
MAX	650	650	2300	2300	1700	2600	3900	6500
Mittelwe	267	267	717	717	575	820	1413	2008
50% Per	260	260	460	460	610	770	1600	2000
90% Per	442	442	1760	1760	886	1580	2460	3180
95% Per	540	540	2040	2040	1280	1860	2680	4380
99% Per	646	646	2212	2212	1612	2380	3636	5752

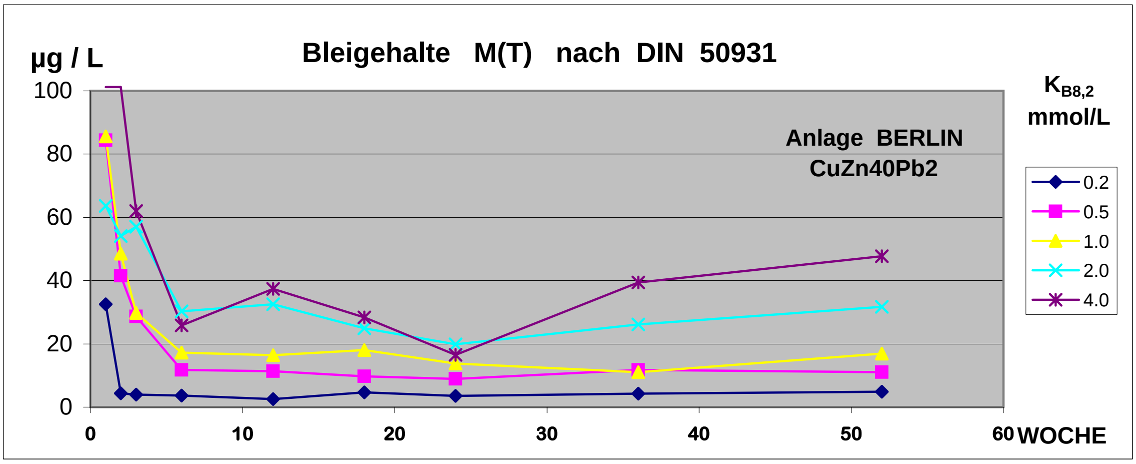
WÜRZBURG

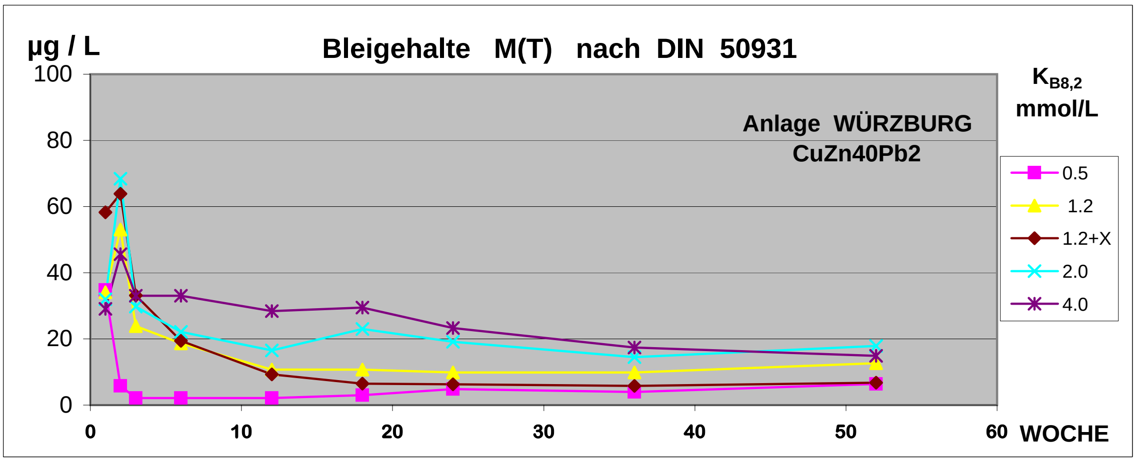
A 6 Pb

Bleigehalte nach M (T) **Werkstoff : CuZn40Pb2**









Legierung C **BLEIKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	4	4	5	5	5	7	52	11	**12**
1	0.5	4	4	7	7	12	12	13	33	**12**
1	1.0	11	11	15	15	29	40	7	119	**31**
1	2.0	9	9	14	14	23	37	72	120	**37**
1	4.0	5	5	8	8	10	12	77	30	**19**
2	0,04	3	3	4	4	3	4	7	5	**4**
2	0.5	3	3	4	4	6	13	22	21	**10**
2	1.0	2	2	5	5	8	16	26	60	**16**
2	2.0	5	5	7	7	15	25	41	83	**24**
2	4.0	9	9	17	17	31	56	83	152	**47**
3	0,04	2	2	3	3	5	5	1	9	**4**
3	0.5	3	3	2	2	4	7	7	9	**5**
3	1.0	2	2	4	4	4	9	16	28	**9**
3	2.0	4	4	8	8	13	22	38	65	**20**
3	4.0	10	10	27	27	34	52	100	200	**58**
6	0,04	1	1	1	1	2	2	3	3	**2**
6	0.5	2	2	4	4	2	3	4	5	**3**
6	1.0	2	2	3	3	2	3	5	10	**4**
6	2.0	4	4	5	5	11	11	44	65	**19**
6	4.0	9	9	26	26	24	90	149	523	**107**
12	0,04	1	1	1	1	1	1	4	2	**2**
12	0.5	0	0	1	1	2	2	3	3	**2**
12	1.0	2	2	3	3	3	4	7	6	**4**
12	2.0	3	3	8	8	7	10	21	42	**13**
12	4.0	10	10	32	32	39	196	167	374	**108**
18	0,04	0	0	1	1	1	1	1	1	**1**
18	0.5	1	1	1	1	3	2	3	3	**2**
18	1.0	2	2	1	1	7	3	4	5	**3**
18	2.0	6	6	7	7	12	20	34	33	**16**
18	4.0	12	12	17	17	30	54	93	85	**40**
24	0,04	1	1	1	1	1	2	2	2	**1**
24	0.5	3	3	2	2	1	2	2	3	**2**
24	1.0	4	4	6	6	4	4	5	6	**5**
24	2.0	7	7	15	15	20	23	65	59	**26**
24	4.0	16	16	25	25	41	62	88	128	**50**
36	0,04	0	0	1	1	1	1	1	1	**1**
36	0.5	1	1	2	2	2	2	3	2	**2**
36	1.0	2	2	3	3	3	3	4	4	**3**
36	2.0	8	8	9	9	13	17	25	39	**16**
36	4.0	17	17	28	28	48	63	121	167	**61**
52	0,04	0	0	1	1	1	1	2	2	**1**
52	0.5	1	1	2	2	2	2	2	3	**2**
52	1.0	1	1	2	2	2	4	3	6	**3**
52	2.0	3	3	7	7	9	15	18	29	**11**
52	4.0	10	10	14	14	45	44	111	116	**46**
	MIN	0	0	1	1	1	1	1	1	
	MAX	17	17	32	32	48	196	167	523	
	Mittelwer	5	5	8	8	12	21	35	59	
	50% Perc	3	3	5	5	6	9	13	21	
	90% Perc	10	10	22	22	33	55	97	142	
	95% Perc	12	12	27	27	41	63	119	193	
THALFANG	**99% Perc**	17	17	30	30	47	149	159	457	THALFANG

Legierung C BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	31	31	40	40	60	83	193	46	**66**
1	1.0	30	30	29	29	42	64	138	155	**65**
1	2.0	10	10	20	20	30	80	120	134	**53**
1	4.0	14	14	26	26	45	122	205	353	**101**
2	0.5	30	30	45	45	81	95	94	83	**63**
2	1.0	25	25	54	54	103	124	111	150	**81**
2	2.0	16	16	22	22	47	92	148	213	**72**
2	4.0	16	16	21	21	43	93	151	195	**70**
3	0.5	14	14	28	28	56	63	59	64	**41**
3	1.0	14	14	23	23	35	41	63	29	**30**
3	2.0	20	20	39	39	70	126	163	175	**82**
3	4.0	11	11	25	25	43	85	116	163	**60**
6	0.5	6	6	12	12	18	30	34	27	**18**
6	1.0	7	7	14	14	21	35	43	42	**23**
6	2.0	13	13	24	24	33	65	52	65	**36**
6	4.0	10	10	15	15	30	63	85	109	**42**
12	0.5	2	2	3	3	4	6	8	7	**4**
12	1.0	5	5	6	6	12	15	20	20	**11**
12	2.0	12	12	14	14	23	30	27	40	**22**
12	4.0	9	9	12	12	19	27	29	38	**19**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	1	1	2	2	3	4	4	5	**3**
24	1.0	2	2	3	3	6	6	9	9	**5**
24	2.0	3	3	5	5	11	9	18	17	**9**
24	4.0	13	13	19	19	43	34	51	70	**33**
36	0.5	1	1	2	2	4	6	7	8	**4**
36	1.0	3	3	5	5	8	11	17	14	**8**
36	2.0	5	5	10	10	16	22	30	35	**17**
36	4.0	10	10	18	18	26	41	50	57	**29**
52	0.5	2	2	2	2	3	5	7	6	**4**
52	1.0	5	5	7	7	13	21	26	23	**13**
52	2.0	8	8	13	13	27	30	49	37	**23**
52	4.0	10	10	14	14	25	38	44	51	**26**
	MIN	1	1	2	2	3	4	4	5	
	MAX	31	31	54	54	103	126	205	353	
	Mittelwert	11	11	18	18	31	49	68	76	
	50% Perc	10	10	15	15	27	37	50	44	
	90% Perc	25	25	38	38	60	95	151	174	
	95% Perc	30	30	42	42	75	123	177	203	
	99% Perc	31	31	51	51	96	125	201	310	

Legierung C BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	18	18	26	26	39	20	79	34	**33**
1	0.5	26	26	43	43	91	121	175	150	**84**
1	1.0	29	29	44	44	82	179	161	117	**86**
1	2.0	31	31	48	48	58	88	176	29	**64**
1	4.0	40	40	65	65	100	125	216	159	**101**
2	0.2	2	2	4	4	4	5	6	8	**4**
2	0.5	18	18	36	36	45	55	43	81	**42**
2	1.0	29	29	43	43	69	5	81	89	**49**
2	2.0	16	16	25	25	43	71	82	155	**54**
2	4.0	40	40	65	65	100	125	216	159	**101**
3	0.2	3	3	3	3	5	4	6	5	**4**
3	0.5	15	15	14	14	26	24	84	37	**29**
3	1.0	17	17	17	17	7	48	52	63	**30**
3	2.0	31	31	34	34	45	70	80	131	**57**
3	4.0	43	43	45	45	49	66	98	107	**62**
6	0.2	3	3	3	3	3	5	4	5	**4**
6	0.5	8	8	8	8	13	14	18	17	**12**
6	1.0	8	8	14	14	16	20	28	30	**17**
6	2.0	16	16	19	19	29	41	40	62	**30**
6	4.0	19	19	25	25	27	29	32	31	**26**
12	0.2	2	2	2	2	2	3	4	3	**3**
12	0.5	7	7	7	7	11	15	19	18	**11**
12	1.0	7	7	10	10	15	24	29	29	**16**
12	2.0	16	16	20	20	31	51	40	66	**33**
12	4.0	19	19	52	52	35	42	37	43	**37**
18	0.2	8	8	2	2	3	4	5	5	**5**
18	0.5	9	9	5	5	8	12	16	14	**10**
18	1.0	8	8	9	9	16	26	33	35	**18**
18	2.0	13	13	14	14	22	37	38	48	**25**
18	4.0	17	17	37	37	27	30	31	31	**28**
24	0.2	1	1	5	5	3	4	4	5	**4**
24	0.5	3	3	8	8	8	12	15	14	**9**
24	1.0	4	4	7	7	14	22	25	27	**14**
24	2.0	6	6	12	12	19	29	35	40	**20**
24	4.0	9	9	12	12	20	22	24	24	**17**
36	0.2	3	3	3	3	4	5	6	7	**4**
36	0.5	8	8	7	7	11	16	18	19	**12**
36	1.0	4	4	5	5	10	18	20	22	**11**
36	2.0	11	11	15	15	25	36	44	52	**26**
36	4.0	18	18	41	41	49	47	49	52	**39**
52	0.2	4	4	3	3	5	6	6	8	**5**
52	0.5	7	7	9	9	9	16	16	15	**11**
52	1.0	7	7	14	14	14	26	26	27	**17**
52	2.0	13	13	19	19	28	39	44	79	**32**
52	4.0	24	24	42	42	52	68	61	69	**48**
	MIN	1	1	2	2	2	3	4	3	
	MAX	43	43	65	65	100	179	216	159	
	Mittelwe	14	14	21	21	29	38	52	49	
	50% Per	11	11	14	14	20	26	33	31	
	90% Per	30	30	45	45	65	81	136	125	
	95% Per	38	38	51	51	89	124	176	154	
BERLIN	**99% Per**	42	42	65	65	100	155	216	159	BERLIN

Legierung C BLEIKONZENTRATION NACH STAGNATION (µg / L)

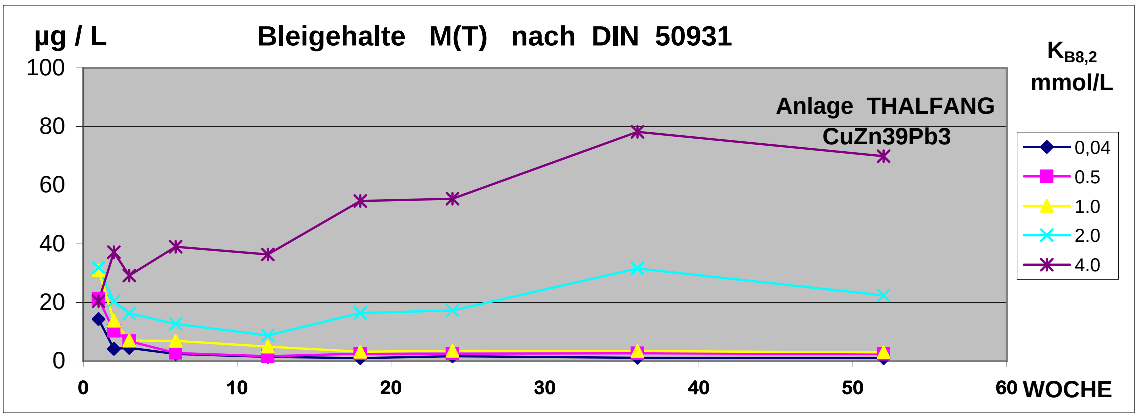
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	16	16	14	14	18	36	59	105	**35**
1	1.2	9	9	14	14	23	33	66	105	**34**
1	1.2+X	16	16	23	23	38	61	109	180	**58**
1	2.0	9	9	14	14	19	34	53	104	**32**
1	4.0	7	7	13	13	19	31	49	94	**29**
2	0.5	2	2	7	7	5	4	12	7	**6**
2	1.2	13	13	56	56	34	51	99	102	**53**
2	1.2+X	17	17	81	81	35	53	109	118	**64**
2	2.0	11	11	111	111	27	58	79	139	**68**
2	4.0	14	14	59	59	19	38	58	104	**46**
3	0.5	1	1	1	1	2	2	5	4	**2**
3	1.2	9	9	18	18	19	31	37	50	**24**
3	1.2+X	10	10	22	22	25	37	69	70	**33**
3	2.0	10	10	23	23	25	39	46	62	**30**
3	4.0	9	9	21	21	28	41	61	74	**33**
6	0.5	1	1	3	3	2	2	3	2	**2**
6	1.2	7	7	23	23	13	21	24	31	**19**
6	1.2+X	5	5	29	29	10	17	19	41	**19**
6	2.0	9	9	20	20	18	28	31	42	**22**
6	4.0	10	10	43	43	18	37	40	63	**33**
12	0.5	1	1	2	2	2	2	3	4	**2**
12	1.2	5	5	6	6	11	14	18	21	**11**
12	1.2+X	3	3	14	14	6	9	11	14	**9**
12	2.0	7	7	13	13	8	21	30	33	**17**
12	4.0	10	10	11	11	43	34	42	66	**28**
18	0.5	2	2	3	3	3	3	4	4	**3**
18	1.2	4	4	14	14	7	11	14	18	**11**
18	1.2+X	3	3	8	8	4	7	9	10	**7**
18	2.0	8	8	15	15	19	29	40	50	**23**
18	4.0	9	9	33	33	18	31	37	66	**30**
24	0.5	2	2	5	5	4	6	7	8	**5**
24	1.2	3	3	12	12	6	12	14	17	**10**
24	1.2+X	2	2	8	8	4	7	8	11	**6**
24	2.0	11	11	10	10	13	25	34	39	**19**
24	4.0	6	6	17	17	14	28	34	64	**23**
36	0.5	2	2	3	3	5	6	5	6	**4**
36	1.2	4	4	5	5	9	13	18	21	**10**
36	1.2+X	2	2	3	3	5	7	11	13	**6**
36	2.0	6	6	8	8	13	17	25	33	**15**
36	4.0	7	7	9	9	22	20	30	35	**17**
52	0.5	3	3	5	5	6	8	10	11	**6**
52	1.2	5	5	8	8	10	17	22	26	**13**
52	1.2+X	3	3	4	4	6	9	11	14	**7**
52	2.0	7	7	11	11	14	23	30	40	**18**
52	4.0	6	6	9	9	12	18	26	33	**15**

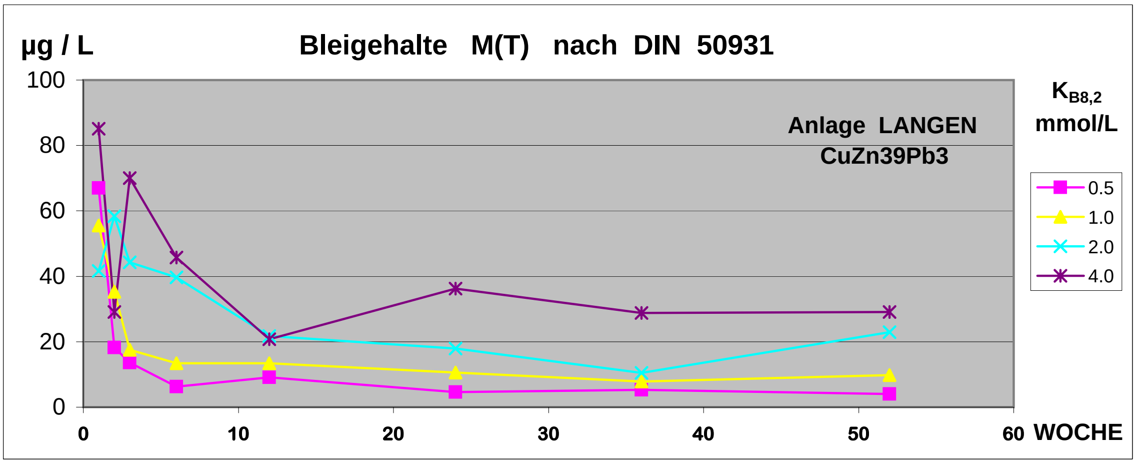
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

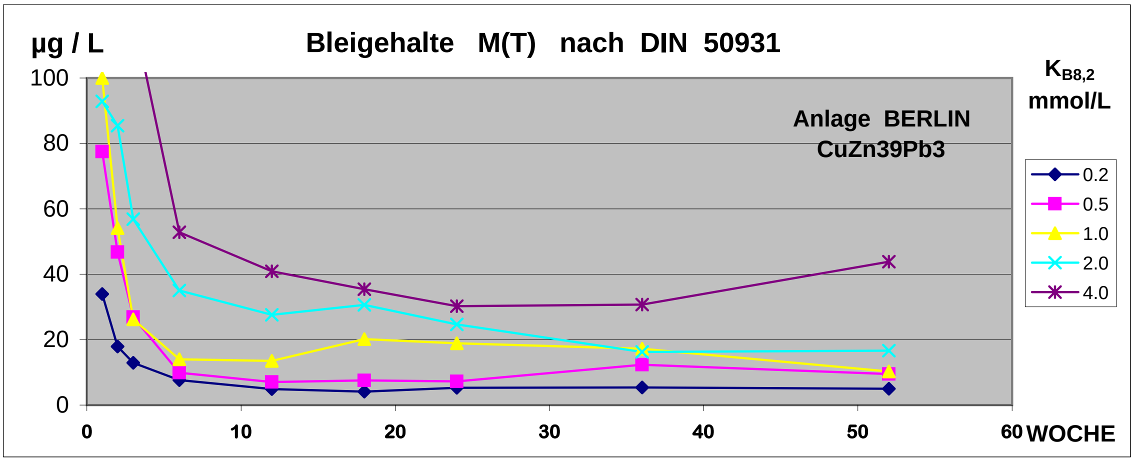
	0,5H	0,5H	1H	1H	2H	4H	8H	16H
MIN	1	1	1	1	2	2	3	2
MAX	17	17	111	111	43	61	109	180
Mittelwe	7	7	18	18	15	23	34	48
50% Per	7	7	13	13	13	21	30	35
90% Per	12	12	39	39	28	40	68	105
95% Per	16	16	58	58	35	53	95	115
99% Per	17	17	98	98	41	60	109	162

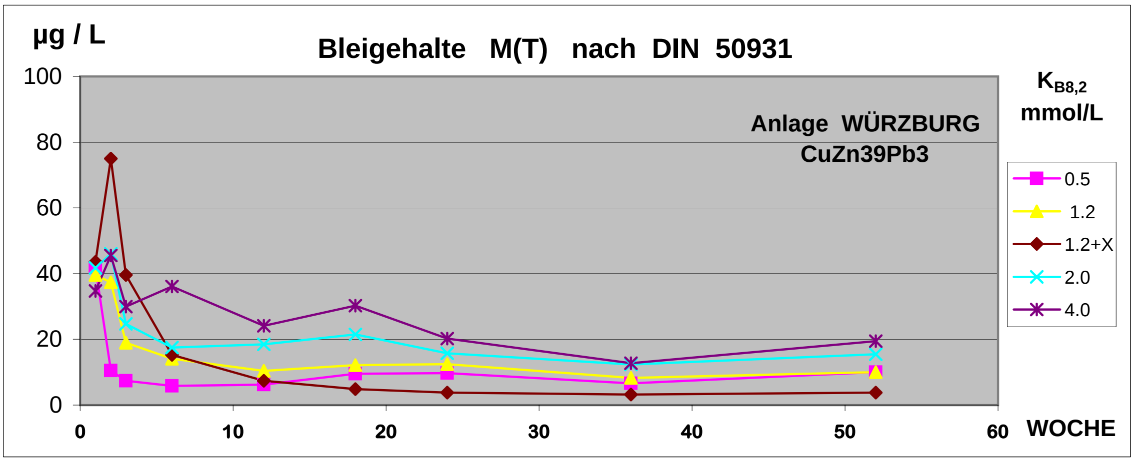
A 6 Pb

Bleigehalte nach M (T) **Werkstoff : CuZn39Pb3**









A 6 Pb

Legierung D BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	4	4	5	5	5	8	72	11	**14**
1	0.5	6	6	13	13	24	23	21	64	**21**
1	1.0	11	11	15	15	28	43	9	116	**31**
1	2.0	7	7	13	13	21	26	63	105	**32**
1	4.0	5	5	8	8	12	16	69	40	**20**
2	0,04	3	3	4	4	3	4	7	5	**4**
2	0.5	4	4	4	4	7	12	23	24	**10**
2	1.0	2	2	5	5	8	14	21	53	**14**
2	2.0	5	5	8	8	14	23	32	68	**20**
2	4.0	8	8	12	12	22	42	66	127	**37**
3	0,04	2	2	3	3	6	5	6	9	**5**
3	0.5	3	3	3	3	6	11	9	16	**7**
3	1.0	2	2	4	4	3	8	13	20	**7**
3	2.0	4	4	7	7	10	17	26	55	**16**
3	4.0	7	7	12	12	19	36	62	78	**29**
6	0,04	1	1	1	1	4	2	4	5	**2**
6	0.5	2	2	0	0	2	3	6	7	**3**
6	1.0	5	5	5	5	2	7	13	13	**7**
6	2.0	5	5	6	6	6	12	24	37	**13**
6	4.0	10	10	21	21	18	35	77	120	**39**
12	0,04	1	1	1	1	1	2	2	2	**1**
12	0.5	0	0	1	1	2	2	4	3	**2**
12	1.0	1	1	4	4	3	6	10	10	**5**
12	2.0	3	3	5	5	6	9	16	23	**9**
12	4.0	8	8	18	18	26	43	71	99	**36**
18	0,04	0	0	1	1	1	1	2	2	**1**
18	0.5	1	1	2	2	2	3	5	4	**3**
18	1.0	2	2	2	2	7	0	5	5	**3**
18	2.0	6	6	6	6	13	18	35	41	**16**
18	4.0	17	17	22	22	40	71	112	136	**55**
24	0,04	2	2	1	1	1	2	2	2	**2**
24	0.5	4	4	1	1	2	2	3	3	**3**
24	1.0	3	3	3	3	3	4	4	5	**4**
24	2.0	5	5	9	9	14	14	34	48	**17**
24	4.0	21	21	36	36	50	69	83	127	**55**
36	0,04	1	1	1	1	1	1	1	2	**1**
36	0.5	2	2	2	2	2	4	5	2	**3**
36	1.0	2	2	3	3	4	4	4	5	**3**
36	2.0	13	13	16	16	24	36	47	87	**32**
36	4.0	23	23	36	36	67	90	146	204	**78**
52	0,04	0	0	1	1	1	1	2	2	**1**
52	0.5	1	1	2	2	2	4	3	4	**2**
52	1.0	1	1	3	3	3	4	4	5	**3**
52	2.0	6	6	13	13	17	27	38	59	**22**
52	4.0	19	19	29	29	44	148	122	149	**70**
	MIN	0	0	0	0	1	0	1	2	
	MAX	23	23	36	36	67	148	146	204	
	Mittelwe	5	5	8	8	12	20	31	44	
	50% Per	4	4	5	5	6	9	13	20	
	90% Per	12	12	20	20	27	43	75	124	
	95% Per	19	19	28	28	43	71	106	134	
THALFANG	**99% Per**	22	22	36	36	60	122	135	180	THALFANG

Legierung D BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	19	19	38	38	54	84	217	67	**67**
1	1.0	16	16	25	25	39	62	107	154	**56**
1	2.0	9	9	15	15	23	45	98	119	**42**
1	4.0	13	13	25	25	43	102	191	269	**85**
2	0.5	9	9	15	15	21	27	29	21	**18**
2	1.0	11	11	19	19	37	61	51	73	**35**
2	2.0	14	14	18	18	37	78	111	177	**58**
2	4.0	12	12	18	18	33	48	45	47	**29**
3	0.5	4	4	9	9	17	22	24	20	**14**
3	1.0	7	7	12	12	20	26	40	16	**18**
3	2.0	9	9	20	20	35	69	77	115	**44**
3	4.0	14	14	28	28	46	98	130	202	**70**
6	0.5	2	2	4	4	6	9	12	11	**6**
6	1.0	4	4	8	8	12	19	25	27	**13**
6	2.0	16	16	26	26	37	54	61	81	**40**
6	4.0	12	12	16	16	32	61	92	125	**46**
12	0.5	2	2	3	3	5	6	9	43	**9**
12	1.0	4	4	8	8	12	19	25	27	**13**
12	2.0	10	10	14	14	23	29	34	40	**22**
12	4.0	8	8	12	12	20	23	35	48	**21**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	1	1	2	2	6	6	8	11	**5**
24	1.0	3	3	5	5	26	11	14	18	**11**
24	2.0	3	3	5	5	9	11	15	92	**18**
24	4.0	17	17	39	39	45	49	66	18	**36**
36	0.5	2	2	3	3	4	7	9	12	**5**
36	1.0	3	3	5	5	7	10	15	15	**8**
36	2.0	4	4	7	7	10	14	18	20	**11**
36	4.0	10	10	21	21	28	41	49	50	**29**
52	0.5	2	2	3	3	3	5	7	7	**4**
52	1.0	5	5	6	6	9	13	18	16	**10**
52	2.0	8	8	13	13	27	29	48	37	**23**
52	4.0	12	12	18	18	33	48	45	47	**29**
	MIN	1	1	2	2	3	5	7	7	
	MAX	19	19	39	39	54	102	217	269	
	Mittelwer	8	8	14	14	24	37	54	63	
	50% Perc	9	9	14	14	23	28	38	42	
	90% Perc	16	16	26	26	43	77	111	151	
	95% Perc	16	16	33	33	45	90	157	188	
	99% Perc	18	18	39	39	52	101	209	248	

Legierung D BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	12	12	18	18	30	49	88	45	**34**
1	0.5	20	20	33	33	66	123	217	108	**78**
1	1.0	30	30	44	44	95	232	187	138	**100**
1	2.0	32	32	46	46	101	170	159	157	**93**
1	4.0	54	54	90	90	151	226	418	181	**158**
2	0.2	8	8	12	12	15	21	28	39	**18**
2	0.5	17	17	35	35	40	52	66	112	**47**
2	1.0	27	27	27	27	46	74	81	124	**54**
2	2.0	24	24	38	38	59	106	156	238	**85**
2	4.0	69	69	130	130	137	159	185	716	**199**
3	0.2	7	7	7	7	12	15	23	25	**13**
3	0.5	14	14	23	23	17	27	53	44	**27**
3	1.0	15	15	12	12	13	35	41	67	**26**
3	2.0	33	33	27	27	44	62	94	135	**57**
3	4.0	50	50	57	57	71	191	203	277	**120**
6	0.2	5	5	5	5	8	8	11	14	**8**
6	0.5	6	6	5	5	9	11	17	20	**10**
6	1.0	10	10	7	7	11	15	22	30	**14**
6	2.0	18	18	22	22	33	38	53	76	**35**
6	4.0	23	23	29	29	46	51	90	132	**53**
12	0.2	3	3	3	3	4	6	8	9	**5**
12	0.5	4	4	4	4	6	9	11	14	**7**
12	1.0	9	9	7	7	10	17	20	29	**14**
12	2.0	13	13	17	17	24	38	41	58	**28**
12	4.0	17	17	23	23	36	46	69	96	**41**
18	0.2	4	4	2	2	3	5	6	7	**4**
18	0.5	8	8	4	4	5	8	11	12	**8**
18	1.0	30	30	8	8	12	19	24	30	**20**
18	2.0	17	17	16	16	31	42	52	54	**31**
18	4.0	22	22	24	24	22	45	51	73	**35**
24	0.2	2	2	8	8	3	5	6	8	**5**
24	0.5	2	2	9	9	6	8	10	12	**7**
24	1.0	5	5	32	32	12	17	22	26	**19**
24	2.0	8	8	16	16	25	34	44	46	**25**
24	4.0	10	10	16	16	23	39	51	77	**30**
36	0.2	4	4	4	4	5	6	7	9	**5**
36	0.5	18	18	6	6	8	12	14	17	**12**
36	1.0	32	32	8	8	9	14	16	19	**17**
36	2.0	11	11	11	11	13	19	24	30	**16**
36	4.0	12	12	19	19	26	36	49	73	**31**
52	0.2	3	3	4	4	5	6	6	9	**5**
52	0.5	7	7	7	7	8	12	12	16	**10**
52	1.0	6	6	8	8	9	14	14	17	**10**
52	2.0	8	8	12	12	15	21	25	32	**17**
52	4.0	15	15	26	26	34	60	71	104	**44**
	MIN	2	2	2	2	3	5	6	7	
	MAX	69	69	130	130	151	232	418	716	
	Mittelwer	17	17	21	21	30	49	63	79	
	50% Perc	12	12	16	16	15	27	41	44	
	90% Perc	32	32	42	42	69	145	175	149	
	95% Perc	47	47	55	55	100	187	200	227	
BERLIN	**99% Perc**	62	62	112	112	145	229	330	523	BERLIN

Legierung D BLEIKONZENTRATION NACH STAGNATION (µg / L)

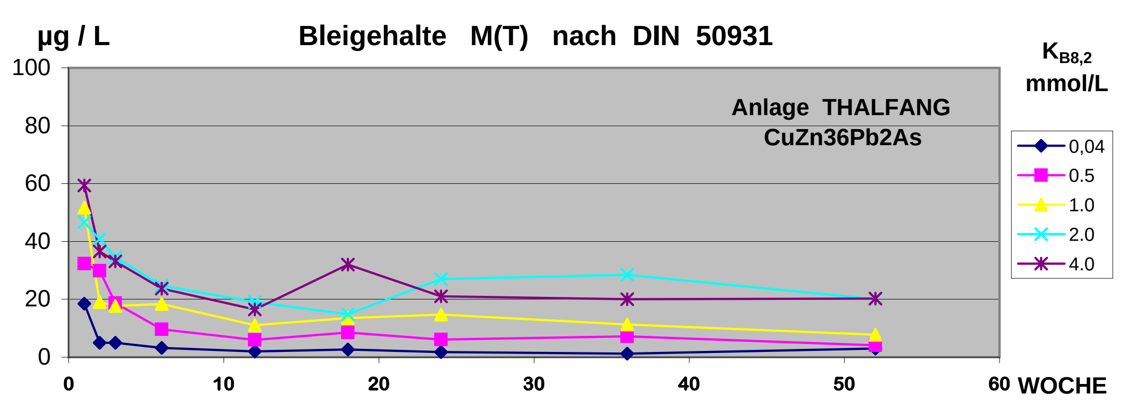
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	22	22	18	18	23	41	67	124	**42**
1	1.2	10	10	16	16	25	37	78	125	**40**
1	1.2+X	15	15	20	20	19	49	78	133	**44**
1	2.0	12	12	15	15	21	41	64	154	**42**
1	4.0	7	7	13	13	30	35	54	119	**35**
2	0.5	4	4	13	13	9	7	20	14	**11**
2	1.2	11	11	38	38	27	36	74	64	**37**
2	1.2+X	17	17	93	93	37	64	117	162	**75**
2	2.0	10	10	57	57	23	38	69	104	**46**
2	4.0	9	9	64	64	0	40	68	110	**46**
3	0.5	3	3	5	5	8	7	17	11	**7**
3	1.2	6	6	12	12	15	24	34	43	**19**
3	1.2+X	11	11	25	25	30	48	76	91	**40**
3	2.0	8	8	17	17	19	33	39	57	**25**
3	4.0	8	8	19	19	25	41	49	71	**30**
6	0.5	2	2	8	8	4	7	8	8	**6**
6	1.2	4	4	19	19	9	14	19	25	**14**
6	1.2+X	4	4	26	26	8	13	16	25	**15**
6	2.0	8	8	16	16	16	24	32	20	**18**
6	4.0	12	12	47	47	21	43	44	63	**36**
12	0.5	3	3	4	4	7	6	8	15	**6**
12	1.2	6	6	5	5	10	13	16	22	**10**
12	1.2+X	11	11	3	3	5	6	8	12	**7**
12	2.0	8	8	9	9	21	22	29	42	**19**
12	4.0	2	2	13	13	25	32	44	62	**24**
18	0.5	5	5	10	10	8	9	15	14	**10**
18	1.2	5	5	14	14	9	12	15	23	**12**
18	1.2+X	2	2	6	6	3	5	7	8	**5**
18	2.0	9	9	26	26	15	21	27	39	**22**
18	4.0	12	12	24	24	22	35	45	68	**30**
24	0.5	4	4	10	10	8	11	14	17	**10**
24	1.2	5	5	16	16	8	14	16	20	**13**
24	1.2+X	2	2	4	4	2	4	5	7	**4**
24	2.0	5	5	19	19	11	18	23	26	**16**
24	4.0	7	7	13	13	17	25	34	46	**20**
36	0.5	4	4	6	6	8	10	9	6	**7**
36	1.2	4	4	5	5	8	10	14	16	**8**
36	1.2+X	2	2	2	2	3	4	5	6	**3**
36	2.0	6	6	8	8	11	15	20	25	**12**
36	4.0	9	9	11	11	19	22	13	8	**13**
52	0.5	5	5	8	8	10	13	15	16	**10**
52	1.2	5	5	7	7	9	13	15	19	**10**
52	1.2+X	2	2	3	3	3	4	6	7	**4**
52	2.0	7	7	10	10	12	19	23	36	**16**
52	4.0	8	8	12	12	16	25	34	41	**20**

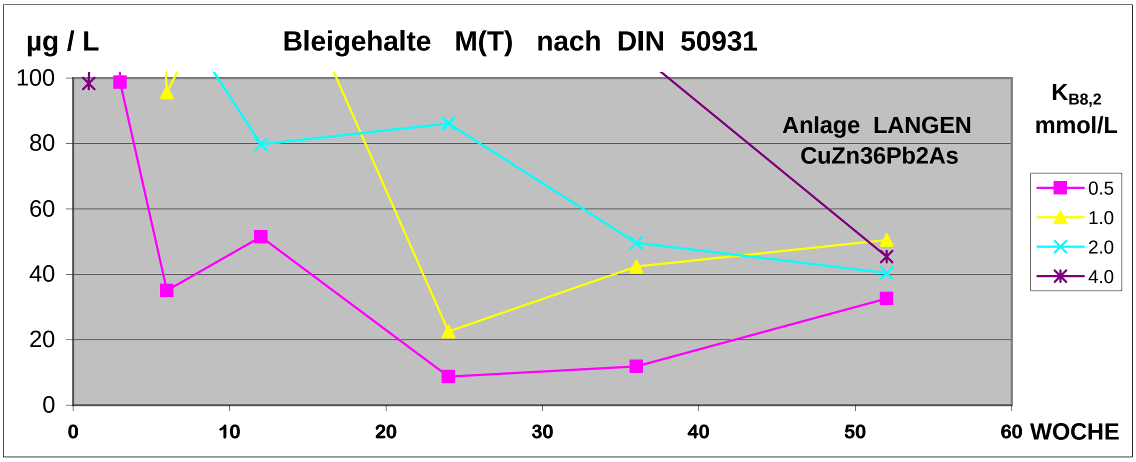
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

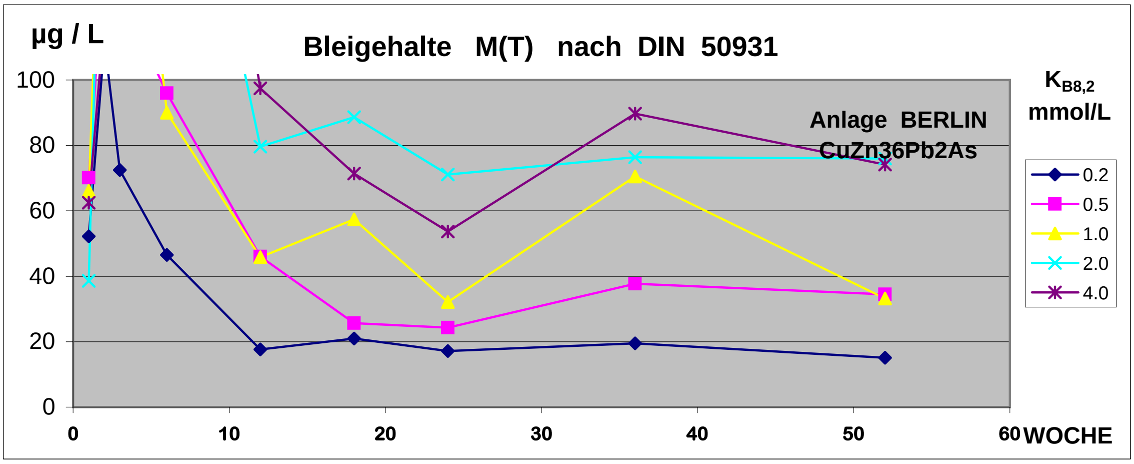
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	2	2	2	2	0	4	5	6	
	MAX	22	22	93	93	37	64	117	162	
	Mittelwer	7	7	18	18	14	22	33	47	
	50% Perc	6	6	13	13	11	19	23	25	
	90% Perc	12	12	33	33	25	41	72	122	
	95% Perc	14	14	55	55	29	47	78	131	
WÜRZBURG	**99% Perc**	20	20	80	80	34	57	100	158	WÜRZBURG

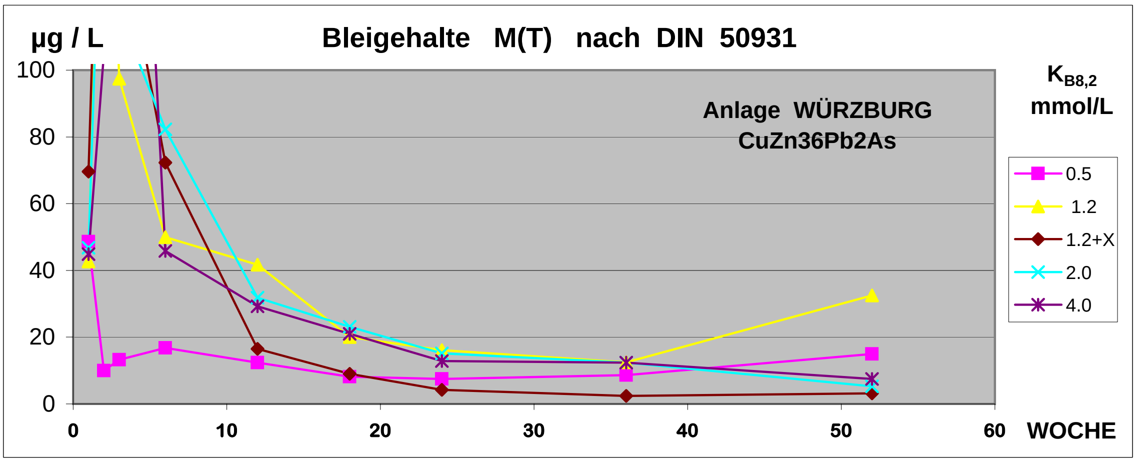
A 6 Pb

Bleigehalte nach M (T) **Werkstoff : CuZn36Pb2As**









Legierung E   BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	4	4	5	5	6	10	99	15	**19**
1	0.5	7	7	13	13	26	26	72	95	**32**
1	1.0	11	11	17	17	39	58	107	154	**52**
1	2.0	9	9	18	18	32	43	113	131	**47**
1	4.0	8	8	18	18	43	44	153	183	**59**
2	0,04	3	3	4	4	4	6	9	7	**5**
2	0.5	4	4	5	5	14	27	79	101	**30**
2	1.0	3	3	6	6	11	21	23	79	**19**
2	2.0	7	7	12	12	23	43	63	160	**41**
2	4.0	6	6	9	9	17	35	62	148	**37**
3	0,04	2	2	3	3	5	7	7	11	**5**
3	0.5	5	5	6	6	9	27	33	59	**19**
3	1.0	4	4	8	8	9	23	29	57	**18**
3	2.0	6	6	12	12	21	43	57	119	**35**
3	4.0	5	5	14	14	14	31	70	112	**33**
6	0,04	2	2	2	2	4	2	5	7	**3**
6	0.5	5	5	8	8	2	8	17	24	**10**
6	1.0	9	9	11	11	6	21	27	53	**18**
6	2.0	6	6	10	10	12	29	29	96	**25**
6	4.0	5	5	11	11	9	18	47	84	**24**
12	0,04	1	1	1	1	2	3	4	3	**2**
12	0.5	1	1	4	4	5	8	14	11	**6**
12	1.0	2	2	7	7	9	11	18	33	**11**
12	2.0	2	2	8	8	10	20	38	64	**19**
12	4.0	3	3	6	6	9	14	40	51	**17**
18	0,04	1	1	4	4	2	2	3	4	**3**
18	0.5	4	4	3	3	7	9	18	20	**9**
18	1.0	5	5	6	6	21	0	22	43	**14**
18	2.0	5	5	6	6	10	23	29	35	**15**
18	4.0	6	6	14	14	14	34	45	123	**32**
24	0,04	2	2	1	1	1	2	2	3	**2**
24	0.5	3	3	5	5	5	7	10	11	**6**
24	1.0	12	12	7	7	13	14	20	33	**15**
24	2.0	4	4	10	10	20	29	52	87	**27**
24	4.0	7	7	8	8	13	18	40	67	**21**
36	0,04	1	1	1	1	2	1	2	1	**1**
36	0.5	6	6	6	6	6	8	12	8	**7**
36	1.0	6	6	9	9	9	10	15	26	**11**
36	2.0	11	11	11	11	17	25	49	93	**29**
36	4.0	6	6	8	8	12	19	39	62	**20**
52	0,04	1	1	3	3	3	3	5	5	**3**
52	0.5	2	2	2	2	4	7	6	8	**4**
52	1.0	3	3	6	6	6	7	10	21	**8**
52	2.0	4	4	10	10	11	21	32	68	**20**
52	4.0	5	5	8	8	13	18	49	56	**20**
	MIN	1	1	1	1	1	0	2	1	
	MAX	12	12	18	18	43	58	153	183	
	Mittelwer	5	5	8	8	12	19	37	58	
	50% Perc	5	5	7	7	9	18	29	53	
	90% Perc	9	9	14	14	22	40	76	128	
	95% Perc	11	11	16	16	31	43	105	153	
THALFANG	**99% Perc**	12	12	18	18	41	52	135	173	THALFANG

Legierung E

BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	40	40	46	46	82	140	372	193	**120**
1	1.0	15	15	30	30	54	133	263	484	**128**
1	2.0	15	15	31	31	62	154	298	504	**139**
1	4.0	15	15	25	25	41	100	196	370	**98**
2	0.5	52	52	141	141	273	597	723	750	**341**
2	1.0	46	46	45	45	103	180	344	558	**171**
2	2.0	52	52	73	73	182	333	706	1429	**363**
2	4.0	53	53	55	55	120	283	511	1249	**297**
3	0.5	17	17	35	35	77	96	214	299	**99**
3	1.0	74	74	108	108	240	329	878	1210	**378**
3	2.0	35	35	67	67	135	349	530	1339	**320**
3	4.0	47	47	52	52	105	376	327	2176	**398**
6	0.5	9	9	18	18	22	46	59	99	**35**
6	1.0	22	22	44	44	58	106	218	251	**96**
6	2.0	25	25	55	55	68	159	178	426	**124**
6	4.0	56	56	120	120	211	595	1022	1914	**512**
12	0.5	19	19	20	20	41	69	90	134	**52**
12	1.0	41	41	46	46	110	171	276	487	**152**
12	2.0	24	24	32	32	68	107	110	241	**80**
12	4.0	25	25	37	37	81	109	232	318	**108**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	3	3	5	5	0	13	17	24	**9**
24	1.0	7	7	11	11	27	26	36	55	**23**
24	2.0	13	13	76	76	64	95	115	237	**86**
24	4.0	12	12	62	62	58	88	95	620	**126**
36	0.5	4	4	7	7	10	16	19	28	**12**
36	1.0	8	8	18	18	29	69	64	125	**42**
36	2.0	11	11	22	22	40	74	88	129	**50**
36	4.0	14	14	36	36	67	159	182	356	**108**
52	0.5	11	11	20	20	30	48	56	65	**33**
52	1.0	24	24	34	34	41	60	81	106	**51**
52	2.0	15	15	26	26	46	49	81	65	**40**
52	4.0	13	13	22	22	44	70	79	100	**45**
	MIN	3	3	5	5	0	13	17	24	
	MAX	74	74	141	141	273	597	1022	2176	
	Mittelwer	26	26	44	44	81	162	264	511	
	50% Perc	18	18	36	36	63	107	189	309	
	90% Perc	52	52	76	76	177	347	688	1330	
	95% Perc	54	54	113	113	224	475	793	1647	
	99% Perc	68	68	134	134	263	596	977	2095	

A 6 Pb

Legierung E   BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	16	16	23	23	45	103	104	88	**52**
1	0.5	25	25	32	32	59	149	153	86	**70**
1	1.0	24	24	32	32	52	105	140	120	**66**
1	2.0	27	27	30	30	27	70	60	38	**39**
1	4.0	27	27	26	26	42	87	135	130	**63**
2	0.2	27	27	46	46	127	164	233	223	**112**
2	0.5	44	44	90	90	110	162	183	404	**141**
2	1.0	67	67	121	121	110	154	270	635	**193**
2	2.0	41	41	78	78	128	246	586	503	**213**
2	4.0	24	24	53	53	74	174	172	376	**119**
3	0.2	37	37	44	44	69	62	134	153	**73**
3	0.5	50	50	58	58	89	133	317	258	**127**
3	1.0	103	103	70	70	101	198	466	656	**221**
3	2.0	120	120	101	101	157	339	704	717	**295**
3	4.0	81	81	76	76	91	208	515	760	**236**
6	0.2	27	27	26	26	42	43	89	92	**47**
6	0.5	55	55	57	57	74	85	175	210	**96**
6	1.0	44	44	45	45	76	91	159	216	**90**
6	2.0	67	67	83	83	148	263	361	645	**215**
6	4.0	68	68	88	88	159	428	352	873	**266**
12	0.2	8	8	10	10	16	22	30	37	**18**
12	0.5	22	22	22	22	37	56	80	107	**46**
12	1.0	20	20	21	21	32	66	62	125	**46**
12	2.0	23	23	23	23	48	140	100	257	**80**
12	4.0	32	32	42	42	72	115	172	273	**98**
18	0.2	15	15	10	10	16	28	32	42	**21**
18	0.5	22	22	12	12	18	32	37	50	**26**
18	1.0	45	45	23	23	38	75	82	128	**57**
18	2.0	44	44	33	33	72	142	145	196	**89**
18	4.0	32	32	34	34	47	96	113	183	**71**
24	0.2	6	6	16	16	14	22	25	32	**17**
24	0.5	8	8	24	24	20	30	34	46	**24**
24	1.0	8	8	35	35	23	39	44	65	**32**
24	2.0	21	21	46	46	60	104	110	161	**71**
24	4.0	13	13	25	25	50	72	91	140	**54**
36	0.2	12	12	11	11	18	27	27	38	**20**
36	0.5	32	32	18	18	32	50	49	71	**38**
36	1.0	32	32	42	42	67	92	105	152	**71**
36	2.0	42	42	47	47	77	103	120	133	**76**
36	4.0	37	37	39	39	76	107	133	250	**90**
52	0.2	12	12	12	12	15	17	17	24	**15**
52	0.5	33	33	22	22	26	39	42	59	**35**
52	1.0	15	15	24	24	28	45	47	68	**33**
52	2.0	30	30	47	47	56	97	126	175	**76**
52	4.0	29	29	41	41	56	110	126	161	**74**
	MIN	6	6	10	10	14	17	17	24	
	MAX	120	120	121	121	159	428	704	873	
	Mittelwer	35	35	41	41	62	111	161	226	
	50% Perc	29	29	34	34	56	96	120	152	
	90% Perc	67	67	81	81	120	204	357	641	
	95% Perc	78	78	90	90	144	260	505	705	
BERLIN	**99% Perc**	113	113	112	112	158	389	652	823	BERLIN

Legierung E BLEIKONZENTRATION NACH STAGNATION (µg / L)

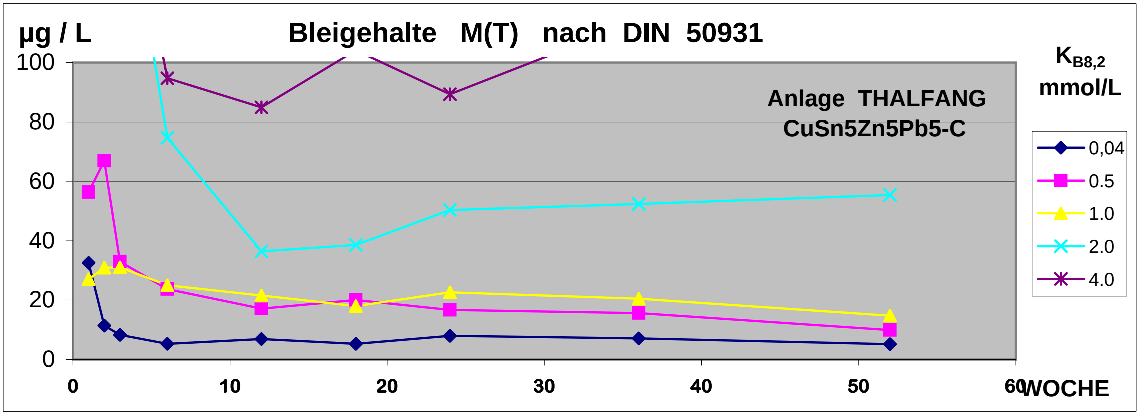
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	14	14	22	22	29	47	94	147	**49**
1	1.2	9	9	17	17	29	41	86	133	**43**
1	1.2+X	17	17	27	27	42	75	128	224	**70**
1	2.0	11	11	17	17	24	49	84	161	**47**
1	4.0	10	10	18	18	24	45	74	160	**45**
2	0.5	4	4	18	18	10	5	12	9	**10**
2	1.2	81	81	263	263	202	244	396	210	**218**
2	1.2+X	44	44	269	269	130	294	357	339	**218**
2	2.0	27	27	237	237	89	340	239	296	**187**
2	4.0	14	14	158	158	34	86	107	269	**105**
3	0.5	10	10	8	8	16	10	27	17	**13**
3	1.2	30	30	45	45	70	95	250	214	**97**
3	1.2+X	53	53	68	68	121	135	352	315	**146**
3	2.0	38	38	78	78	81	195	227	202	**117**
3	4.0	61	61	143	143	206	389	707	798	**314**
6	0.5	6	6	22	22	10	17	17	34	**17**
6	1.2	16	16	62	62	25	45	73	101	**50**
6	1.2+X	19	19	75	75	28	72	73	217	**72**
6	2.0	27	27	72	72	55	87	137	181	**82**
6	4.0	18	18	38	38	49	70	91	45	**46**
12	0.5	7	7	8	8	13	15	17	24	**12**
12	1.2	13	13	16	16	41	55	59	121	**42**
12	1.2+X	7	7	9	9	17	20	27	36	**17**
12	2.0	14	14	14	14	34	41	54	70	**32**
12	4.0	12	12	13	13	25	42	54	63	**29**
18	0.5	4	4	10	10	7	7	11	12	**8**
18	1.2	9	9	24	24	15	20	25	34	**20**
18	1.2+X	3	3	9	9	5	7	10	26	**9**
18	2.0	9	9	27	27	15	23	30	45	**23**
18	4.0	11	11	11	11	15	26	30	53	**21**
24	0.5	3	3	10	10	6	7	10	11	**8**
24	1.2	6	6	18	18	11	19	23	28	**16**
24	1.2+X	2	2	5	5	3	5	5	7	**4**
24	2.0	6	6	15	15	9	18	28	24	**15**
24	4.0	4	4	4	4	7	24	29	27	**13**
36	0.5	4	4	11	11	14	6	7	12	**9**
36	1.2	7	7	8	8	12	16	23	19	**13**
36	1.2+X	1	1	2	2	2	3	4	4	**2**
36	2.0	2	2	4	4	5	7	9	11	**6**
36	4.0	6	6	6	6	11	15	22	27	**12**
52	0.5	9	9	13	13	19	16	23	18	**15**
52	1.2	14	14	21	21	27	44	55	64	**33**
52	1.2+X	2	2	2	2	3	3	5	6	**3**
52	2.0	3	3	4	4	5	7	7	9	**5**
52	4.0	4	4	5	5	7	10	12	13	**8**

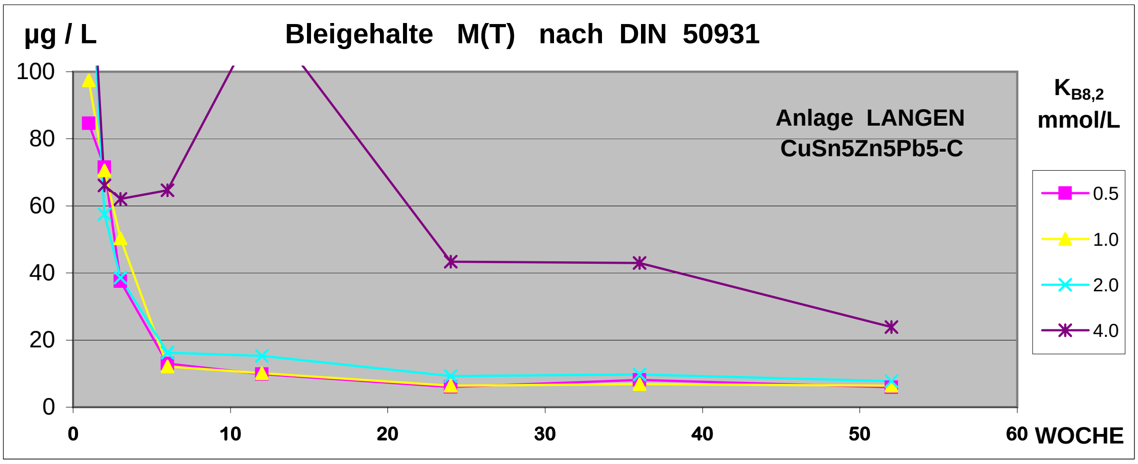
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

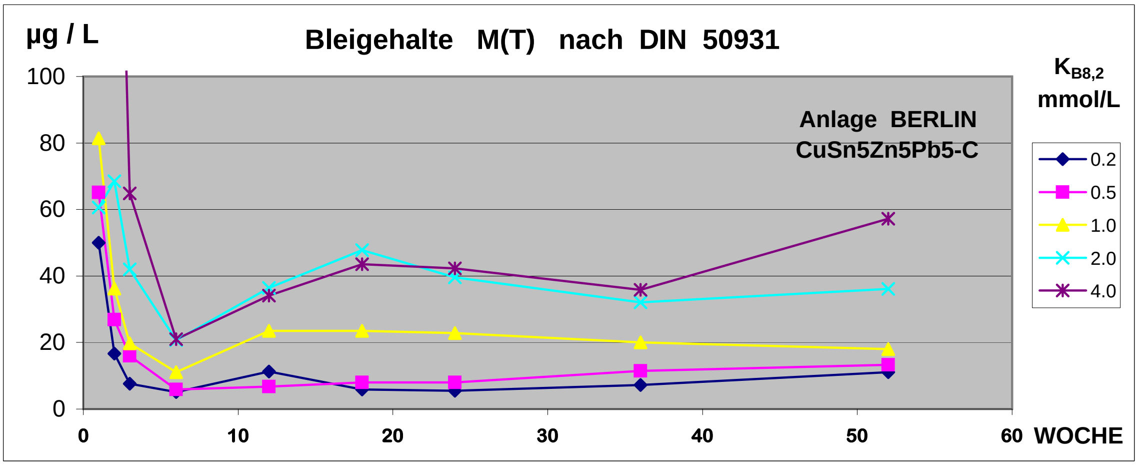
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	1	1	2	2	2	3	4	4	
	MAX	81	81	269	269	206	389	707	798	
	Mittelwer	15	15	43	43	36	62	91	107	
	50% Perc	9	9	17	17	17	24	30	45	
	90% Perc	35	35	117	117	86	171	246	251	
	95% Perc	51	51	221	221	128	284	356	311	
WÜRZBURG	**99% Perc**	72	72	266	266	204	367	570	596	WÜRZBURG

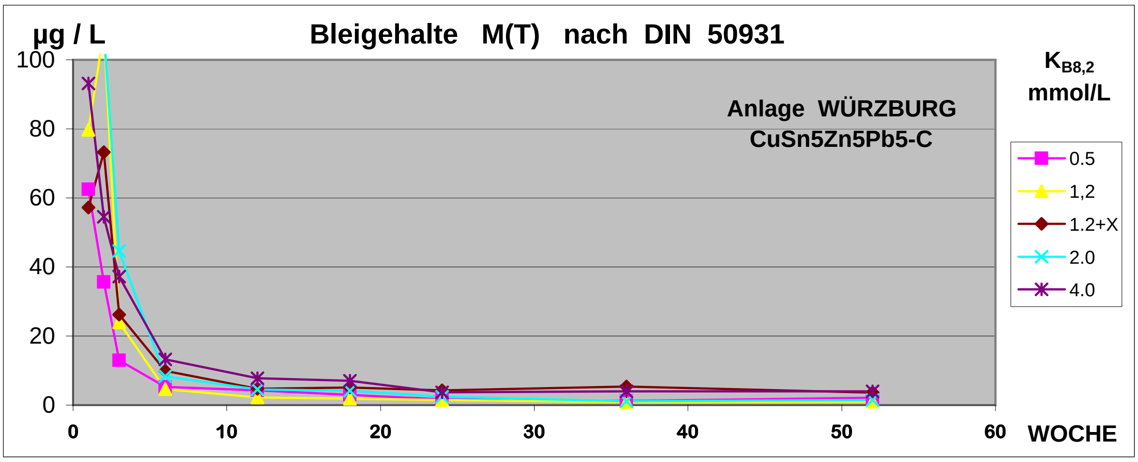
A 6 Pb

Bleigehalte nach M (T) **Werkstoff : CuSn5Zn5Pb5-C**









Legierung F BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	7	7	11	11	7	16	173	28	**33**
1	0.5	21	21	47	47	71	48	70	126	**56**
1	1.0	8	8	18	18	27	27	35	75	**27**
1	2.0	54	54	103	103	141	211	285	541	**187**
1	4.0	94	94	119	119	202	277	432	684	**253**
2	0,04	5	5	8	8	10	14	20	21	**11**
2	0.5	20	20	23	23	47	81	127	194	**67**
2	1.0	9	9	15	15	22	37	58	82	**31**
2	2.0	75	75	106	106	173	248	381	549	**214**
2	4.0	65	65	125	125	227	354	507	967	**304**
3	0,04	3	3	4	4	9	11	12	20	**8**
3	0.5	18	18	18	18	14	53	52	73	**33**
3	1.0	11	11	18	18	18	37	57	78	**31**
3	2.0	59	59	93	93	134	195	258	471	**170**
3	4.0	50	50	82	82	129	215	262	527	**175**
6	0,04	3	3	2	2	6	4	9	13	**5**
6	0.5	8	8	18	18	15	20	36	67	**24**
6	1.0	10	10	14	14	17	29	47	59	**25**
6	2.0	30	30	44	44	64	72	138	175	**75**
6	4.0	39	39	61	61	85	105	159	209	**95**
12	0,04	3	3	5	5	6	8	13	12	**7**
12	0.5	7	7	9	9	15	19	32	39	**17**
12	1.0	6	6	17	17	15	26	46	39	**22**
12	2.0	14	14	22	22	30	48	78	63	**36**
12	4.0	34	34	58	58	61	115	140	179	**85**
18	0,04	2	2	7	7	4	5	7	8	**5**
18	0.5	8	8	18	18	14	19	38	37	**20**
18	1.0	7	7	9	9	28	18	30	36	**18**
18	2.0	15	15	21	21	30	45	79	83	**39**
18	4.0	34	34	72	72	75	182	186	178	**104**
24	0,04	6	6	5	5	8	10	12	12	**8**
24	0.5	15	15	10	10	11	16	24	33	**17**
24	1.0	16	16	14	14	20	25	33	43	**23**
24	2.0	21	21	28	28	39	41	99	126	**50**
24	4.0	42	42	83	83	83	116	129	137	**89**
36	0,04	5	5	5	5	7	8	10	12	**7**
36	0.5	8	8	11	11	13	19	30	25	**16**
36	1.0	11	11	16	16	20	24	30	36	**21**
36	2.0	22	22	32	32	46	67	78	120	**52**
36	4.0	48	48	76	76	95	128	206	236	**114**
52	0,04	2	2	4	4	5	6	9	9	**5**
52	0.5	4	4	7	7	7	14	14	22	**10**
52	1.0	5	5	10	10	12	20	22	34	**15**
52	2.0	17	17	31	31	42	65	97	143	**55**
52	4.0	36	36	99	99	79	119	208	229	**113**
	MIN	2	2	2	2	4	4	7	8	
	MAX	94	94	125	125	227	354	507	967	
	Mittelwe	22	22	36	36	49	71	106	152	
	50% Per	14	14	18	18	22	37	57	73	
	90% Per	52	52	97	97	132	205	260	505	
	95% Per	64	64	105	105	167	241	362	547	
THALFANG	**99% Per**	86	86	122	122	216	320	474	842	THALFANG

Legierung F   BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	26	26	40	40	60	96	213	176	**85**
1	1.0	23	23	42	42	56	99	175	319	**97**
1	2.0	25	25	53	53	80	187	270	462	**144**
1	4.0	19	19	41	41	70	183	255	558	**148**
2	0.5	28	28	38	38	61	104	132	143	**72**
2	1.0	22	22	32	32	55	80	116	206	**71**
2	2.0	14	14	22	22	41	88	95	164	**58**
2	4.0	20	20	24	24	43	86	124	188	**66**
3	0.5	11	11	19	19	40	51	63	86	**38**
3	1.0	15	15	24	24	39	68	103	115	**50**
3	2.0	10	10	20	20	30	55	63	101	**39**
3	4.0	15	15	30	30	42	76	106	183	**62**
6	0.5	5	5	8	8	11	18	22	27	**13**
6	1.0	4	4	8	8	11	19	18	25	**12**
6	2.0	7	7	11	11	15	25	23	31	**16**
6	4.0	17	17	22	22	43	87	123	186	**65**
12	0.5	5	5	6	6	10	13	16	18	**10**
12	1.0	5	5	6	6	10	13	16	20	**10**
12	2.0	7	7	8	8	16	21	24	31	**15**
12	4.0	46	46	57	57	100	138	201	298	**118**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	2	2	4	4	7	8	9	12	**6**
24	1.0	5	5	4	4	6	7	9	11	**6**
24	2.0	3	3	7	7	9	11	15	19	**9**
24	4.0	12	12	55	55	34	59	53	67	**43**
36	0.5	3	3	5	5	7	11	13	18	**8**
36	1.0	3	3	4	4	7	9	12	13	**7**
36	2.0	4	4	6	6	9	13	17	19	**10**
36	4.0	12	12	36	36	35	49	64	100	**43**
52	0.5	3	3	4	4	5	8	10	10	**6**
52	1.0	3	3	4	4	6	9	11	11	**6**
52	2.0	3	3	4	4	9	10	15	14	**8**
52	4.0	8	8	13	13	22	37	43	47	**24**
	MIN	2	2	4	4	5	7	9	10	
	MAX	46	46	57	57	100	187	270	558	
	Mittelw	12	12	21	21	31	54	76	115	
	50% Pe	9	9	16	16	26	43	48	57	
	90% Pe	25	25	42	42	61	104	198	289	
	95% Pe	27	27	54	54	75	158	232	383	
	99% Pe	40	40	56	56	94	186	265	528	

Legierung F **BLEIKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	24	24	34	34	50	60	81	93	**50**
1	0.5	45	45	44	44	64	65	133	81	**65**
1	1.0	34	34	48	48	75	128	129	155	**81**
1	2.0	39	39	47	47	76	75	90	72	**61**
1	4.0	65	65	60	60	84	75	240	431	**135**
2	0.2	12	12	11	11	10	20	20	37	**17**
2	0.5	12	12	24	24	24	33	25	61	**27**
2	1.0	19	19	30	30	26	41	53	72	**36**
2	2.0	31	31	41	41	77	108	116	103	**69**
2	4.0	96	96	106	106	257	310	213	695	**235**
3	0.2	7	7	4	4	6	9	10	14	**8**
3	0.5	8	8	10	10	11	17	33	31	**16**
3	1.0	12	12	10	10	17	22	31	44	**20**
3	2.0	24	24	21	21	29	44	74	99	**42**
3	4.0	29	29	70	70	74	80	79	88	**65**
6	0.2	7	7	3	3	4	5	6	6	**5**
6	0.5	5	5	4	4	6	7	8	8	**6**
6	1.0	9	9	7	7	10	12	16	19	**11**
6	2.0	13	13	13	13	17	22	31	44	**21**
6	4.0	17	17	17	17	21	25	27	27	**21**
12	0.2	5	5	4	4	53	5	7	7	**11**
12	0.5	5	5	5	5	5	7	13	9	**7**
12	1.0	54	54	7	7	10	15	19	22	**24**
12	2.0	30	30	13	13	79	32	37	57	**36**
12	4.0	27	27	26	26	31	39	48	49	**34**
18	0.2	7	7	4	4	4	6	7	8	**6**
18	0.5	8	8	6	6	6	9	10	11	**8**
18	1.0	25	25	13	13	17	26	31	38	**24**
18	2.0	42	42	32	32	25	82	50	77	**48**
18	4.0	27	27	47	47	31	78	43	48	**44**
24	0.2	2	2	7	7	5	6	7	8	**6**
24	0.5	4	4	9	9	7	9	10	12	**8**
24	1.0	8	8	27	27	18	28	29	38	**23**
24	2.0	12	12	49	49	28	43	48	76	**40**
24	4.0	24	24	37	37	41	52	57	66	**42**
36	0.2	8	8	5	5	6	8	9	9	**7**
36	0.5	16	16	6	6	9	12	13	14	**12**
36	1.0	18	18	11	11	18	26	26	32	**20**
36	2.0	28	28	16	16	30	38	42	59	**32**
36	4.0	31	31	28	28	43	44	25	57	**36**
52	0.2	10	10	9	9	11	12	12	16	**11**
52	0.5	12	12	11	11	12	15	15	18	**13**
52	1.0	13	13	14	14	17	22	23	28	**18**
52	2.0	20	20	27	27	30	44	52	69	**36**
52	4.0	35	35	47	47	56	76	72	90	**57**
	MIN	2	2	3	3	4	5	6	6	
	MAX	96	96	106	106	257	310	240	695	
	Mittelwe	22	22	24	24	34	42	47	69	
	50% Pe	17	17	14	14	21	26	31	44	
	90% Pe	41	41	48	48	76	79	106	97	
	95% Pe	52	52	58	58	79	103	132	145	
BERLIN	**99% Pe**	82	82	90	90	181	230	228	579	BERLIN

Legierung F BLEIKONZENTRATION NACH STAGNATION (µg / L)

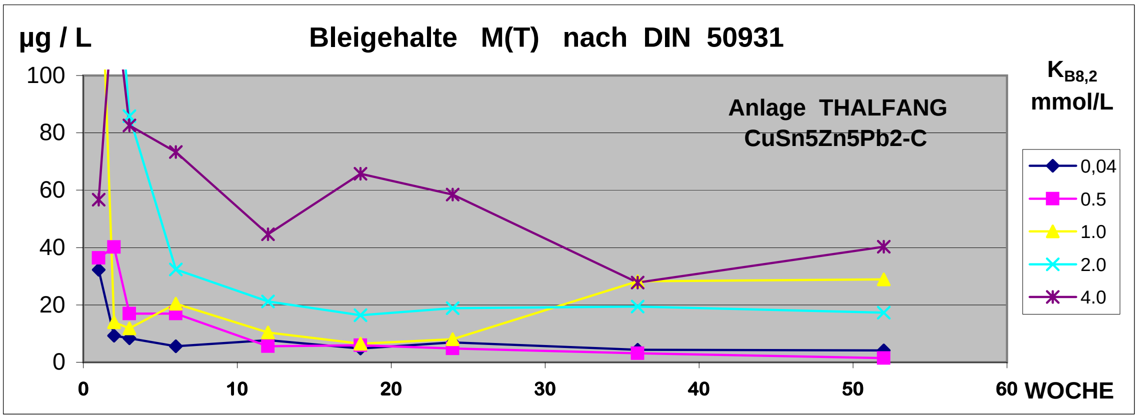
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	29	29	35	35	42	69	116	145	**63**
1	1,2	31	31	45	45	59	80	147	200	**80**
1	1.2+X	23	23	28	28	41	71	95	149	**57**
1	2.0	38	38	54	54	67	107	178	310	**106**
1	4.0	32	32	40	40	57	105	144	295	**93**
2	0.5	17	17	35	35	31	26	64	60	**36**
2	1.2	31	31	164	164	64	96	132	184	**108**
2	1.2+X	24	24	104	104	44	66	90	130	**73**
2	2.0	32	32	142	142	66	88	154	211	**108**
2	4.0	17	17	61	61	35	47	85	113	**55**
3	0.5	5	5	7	7	12	14	27	27	**13**
3	1.2	9	9	16	16	21	27	44	50	**24**
3	1.2+X	8	8	20	20	18	36	38	62	**26**
3	2.0	13	13	19	19	26	63	91	113	**45**
3	4.0	23	23	31	31	26	40	54	70	**37**
6	0.5	2	2	7	7	4	5	6	9	**5**
6	1.2	3	3	5	5	4	5	5	7	**5**
6	1.2+X	4	4	16	16	6	9	11	13	**10**
6	2.0	5	5	10	10	7	9	9	12	**8**
6	4.0	8	8	10	10	11	17	16	26	**13**
12	0.5	2	2	3	3	4	5	6	9	**4**
12	1.2	1	1	2	2	2	3	3	4	**2**
12	1.2+X	2	2	3	3	6	6	7	9	**5**
12	2.0	2	2	3	3	5	6	7	8	**5**
12	4.0	3	3	4	4	7	9	14	18	**8**
18	0.5	2	2	3	3	3	3	4	4	**3**
18	1.2	1	1	2	2	2	2	2	3	**2**
18	1.2+X	3	3	6	6	4	5	7	7	**5**
18	2.0	2	2	4	4	3	4	6	8	**4**
18	4.0	3	3	3	3	5	9	12	18	**7**
24	0.5	1	1	2	2	1	2	2	2	**2**
24	1.2	1	1	2	2	1	1	2	2	**2**
24	1.2+X	2	2	5	5	3	5	6	6	**4**
24	2.0	1	1	2	2	2	3	4	4	**2**
24	4.0	2	2	1	1	2	5	7	10	**4**
36	0.5	1	1	2	2	1	1	1	1	**1**
36	1.2	0	0	1	1	1	2	1	1	**1**
36	1.2+X	2	2	3	3	4	9	6	14	**5**
36	2.0	1	1	1	1	1	2	1	1	**1**
36	4.0	3	3	3	3	6	6	4	4	**4**
52	0.5	1	1	2	2	2	3	2	4	**2**
52	1.2	1	1	1	1	1	1	1	1	**1**
52	1.2+X	2	2	3	3	3	4	6	6	**4**
52	2.0	1	1	1	1	2	2	2	2	**2**
52	4.0	2	2	3	3	4	5	6	7	**4**

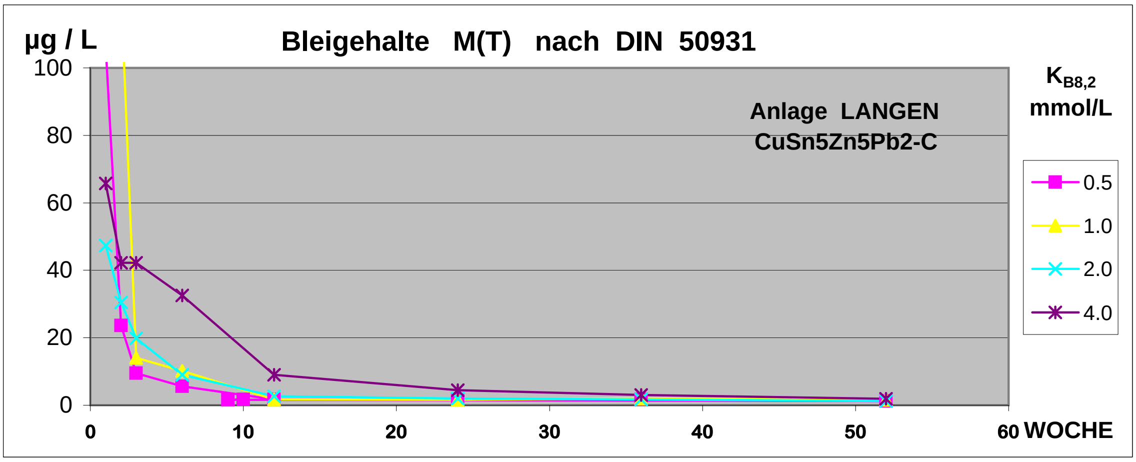
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

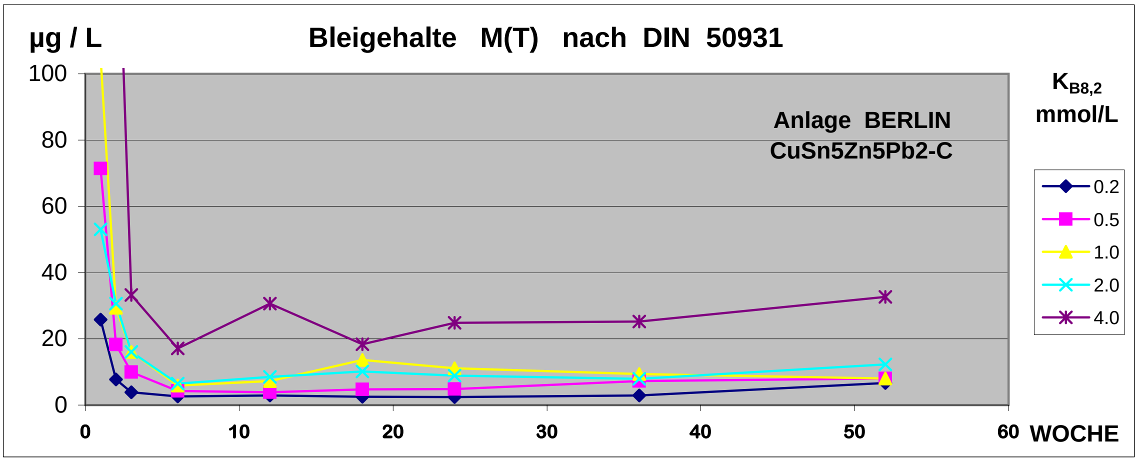
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	0	0	1	1	1	1	1	1	
	MAX	38	38	164	164	67	107	178	310	
	Mittelwe	9	9	20	20	16	24	36	52	
	50% Per	3	3	4	4	5	6	7	9	
	90% Per	30	30	50	50	52	76	126	170	
	95% Per	32	32	95	95	63	94	146	209	
WÜRZBURG	**99% Per**	35	35	154	154	67	106	167	303	WÜRZBURG

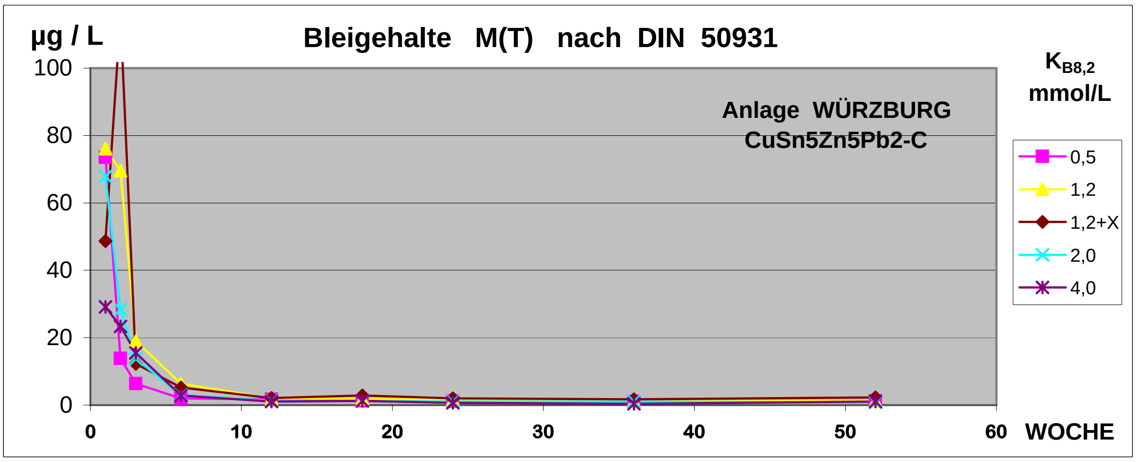
A 6 Pb

Bleigehalte nach M (T) **Werkstoff : CuSn5Zn5Pb2-C**









A 6 Pb

Legierung G **BLEIKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	5	5	7	7	6	12	192	24	**32**
1	0.5	14	14	23	23	48	34	50	85	**36**
1	1.0	78	78	102	102	167	235	17	540	**165**
1	2.0	61	61	107	107	144	189	266	466	**175**
1	4.0	5	5	12	12	19	19	330	52	**57**
2	0,04	5	5	7	7	8	11	17	14	**9**
2	0.5	11	11	14	14	21	47	79	124	**40**
2	1.0	4	4	7	7	10	16	25	39	**14**
2	2.0	54	54	80	80	143	197	238	391	**155**
2	4.0	33	33	52	52	104	159	221	381	**129**
3	0,04	4	4	5	5	9	10	12	18	**8**
3	0.5	9	9	9	9	13	26	26	35	**17**
3	1.0	5	5	8	8	8	14	21	26	**12**
3	2.0	31	31	49	49	78	98	130	221	**86**
3	4.0	27	27	42	42	59	100	147	217	**83**
6	0,04	3	3	2	2	8	4	9	14	**6**
6	0.5	9	9	9	9	13	26	26	35	**17**
6	1.0	13	13	14	14	9	22	37	41	**20**
6	2.0	12	12	18	18	25	39	71	64	**32**
6	4.0	24	24	55	55	52	164	101	112	**73**
12	0,04	3	3	6	6	6	10	14	14	**8**
12	0.5	1	1	3	3	5	8	11	13	**6**
12	1.0	3	3	9	9	8	12	22	17	**10**
12	2.0	8	8	12	12	16	23	38	53	**21**
12	4.0	11	11	28	28	31	51	70	127	**45**
18	0,04	2	2	5	5	4	5	7	8	**5**
18	0.5	3	3	3	3	4	6	12	13	**6**
18	1.0	4	4	4	4	12	0	12	12	**7**
18	2.0	7	7	7	7	14	20	33	36	**16**
18	4.0	13	13	27	27	29	69	63	285	**66**
24	0,04	5	5	5	5	5	8	10	12	**7**
24	0.5	2	2	4	4	3	5	7	11	**5**
24	1.0	4	4	6	6	8	10	12	14	**8**
24	2.0	5	5	10	10	13	13	32	63	**19**
24	4.0	15	15	70	70	33	67	86	112	**59**
36	0,04	3	3	4	4	4	6	3	8	**4**
36	0.5	2	2	3	3	3	4	5	3	**3**
36	1.0	19	19	20	20	23	38	44	43	**28**
36	2.0	9	9	12	12	16	21	30	46	**19**
36	4.0	10	10	16	16	26	31	54	59	**28**
52	0,04	2	2	3	3	4	5	7	7	**4**
52	0.5	1	1	1	1	2	2	2	2	**2**
52	1.0	7	7	11	11	28	39	50	78	**29**
52	2.0	5	5	11	11	13	20	30	43	**17**
52	4.0	15	15	22	22	33	52	81	82	**40**
	MIN	1	1	1	1	2	0	2	2	
	MAX	78	78	107	107	167	235	330	540	
	Mittelwe	13	13	21	21	29	43	61	90	
	50% Pe	7	7	10	10	13	20	30	41	
	90% Pe	29	29	54	54	70	135	174	259	
	95% Pe	50	50	78	78	135	184	235	389	
THALFANG	**99% Pe**	71	71	105	105	157	218	302	507	THALFANG

Legierung G BLEIKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	54	54	59	59	83	117	266	157	**106**
1	1.0	27	27	54	54	76	143	306	486	**147**
1	2.0	10	10	17	17	27	59	87	152	**47**
1	4.0	15	15	26	26	80	73	117	174	**66**
2	0.5	8	8	12	12	17	35	36	61	**24**
2	1.0	21	21	45	45	83	138	214	415	**123**
2	2.0	9	9	14	14	23	42	53	80	**31**
2	4.0	16	16	19	19	32	53	78	105	**42**
3	0.5	3	3	5	5	10	11	15	24	**10**
3	1.0	6	6	7	7	11	18	32	25	**14**
3	2.0	6	6	12	12	17	29	30	47	**20**
3	4.0	12	12	24	24	33	55	72	106	**42**
6	0.5	2	2	3	3	4	8	9	14	**6**
6	1.0	3	3	5	5	7	14	17	27	**10**
6	2.0	3	3	5	5	7	13	15	21	**9**
6	4.0	11	11	14	14	26	44	68	72	**33**
12	0.5	1	1	1	1	2	2	3	3	**2**
12	1.0	1	1	1	1	2	3	2	3	**2**
12	2.0	2	2	2	2	3	3	3	4	**3**
12	4.0	4	4	6	6	9	10	15	18	**9**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	1	1	1	1	1	1	2	2	**1**
24	1.0	1	1	1	1	2	2	2	3	**2**
24	2.0	1	1	2	2	2	2	3	3	**2**
24	4.0	1	1	3	3	3	6	5	14	**5**
36	0.5	1	1	1	1	1	2	3	3	**2**
36	1.0	1	1	2	2	2	2	3	3	**2**
36	2.0	1	1	1	1	2	2	3	3	**2**
36	4.0	1	1	2	2	3	4	5	6	**3**
52	0.5	1	1	1	1	2	2	3	3	**2**
52	1.0	1	1	1	1	2	2	2	3	**2**
52	2.0	1	1	1	1	1	1	2	2	**1**
52	4.0	1	1	1	1	2	2	3	4	**2**
	MIN	1	1	1	1	1	1	2	2	
	MAX	54	54	59	59	83	143	306	486	
	Mittelwe	7	7	11	11	18	28	46	64	
	50% Pe	3	3	4	4	6	9	12	16	
	90% Pe	16	16	26	26	72	72	114	157	
	95% Pe	24	24	49	49	81	126	237	282	
	99% Pe	46	46	57	57	83	141	294	464	

Legierung G BLEIKONZENTRATION NACH STAGNATION (µg / L)

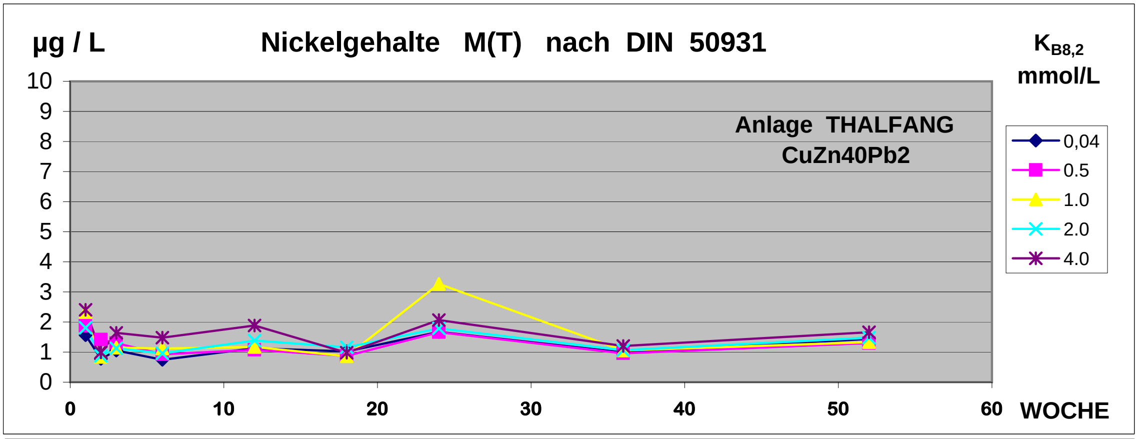
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	13	13	33	33	24	22	45	23	**26**
1	0.5	52	52	63	63	79	73	150	39	**71**
1	1.0	41	41	54	54	80	182	185	202	**105**
1	2.0	49	49	53	53	55	61	60	44	**53**
1	4.0	60	60	150	150	96	109	238	160	**128**
2	0.2	3	3	4	4	13	9	8	18	**8**
2	0.5	8	8	13	13	11	21	20	52	**18**
2	1.0	13	13	24	24	30	31	33	67	**29**
2	2.0	21	21	34	34	32	52	29	22	**31**
2	4.0	70	70	80	80	143	174	107	610	**167**
3	0.2	3	3	2	2	3	4	6	8	**4**
3	0.5	5	5	7	7	7	10	21	18	**10**
3	1.0	9	9	11	11	13	20	20	35	**16**
3	2.0	10	10	10	10	14	21	18	35	**16**
3	4.0	11	11	26	26	29	34	54	75	**33**
6	0.2	2	2	2	2	2	3	4	4	**3**
6	0.5	4	4	3	3	4	5	5	6	**4**
6	1.0	4	4	4	4	6	6	9	10	**6**
6	2.0	5	5	5	5	6	8	8	10	**7**
6	4.0	8	8	10	10	15	21	27	38	**17**
12	0.2	2	2	3	3	3	3	4	3	**3**
12	0.5	3	3	3	3	3	5	5	6	**4**
12	1.0	4	4	5	5	7	8	12	13	**7**
12	2.0	5	5	6	6	8	11	12	15	**9**
12	4.0	13	13	17	17	29	43	49	64	**31**
18	0.2	2	2	2	2	2	3	3	4	**3**
18	0.5	5	5	3	3	4	5	6	7	**5**
18	1.0	12	12	8	8	10	16	19	24	**14**
18	2.0	9	9	6	6	9	13	13	16	**10**
18	4.0	10	10	9	9	15	25	30	39	**18**
24	0.2	1	1	2	2	2	3	3	5	**2**
24	0.5	2	2	5	5	4	6	7	8	**5**
24	1.0	5	5	10	10	10	14	16	19	**11**
24	2.0	4	4	8	8	9	11	13	14	**9**
24	4.0	7	7	11	11	16	25	34	88	**25**
36	0.2	2	2	2	2	3	4	4	4	**3**
36	0.5	9	9	4	4	6	8	9	9	**7**
36	1.0	6	6	6	6	9	13	13	16	**9**
36	2.0	6	6	5	5	8	10	11	12	**8**
36	4.0	13	13	14	14	21	30	41	56	**25**
52	0.2	5	5	5	5	7	8	8	10	**7**
52	0.5	8	8	6	6	7	9	9	11	**8**
52	1.0	5	5	7	7	8	10	10	12	**8**
52	2.0	9	9	10	10	11	15	16	18	**12**
52	4.0	16	16	21	21	27	42	48	70	**33**
	MIN	1	1	2	2	2	3	3	3	
	MAX	70	70	150	150	143	182	238	610	
	Mittelwe	12	12	17	17	20	27	32	45	
	50% Pe	7	7	7	7	9	13	13	18	
	90% Pe	33	33	45	45	46	57	58	73	
	95% Pe	51	51	61	61	80	102	141	146	
BERLIN	**99% Pe**	66	66	119	119	122	178	215	430	BERLIN

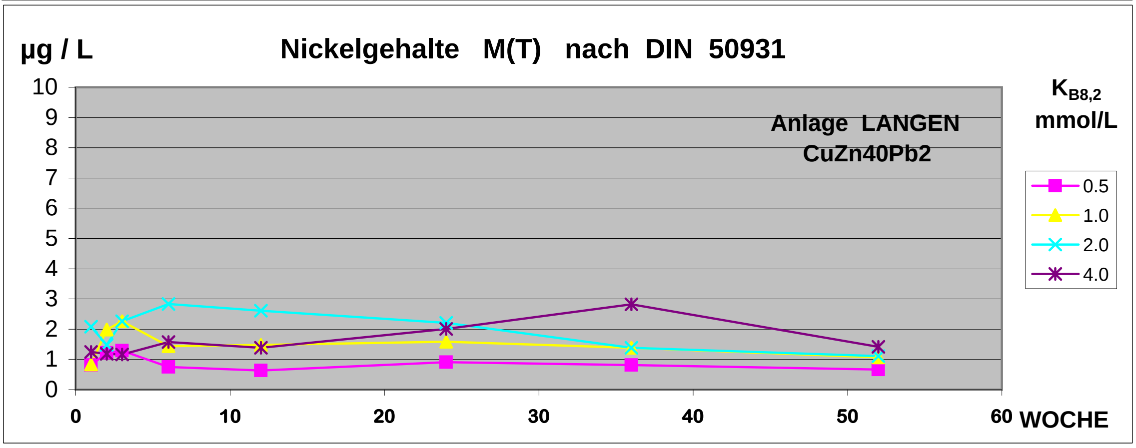
Legierung G **BLEIKONZENTRATION NACH STAGNATION (µg / L)**

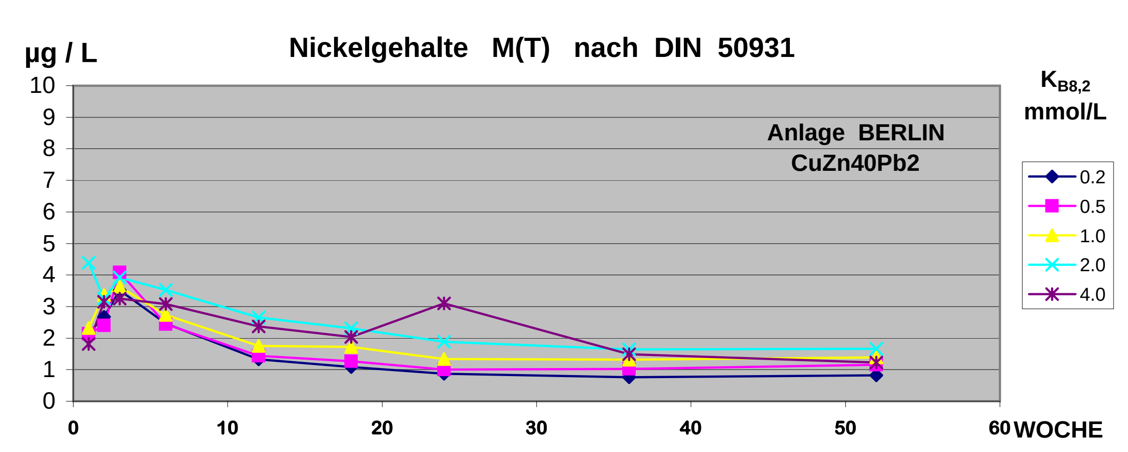
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,5	29	29	44	44	54	69	135	184	**74**
1	1,2	28	28	41	41	55	72	145	199	**76**
1	1,2+X	19	19	26	26	35	55	86	123	**49**
1	2,0	26	26	32	32	41	65	115	206	**68**
1	4,0	11	11	15	15	19	32	56	74	**29**
2	0.5	7	7	9	9	13	11	25	30	**14**
2	1.2	30	30	47	47	60	53	154	135	**70**
2	1.2+X	30	30	167	167	62	111	149	211	**116**
2	2.0	11	11	28	28	22	23	55	49	**28**
2	4.0	10	10	17	17	20	23	44	46	**23**
3	0.5	4	4	4	4	4	6	13	12	**6**
3	1.2	6	6	12	12	13	23	36	44	**19**
3	1.2+X	5	5	10	10	9	13	21	25	**12**
3	2.0	5	5	10	10	9	17	25	29	**14**
3	4.0	7	7	9	9	14	19	25	34	**16**
6	0.5	1	1	2	2	2	2	3	3	**2**
6	1.2	3	3	8	8	5	7	7	10	**6**
6	1.2+X	3	3	6	6	3	5	5	11	**5**
6	2.0	2	2	3	3	2	4	3	5	**3**
6	4.0	2	2	3	3	2	4	3	4	**3**
12	0.5	1	1	2	2	1	1	2	4	**2**
12	1.2	1	1	2	2	2	2	3	3	**2**
12	1.2+X	1	1	1	1	3	3	3	4	**2**
12	2.0	1	1	1	1	1	2	1	2	**1**
12	4.0	1	1	0	0	2	0	1	3	**1**
18	0.5	1	1	1	1	1	1	2	2	**1**
18	1.2	1	1	2	2	2	2	2	3	**2**
18	1.2+X	2	2	4	4	2	3	3	3	**3**
18	2.0	1	1	1	1	1	1	2	2	**1**
18	4.0	1	1	1	1	1	1	2	2	**1**
24	0.5	1	1	1	1	1	1	1	2	**1**
24	1.2	1	1	2	2	2	1	2	2	**2**
24	1.2+X	1	1	2	2	2	2	3	3	**2**
24	2.0	1	1	1	1	1	1	1	1	**1**
24	4.0	1	1	0	0	0	1	1	1	**1**
36	0.5	0	0	2	2	1	1	1	1	**1**
36	1.2	1	1	1	1	1	1	1	2	**1**
36	1.2+X	1	1	1	1	2	2	3	3	**2**
36	2.0	1	1	1	1	1	1	1	1	**1**
36	4.0	0	0	0	0	1	1	0	1	**0**
52	0.5	1	1	1	1	1	2	1	2	**1**
52	1.2	1	1	1	1	1	1	2	2	**1**
52	1.2+X	1	1	2	2	2	3	3	4	**2**
52	2.0	0	0	1	1	1	1	1	1	**1**
52	4.0	1	1	1	1	1	1	1	1	**1**
	Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !									
	MIN	0	0	0	0	0	0	0	1	
	MAX	30	30	167	167	62	111	154	211	
	Mittelwe	6	6	12	12	11	14	26	33	
	50% Per	1	1	2	2	2	2	3	3	
	90% Per	23	23	30	30	39	54	103	130	
	95% Per	29	29	43	43	55	68	143	196	
WÜRZBURG	**99% Per**	30	30	114	114	61	94	152	209	WÜRZBURG

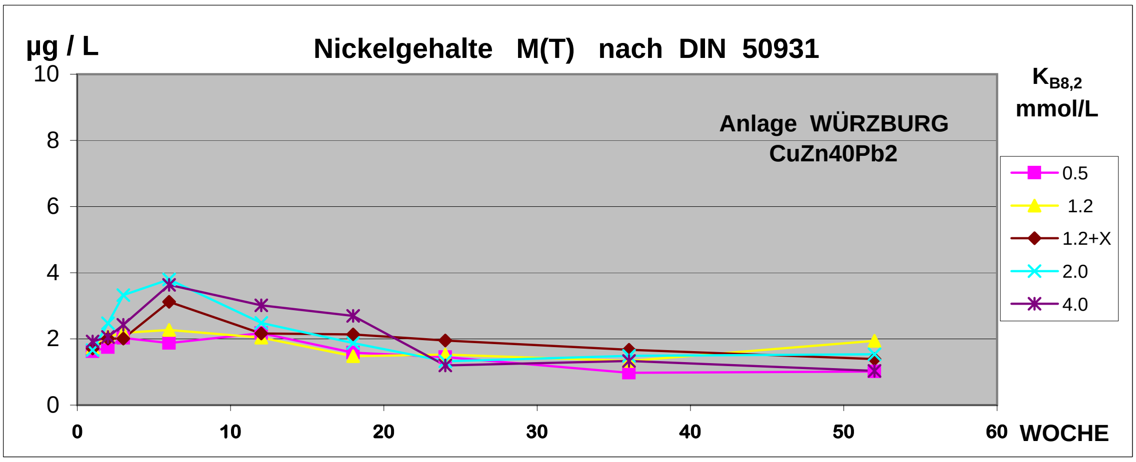
A 6 Ni

Nickelgehalte nach M (T) **Werkstoff : CuZn40Pb2**









Legierung C NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	1,5	1,5	1,3	1,3	1,4	1,0	2,6	1,9	**1,6**
1	0.5	1,6	1,6	1,8	1,8	2,0	2,1	2,3	1,8	**1,9**
1	1.0	2,0	2,0	1,9	1,9	2,3	2,2	2,7	3,6	**2,3**
1	2.0	1,8	1,8	1,6	1,6	2,1	1,7	2,3	1,6	**1,8**
1	4.0	2,3	2,3	2,0	2,0	2,5	2,6	2,8	2,7	**2,4**
2	0,04	0,7	0,7	0,8	0,8	0,8	0,7	0,8	0,9	**0,8**
2	0.5	1,6	1,6	0,8	0,8	0,8	1,1	1,4	3,2	**1,4**
2	1.0	0,7	0,7	0,8	0,8	0,6	0,8	1,0	1,3	**0,8**
2	2.0	0,8	0,8	0,8	0,8	0,7	0,7	0,9	1,5	**0,9**
2	4.0	0,7	0,7	0,8	0,8	0,8	0,9	1,2	2,0	**1,0**
3	0,04	0,9	0,9	1,0	1,0	1,3	1,1	1,1	1,1	**1,1**
3	0.5	1,0	1,0	1,1	1,1	1,4	1,8	1,3	1,7	**1,3**
3	1.0	1,0	1,0	1,0	1,0	1,1	1,2	1,2	1,7	**1,2**
3	2.0	0,9	0,9	1,0	1,0	1,1	1,6	1,1	1,4	**1,1**
3	4.0	1,5	1,5	1,6	1,6	1,2	1,3	1,4	3,0	**1,6**
6	0,04	0,9	0,9	0,5	0,5	0,9	0,6	0,7	1,0	**0,8**
6	0.5	0,8	0,8	0,9	0,9	1,2	0,8	0,8	1,2	**0,9**
6	1.0	0,9	0,9	1,0	1,0	1,1	1,0	1,1	1,9	**1,1**
6	2.0	0,8	0,8	0,9	0,9	1,2	0,9	0,9	1,3	**1,0**
6	4.0	0,8	0,8	1,8	1,8	1,1	1,2	1,1	3,2	**1,5**
12	0,04	1,1	1,1	1,1	1,1	1,3	1,1	1,2	1,0	**1,1**
12	0.5	1,1	1,1	1,0	1,0	1,0	1,0	1,2	1,2	**1,1**
12	1.0	1,2	1,2	1,2	1,2	1,0	1,1	1,3	1,2	**1,2**
12	2.0	1,2	1,2	1,7	1,7	1,0	1,0	1,2	2,1	**1,4**
12	4.0	1,2	1,2	1,7	1,7	1,2	3,9	1,5	2,7	**1,9**
18	0,04	0,6	0,6	0,9	0,9	2,2	1,1	1,0	0,9	**1,0**
18	0.5	0,7	0,7	0,8	0,8	0,7	0,8	1,3	1,2	**0,9**
18	1.0	0,8	0,8	0,8	0,8	0,7	0,9	0,9	1,2	**0,9**
18	2.0	0,8	0,8	1,8	1,8	0,8		1,0	1,1	**1,2**
18	4.0	0,6	0,6	0,7	0,7	0,8	1,0	1,3	2,1	**1,0**
24	0,04	1,7	1,7	1,6	1,6	1,8	1,8	1,5	1,7	**1,7**
24	0.5	1,8	1,8	1,6	1,6	1,6	1,6	1,6	1,7	**1,7**
24	1.0	2,2	2,2	6,3	6,3	4,0	1,5	1,7	1,9	**3,3**
24	2.0	1,8	1,8	1,9	1,9	1,6	1,6	1,8	1,9	**1,8**
24	4.0	1,6	1,6	..884	..884	3,3	1,7	2,0	2,2	**2,1**
		Ausreißer mit 884µg/L (EC2J24) nicht berücksichtigt								
36	0,04	1,0	1,0	1,1	1,1	0,9	0,9	0,9	1,0	**1,0**
36	0.5	0,8	0,8	0,9	0,9	0,9	1,0	1,2	1,2	**1,0**
36	1.0	0,9	0,9	1,1	1,1	0,9	1,1	1,2	1,2	**1,1**
36	2.0	0,8	0,8	1,0	1,0	1,0	1,0	1,3	1,6	**1,1**
36	4.0	0,9	0,9	1,0	1,0	1,1	1,3	1,5	1,9	**1,2**
52	0,04	1,2	1,2	2,0	2,0	1,3	1,1	1,4	1,3	**1,4**
52	0.5	1,2	1,2	1,4	1,4	1,3	1,1	1,4	1,4	**1,3**
52	1.0	1,3	1,3	1,3	1,3	1,3	1,2	1,4	1,5	**1,3**
52	2.0	1,3	1,3	1,3	1,3	1,5	1,6	1,7	1,8	**1,5**
52	4.0	1,4	1,4	1,4	1,4	1,4	1,5	2,3	2,5	**1,7**
	MIN	0,6	0,6	0,5	0,5	0,6	0,6	0,7	0,9	
	MAX	2,3	2,3	6,3	6,3	4,0	3,9	2,8	3,6	
	Mittelwer	1,2	1,2	1,3	1,3	1,3	1,3	1,4	1,7	
	50% Perc	1,0	1,0	1,1	1,1	1,2	1,1	1,3	1,6	
	90% Perc	1,8	1,8	1,9	1,9	2,2	1,8	2,3	2,7	
	95% Perc	2,0	2,0	2,0	2,0	2,5	2,2	2,5	3,2	
THALFANG	**99% Perc**	2,3	2,3	4,5	4,5	3,7	3,3	2,8	3,4	THALFANG

Legierung C NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	0,1	0,1	0,5	0,5	0,8	0,7	2,1	1,7	**0,8**
1	1.0	0,0	0,0	0,4	0,4	1,0	0,7	1,6	2,6	**0,8**
1	2.0	0,1	0,1	0,4	0,4	..125,7	1,4	2,4	9,8	**2,1**
1	4.0	0,1	0,1	0,6	0,6	1,1	1,3	2,5	3,7	**1,3**
		Ausreißer mit 125,7µg/L (EC3C01) nicht berücksichtigt								
2	0.5	0,5	0,5	0,9	0,9	1,0	1,5	2,0	2,4	**1,2**
2	1.0	0,8	0,8	1,2	1,2	1,9	2,4	3,3	4,3	**2,0**
2	2.0	0,5	0,5	0,8	0,8	1,0	1,4	2,9	3,9	**1,5**
2	4.0	0,5	0,5	0,6	0,6	0,9	1,5	2,0	2,9	**1,2**
3	0.5	0,5	0,5	0,7	0,7	1,1	1,4	2,1	3,3	**1,3**
3	1.0	1,2	1,2	1,2	1,2	2,1	2,3	3,6	5,3	**2,3**
3	2.0	1,2	1,2	0,9	0,9	1,6	2,2	3,7	6,4	**2,3**
3	4.0	0,4	0,4	0,6	0,6	0,7	1,1	1,8	3,7	**1,2**
6	0.5	0,0	0,0	0,1	0,1	0,3	0,8	2,1	2,6	**0,8**
6	1.0	0,0	0,0	0,4	0,4	0,8	1,8	3,7	4,4	**1,4**
6	2.0	0,6	0,6	1,0	1,0	2,1	3,2	6,7	7,5	**2,8**
6	4.0	0,0	0,0	0,3	0,3	0,4	1,2	6,3	4,1	**1,6**
12	0.5	0,1	0,1	0,2	0,2	0,4	0,9	1,3	1,9	**0,6**
12	1.0	0,2	0,2	0,5	0,5	1,1	1,5	2,9	4,9	**1,5**
12	2.0	0,7	0,7	1,1	1,1	2,1	2,6	4,8	7,8	**2,6**
12	4.0	0,3	0,3	0,5	0,5	1,0	1,3	2,9	4,3	**1,4**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	0,5	0,5	0,6	0,6	0,7	1,0	1,3	2,1	**0,9**
24	1.0	0,6	0,6	0,8	0,8	1,4	1,6	2,8	4,1	**1,6**
24	2.0	0,6	0,6	0,9	0,9	1,6	1,8	3,9	7,4	**2,2**
24	4.0	0,8	0,8	1,1	1,1	1,5	2,3	3,6	4,9	**2,0**
36	0.5	0,3	0,3	0,4	0,4	0,6	0,9	1,4	2,2	**0,8**
36	1.0	0,4	0,4	0,6	0,6	0,9	1,4	2,8	4,0	**1,4**
36	2.0	0,4	0,4	0,6	0,6	1,0	1,5	2,4	4,2	**1,4**
36	4.0	0,8	0,8	1,2	1,2	1,8	2,5	4,6	9,7	**2,8**
52	0.5	0,3	0,3	0,4	0,4	0,5	0,7	1,1	1,6	**0,7**
52	1.0	0,4	0,4	0,5	0,5	0,6	1,1	1,9	3,1	**1,1**
52	2.0	0,4	0,4	0,5	0,5	0,7	1,1	2,1	3,2	**1,1**
52	4.0	0,4	0,4	0,8	0,8	0,8	1,4	2,5	4,2	**1,4**
	MIN	0,0	0,0	0,1	0,1	0,3	0,7	1,1	1,6	
	MAX	1,2	1,2	1,2	1,2	2,1	3,2	6,7	9,8	
	Mittelwert	0,4	0,4	0,7	0,7	1,1	1,5	2,8	4,3	
	50% Perc	0,4	0,4	0,6	0,6	1,0	1,4	2,5	4,1	
	90% Perc	0,8	0,8	1,1	1,1	1,9	2,4	4,5	7,5	
	95% Perc	1,0	1,0	1,2	1,2	2,1	2,5	5,5	8,7	
	99% Perc	1,2	1,2	1,2	1,2	2,1	3,0	6,6	9,8	

Legierung C **NICKELKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	2,0	2,0	2,1	2,1	1,8	2,6	2,3	2,4	**2,2**
1	0.5	1,8	1,8	1,7	1,7	1,9	4,0	2,1		**2,1**
1	1.0	2,3	2,3	2,2	2,2	2,1	3,2	2,4	1,9	**2,3**
1	2.0	4,2	4,2	3,1	3,1	3,6	6,1	3,3	7,5	**4,4**
1	4.0	1,4	1,4	1,4	1,4	1,6	2,7	2,4	2,2	**1,8**
2	0.2	2,4	2,4	1,8	1,8	3,0	3,2	3,6	3,2	**2,7**
2	0.5	2,0	2,0	1,7	1,7	2,7	2,4	3,4	3,3	**2,4**
2	1.0	2,6	2,6	3,0	3,0	3,0	5,0	4,4	3,3	**3,4**
2	2.0	3,3	3,3	1,9	1,9	3,5	4,3	4,0	3,8	**3,3**
2	4.0	2,1	2,1	2,5	2,5	2,1	2,5	3,5	7,9	**3,2**
3	0.2	3,9	3,9	2,3	2,3	2,9	3,7	4,7	4,4	**3,5**
3	0.5	3,3	3,3	4,8	4,8	2,3	3,7	5,1	5,4	**4,1**
3	1.0	4,0	4,0	2,3	2,3	2,0	4,4	5,0	5,0	**3,6**
3	2.0	4,2	4,2	2,6	2,6	2,9	5,1	4,5	5,3	**3,9**
3	4.0	3,2	3,2	2,2	2,2	2,8	5,2	3,5	3,7	**3,3**
6	0.2	2,1	2,1	2,1	2,1	2,2	2,9	2,6	3,6	**2,5**
6	0.5	2,1	2,1	1,9	1,9	2,3	2,6	3,0	3,6	**2,4**
6	1.0	2,1	2,1	2,3	2,3	2,5	2,9	3,5	4,2	**2,7**
6	2.0	2,4	2,4	3,0	3,0	3,3	3,8	4,7	5,6	**3,5**
6	4.0	2,3	2,3	2,9	2,9	5,7	3,3	2,6	2,6	**3,1**
12	0.2	1,1	1,1	1,0	1,0	1,0	1,4	1,8	2,2	**1,3**
12	0.5	1,1	1,1	1,1	1,1	1,1	1,4	2,0	2,6	**1,4**
12	1.0	1,2	1,2	1,2	1,2	1,3	1,9	2,7	3,3	**1,8**
12	2.0	1,6	1,6	1,7	1,7	2,2	2,8	4,1	5,5	**2,7**
12	4.0	1,6	1,6	3,7	3,7	2,0	2,2	2,1	2,1	**2,4**
18	0.2	1,3	1,3	0,8	0,8	0,8	0,9	1,1	1,7	**1,1**
18	0.5	1,1	1,1	0,9	0,9	0,9	1,2	1,7	2,3	**1,3**
18	1.0	1,0	1,0	1,2	1,2	1,3	1,9	2,7	3,5	**1,7**
18	2.0	1,4	1,4	1,3	1,3	1,7	2,7	3,5	5,2	**2,3**
18	4.0	1,3	1,3	3,3	3,3	1,7	1,8	1,8	1,8	**2,0**
24	0.2	0,6	0,6	0,8	0,8	0,8	0,8	1,2	1,4	**0,9**
24	0.5	0,6	0,6	0,8	0,8	0,7	0,9	1,7	1,9	**1,0**
24	1.0	0,5	0,5	0,9	0,9	1,8	1,4	1,9	2,8	**1,3**
24	2.0	0,8	0,8	1,2	1,2	1,5	1,9	3,2	4,5	**1,9**
24	4.0	0,8	0,8	0,9	0,9	1,4	1,4	17,2	1,4	**3,1**
36	0.2	0,8	0,8	0,5	0,5	0,7	0,7	0,8	1,3	**0,8**
36	0.5	0,7	0,7	0,7	0,7	0,8	1,1	1,3	2,2	**1,0**
36	1.0	0,6	0,6	0,7	0,7	1,2	1,5	1,9	3,3	**1,3**
36	2.0	0,7	0,7	1,0	1,0	1,2	1,7	2,7	4,1	**1,6**
36	4.0	1,1	1,1	1,6	1,6	1,7	1,5	1,6	1,7	**1,5**
52	0.2	0,9	0,9	0,5	0,5	0,7	1,0	0,8	1,3	**0,8**
52	0.5	0,8	0,8	0,8	0,8	1,2	0,9	2,0	1,9	**1,2**
52	1.0	0,8	0,8	0,9	0,9	1,0	1,5	2,1	3,1	**1,4**
52	2.0	0,8	0,8	0,9	0,9	1,2	1,7	2,6	4,4	**1,7**
52	4.0	0,7	0,7	0,9	0,9	1,4	1,9	1,8	1,5	**1,2**
	MIN	0,5	0,5	0,5	0,5	0,7	0,7	0,8	1,3	
	MAX	4,2	4,2	4,8	4,8	5,7	6,1	17,2	7,9	
	Mittelwe	1,7	1,7	1,7	1,7	1,9	2,5	3,0	3,3	
	50% Per	1,4	1,4	1,6	1,6	1,7	2,2	2,6	3,3	
	90% Per	3,3	3,3	3,0	3,0	3,0	4,4	4,6	5,4	
	95% Per	4,0	4,0	3,3	3,3	3,5	5,1	4,9	5,6	
BERLIN	**99% Per**	4,2	4,2	4,3	4,3	4,8	5,7	11,9	7,7	BERLIN

Legierung C **NICKELKONZENTRATION NACH STAGNATION (µg / L)**

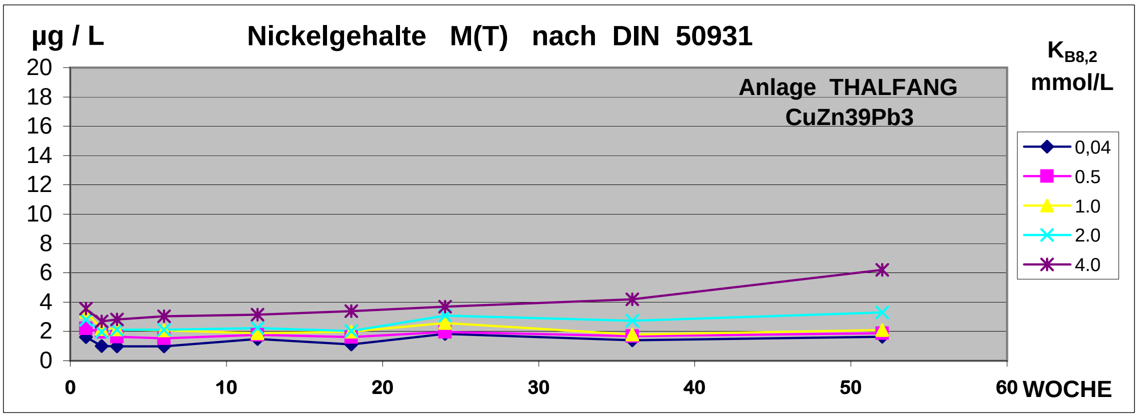
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	1,8	1,8	1,3	1,3	2,0	1,5	1,6	1,7	**1,6**
1	1.2	1,4	1,4	1,3	1,3	1,8	1,5	3,3	1,9	**1,7**
1	1.2+X	1,2	1,2	1,2	1,2	1,7	1,9	2,2	3,1	**1,7**
1	2.0	1,3	1,3	1,4	1,4	1,7	1,8	1,8	2,6	**1,7**
1	4.0	1,3	1,3	2,2	2,2	1,8	1,7	2,0	2,9	**1,9**
2	0.5	1,1	1,1	2,0	2,0	0,1	1,7	3,5	2,5	**1,8**
2	1.2	1,2	1,2	2,6	2,6	1,6	1,9	2,6	2,9	**2,1**
2	1.2+X	1,2	1,2	2,2	2,2	3,4	1,7	2,0	2,2	**2,0**
2	2.0	1,2	1,2	3,8	3,8	1,6	2,3	2,4	3,5	**2,5**
2	4.0	1,1	1,1	2,8	2,8	1,3	1,9	1,9	3,6	**2,1**
3	0.5	1,5	1,5	2,2	2,2	1,5	1,8	2,8	2,7	**2,0**
3	1.2	1,7	1,7	1,7	1,7	1,9	2,4	3,0	3,4	**2,2**
3	1.2+X	1,4	1,4	1,7	1,7	1,8	2,2	2,8	3,1	**2,0**
3	2.0	1,6	1,6	2,7	2,7	3,2	3,5	5,4	5,9	**3,3**
3	4.0	1,5	1,5	2,0	2,0	2,1	2,5	3,9	3,9	**2,4**
6	0.5	0,8	0,8	2,2	2,2	1,6	2,0	2,9	2,5	**1,9**
6	1.2	1,2	1,2	2,5	2,5	1,8	2,4	2,9	3,7	**2,3**
6	1.2+X	1,3	1,3	4,9	4,9	2,0	2,6	2,6	5,4	**3,1**
6	2.0	1,6	1,6	3,6	3,6	3,0	4,3	5,6	7,1	**3,8**
6	4.0	1,4	1,4	4,0	4,0	2,5	3,6	4,8	7,4	**3,6**
12	0.5	1,1	1,1	2,6	2,6	1,7	2,0	2,7	3,6	**2,2**
12	1.2	1,2	1,2	1,4	1,4	1,8	2,2	2,9	4,2	**2,0**
12	1.2+X	1,4	1,4	2,7	2,7	0,0	2,2	3,1	3,8	**2,2**
12	2.0	1,4	1,4	2,1	2,1	1,7	2,0	3,5	5,7	**2,5**
12	4.0	1,5	1,5	2,5	2,5	3,2	2,3	3,5	7,1	**3,0**
18	0.5	0,6	0,6	1,5	1,5	1,3	1,5	2,7	3,0	**1,6**
18	1.2	0,6	0,6	1,9	1,9	1,0	1,3	1,9	2,6	**1,5**
18	1.2+X	2,1	2,1	2,3	2,3	1,3	1,6	2,4	3,0	**2,1**
18	2.0	0,6	0,6	0,9	0,9	1,8	1,9	3,8	4,5	**1,9**
18	4.0	0,7	0,7	3,3	3,3	1,4	2,5	3,4	6,3	**2,7**
24	0.5	0,6	0,6	1,4	1,4	0,8	1,4	2,1	3,3	**1,5**
24	1.2	0,5	0,5	1,8	1,8	0,9	1,6	2,2	2,9	**1,5**
24	1.2+X	0,7	0,7	2,4	2,4	1,4	1,8	2,8	3,4	**2,0**
24	2.0	0,5	0,5	0,6	0,6	0,8	1,5	2,5	3,6	**1,3**
24	4.0	0,5	0,5	0,8	0,8	0,8	1,1	1,6	3,5	**1,2**
36	0.5	0,7	0,7	0,9	0,9	1,0	1,3	1,1	1,2	**1,0**
36	1.2	0,8	0,8	0,9	0,9	1,0	1,4	2,0	2,9	**1,3**
36	1.2+X	1,0	1,0	1,1	1,1	1,4	1,6	3,6	2,6	**1,7**
36	2.0	0,8	0,8	0,8	0,8	1,1	2,2	2,1	3,3	**1,5**
36	4.0	0,7	0,7	0,8	0,8	1,2	1,3	2,1	3,1	**1,3**
52	0.5	0,6	0,6	0,8	0,8	0,8	1,1	1,4	2,0	**1,0**
52	1.2	0,8	0,8	2,5	2,5	1,2	1,5	2,6	3,6	**1,9**
52	1.2+X	1,0	1,0	1,0	1,0	1,5	1,3	1,8	2,5	**1,4**
52	2.0	0,7	0,7	1,0	1,0	1,2	1,5	2,6	3,6	**1,5**
52	4.0	0,6	0,6	0,8	0,8	0,9	1,0	1,6	2,0	**1,0**

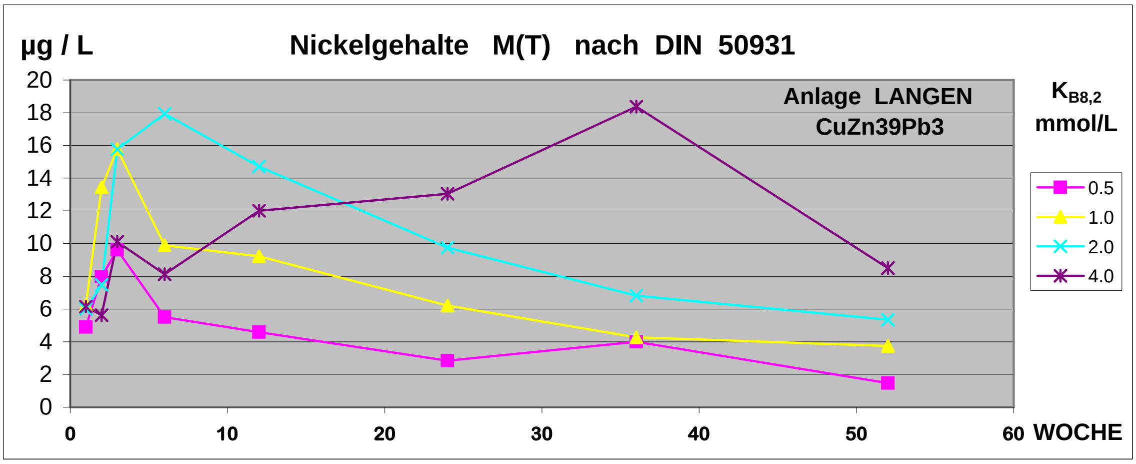
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

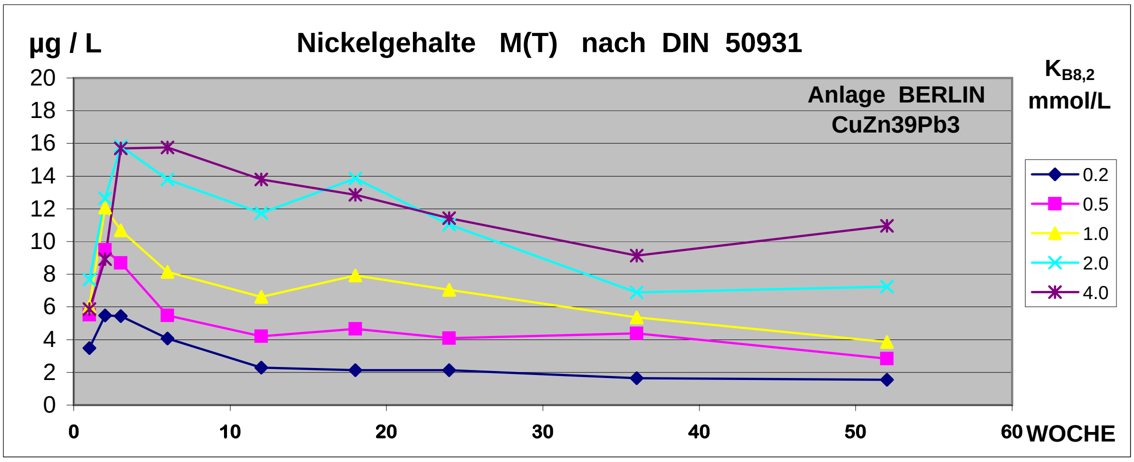
MIN	0,5	0,5	0,6	0,6	0,0	1,0	1,1	1,2
MAX	2,1	2,1	4,9	4,9	3,4	4,3	5,6	7,4
Mittelwe	1,1	1,1	1,9	1,9	1,5	1,9	2,7	3,5
50% Per	1,1	1,1	1,9	1,9	1,5	1,8	2,6	3,3
90% Per	1,6	1,6	3,1	3,1	2,3	2,5	3,7	5,8
95% Per	1,7	1,7	3,8	3,8	3,2	3,3	4,6	6,9
99% Per	2,0	2,0	4,5	4,5	3,3	4,0	5,5	7,3

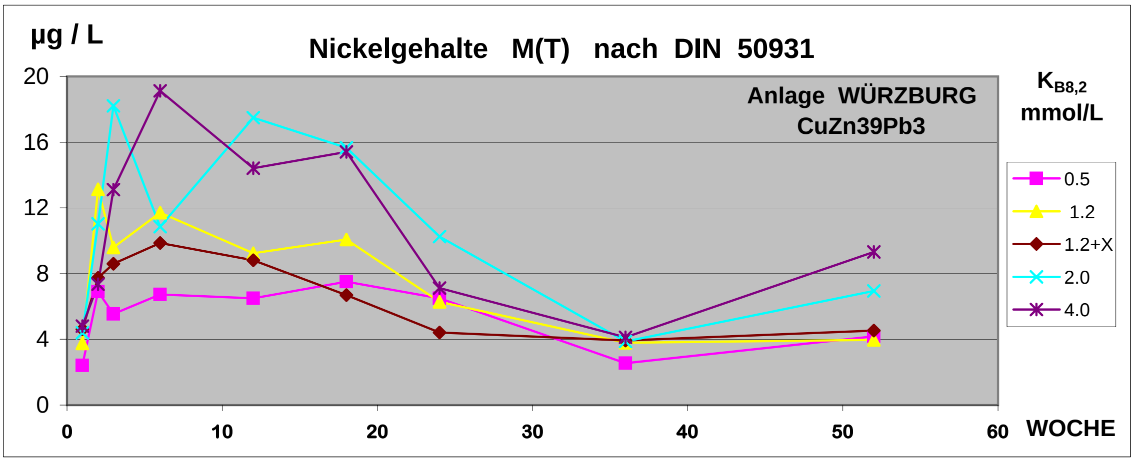
A 6 Ni

Nickelgehalte nach M (T) **Werkstoff : CuZn39Pb3**









Legierung D NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	1,0	1,0	1,1	1,1	1,0	1,6	4,2	1,9	**1,6**
1	0.5	1,1	1,1	1,4	1,4	2,3	2,2	3,9	4,2	**2,2**
1	1.0	1,4	1,4	2,0	2,0	2,6	3,6	5,2	8,5	**3,3**
1	2.0	1,1	1,1	1,3	1,3	2,2	1,8	7,0	6,5	**2,8**
1	4.0	1,6	1,6	1,9	1,9	3,0	4,4	5,2	8,9	**3,6**
2	0,04	0,8	0,8	1,0	1,0	0,8	1,0	1,3	1,4	**1,0**
2	0.5	0,8	0,8	0,9	0,9	1,4	1,9	3,1	6,0	**2,0**
2	1.0	0,9	0,9	1,1	1,1	1,3	2,3	3,6	6,1	**2,2**
2	2.0	0,9	0,9	1,0	1,0	1,3	2,1	2,5	6,0	**2,0**
2	4.0	0,9	0,9	1,3	1,3	1,7	2,5	4,6	8,3	**2,7**
3	0,04	0,7	0,7	0,8	0,8	1,2	1,0	1,1	1,6	**1,0**
3	0.5	0,8	0,8	1,0	1,0	1,4	1,7	2,5	3,9	**1,6**
3	1.0	0,9	0,9	1,2	1,2	1,6	2,3	3,3	5,7	**2,1**
3	2.0	0,9	0,9	1,2	1,2	1,5	2,1	3,3	5,8	**2,1**
3	4.0	1,1	1,1	1,3	1,3	2,0	2,8	5,0	8,0	**2,8**
6	0,04	0,9	0,9	0,6	0,6	1,2	0,7	1,2	1,7	**1,0**
6	0.5	0,9	0,9	1,1	1,1	1,3	1,4	2,1	3,5	**1,5**
6	1.0	1,0	1,0	1,3	1,3	1,5	2,0	4,4	4,1	**2,1**
6	2.0	0,9	0,9	1,3	1,3	1,6	2,0	3,4	5,6	**2,1**
6	4.0	1,0	1,0	2,4	2,4	1,9	2,8	5,0	7,8	**3,0**
12	0,04	1,2	1,2	1,3	1,3	1,4	1,4	1,8	2,2	**1,5**
12	0.5	1,1	1,1	1,3	1,3	1,5	1,8	2,7	3,4	**1,8**
12	1.0	1,2	1,2	1,3	1,3	1,5	1,9	3,0	3,7	**1,9**
12	2.0	1,3	1,3	1,4	1,4	1,6	2,2	3,6	5,1	**2,2**
12	4.0	1,4	1,4	1,8	1,8	2,1	3,2	5,3	8,1	**3,1**
18	0,04	0,8	0,8	0,9	0,9	1,0	0,9	2,1	1,5	**1,1**
18	0.5	1,1	1,1	0,9	0,9	1,1	1,2	2,9	3,7	**1,6**
18	1.0	1,3	1,3	1,7	1,7	1,6		2,5	3,8	**2,0**
18	2.0	1,3	1,3	0,9	0,9	1,7	1,6	3,2	5,3	**2,0**
18	4.0	2,8	2,8	1,2	1,2	1,8	2,9	5,3	9,1	**3,4**
24	0,04	1,8	1,8	1,7	1,7	1,6	1,9	1,9	2,3	**1,8**
24	0.5	1,7	1,7	0,0	0,0	1,7	2,0	2,7	5,9	**2,0**
24	1.0	2,0	2,0	2,6	2,6	1,9	2,2	3,0	4,3	**2,6**
24	2.0	1,7	1,7	2,9	2,9	2,1	2,7	4,3	6,4	**3,1**
24	4.0	1,8	1,8	0,0	0,0	2,8	4,2	7,8	11,1	**3,7**
36	0,04	1,2	1,2	1,3	1,3	1,1	1,1	1,9	2,0	**1,4**
36	0.5	1,0	1,0	1,2	1,2	1,1	2,3	2,6	3,0	**1,7**
36	1.0	1,2	1,2	1,2	1,2	1,2	1,7	2,4	4,3	**1,8**
36	2.0	1,2	1,2	1,5	1,5	1,7	2,5	4,7	7,5	**2,7**
36	4.0	1,3	1,3	2,0	2,0	2,7	4,4	7,7	12,2	**4,2**
52	0,04	1,5	1,5	1,4	1,4	1,4	1,5	2,0	2,4	**1,6**
52	0.5	1,3	1,3	1,4	1,4	1,5	1,7	2,7	3,7	**1,9**
52	1.0	1,4	1,4	1,5	1,5	1,7	1,9	3,0	4,4	**2,1**
52	2.0	1,6	1,6	1,9	1,9	2,2	3,0	5,6	8,6	**3,3**
52	4.0	1,9	1,9	2,7	2,7	3,6	11,2	10,2	15,4	**6,2**
	MIN	0,7	0,7	0,0	0,0	0,8	0,7	1,1	1,4	
	MAX	2,8	2,8	2,9	2,9	3,6	11,2	10,2	15,4	
	Mittelwe	1,2	1,2	1,4	1,4	1,7	2,4	3,7	5,4	
	50% Per	1,2	1,2	1,3	1,3	1,6	2,0	3,2	5,1	
	90% Per	1,8	1,8	2,0	2,0	2,5	3,5	5,5	8,8	
	95% Per	1,9	1,9	2,6	2,6	2,8	4,4	7,6	10,7	
THALFANG	**99% Per**	2,4	2,4	2,8	2,8	3,3	8,3	9,1	14,0	THALFANG

Legierung D NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	1,4	1,4	2,8	2,8	2,9	4,5	12,2	11,1	**4,9**
1	1.0	1,0	1,0	2,5	2,5	5,1	5,5	10,8	21,6	**6,3**
1	2.0	0,8	0,8	1,5	1,5	2,9	8,9	12,1	19,6	**6,0**
1	4.0	0,9	0,9	1,8	1,8	2,8	7,0	12,1	21,9	**6,2**
2	0.5	2,1	2,1	2,9	2,9	5,3	9,9	16,1	22,5	**8,0**
2	1.0	3,9	3,9	6,2	6,2	8,8	13,8	26,2	38,5	**13,4**
2	2.0	1,8	1,8	2,2	2,2	4,0	7,4	15,0	25,5	**7,5**
2	4.0	1,2	1,2	1,5	1,5	3,1	5,8	10,9	19,8	**5,6**
3	0.5	1,6	1,6	3,0	3,0	6,7	10,8	19,5	30,8	**9,6**
3	1.0	3,2	3,2	5,3	5,3	10,5	19,3	36,0	43,3	**15,8**
3	2.0	4,4	4,4	6,1	6,1	12,3	17,9	33,6	41,4	**15,8**
3	4.0	2,0	2,0	3,1	3,1	6,1	11,2	20,0	33,4	**10,1**
6	0.5	0,6	0,6	1,8	1,8	3,0	6,2	12,1	18,0	**5,5**
6	1.0	1,3	1,3	3,0	3,0	5,3	9,6	20,4	35,2	**9,9**
6	2.0	3,3	3,3	7,4	7,4	12,5	20,2	42,2	47,3	**18,0**
6	4.0	1,1	1,1	2,5	2,5	4,5	8,2	17,2	28,0	**8,1**
12	0.5	1,1	1,1	1,3	1,3	2,6	4,0	9,4	15,9	**4,6**
12	1.0	1,3	1,3	2,6	2,6	5,8	8,0	17,9	34,3	**9,2**
12	2.0	2,9	2,9	5,5	5,5	10,9	15,5	30,0	44,5	**14,7**
12	4.0	2,0	2,0	3,9	3,9	8,3	11,4	24,9	39,6	**12,0**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	0,7	0,7	0,8	0,8	1,6	3,1	5,2	9,8	**2,8**
24	1.0	1,2	1,2	1,9	1,9	3,2	6,4	12,4	21,5	**6,2**
24	2.0	1,4	1,4	2,6	2,6	4,7	9,0	17,7	38,6	**9,8**
24	4.0	3,3	3,3	9,1	9,1	8,4	16,2	25,9	29,1	**13,1**
36	0.5	0,8	0,8	1,2	1,2	1,9	3,8	7,0	15,3	**4,0**
36	1.0	0,7	0,7	1,4	1,4	2,3	3,9	7,9	15,9	**4,3**
36	2.0	1,1	1,1	2,3	2,3	4,1	6,7	13,0	24,0	**6,8**
36	4.0	3,7	3,7	7,9	7,9	12,6	17,5	34,9	58,8	**18,4**
52	0.5	0,3	0,3	0,4	0,4	0,8	1,2	3,4	5,0	**1,5**
52	1.0	0,8	0,8	0,9	0,9	1,8	3,5	7,8	13,4	**3,7**
52	2.0	0,7	0,7	1,3	1,3	2,6	4,8	11,2	20,2	**5,4**
52	4.0	1,1	1,1	2,2	2,2	4,1	8,4	17,6	31,3	**8,5**
	MIN	0,3	0,3	0,4	0,4	0,8	1,2	3,4	5,0	
	MAX	4,4	4,4	9,1	9,1	12,6	20,2	42,2	58,8	
	Mittelwer	1,7	1,7	3,1	3,1	5,4	9,1	17,6	27,3	
	50% Perc	1,3	1,3	2,5	2,5	4,3	8,1	15,6	24,8	
	90% Perc	3,3	3,3	6,2	6,2	10,9	17,4	33,2	43,1	
	95% Perc	3,8	3,8	7,6	7,6	12,4	18,5	35,4	45,8	
	99% Perc	4,2	4,2	8,7	8,7	12,6	19,9	40,3	55,2	

Legierung D NICKELKONZENTRATION NACH STAGNATION (µg / L)

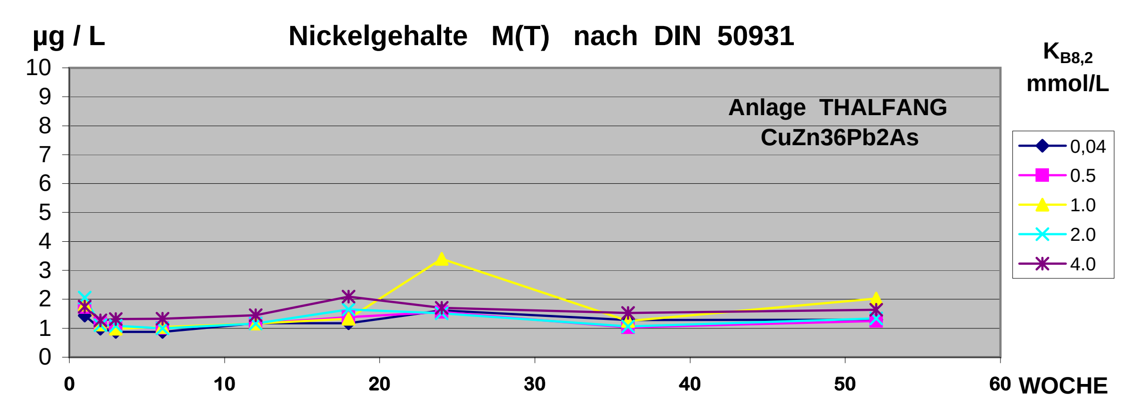
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	2,4	2,4	2,3	2,3	3,1	4,9	6,1	4,4	**3,5**
1	0.5	2,5	2,5	2,8	2,8	4,4	9,9	10,1	9,1	**5,5**
1	1.0	2,8	2,8	3,7	3,7	5,7	11,5	10,3	7,7	**6,0**
1	2.0	4,9	4,9	4,9	4,9	7,5	14,1	7,9	12,2	**7,7**
1	4.0	2,6	2,6	3,5	3,5	5,9	10,6	12,4	5,9	**5,9**
2	0.2	2,7	2,7	3,4	3,4	4,1	6,0	8,9	12,7	**5,5**
2	0.5	3,3	3,3	4,5	4,5	7,5	9,5	16,7	26,6	**9,5**
2	1.0	4,5	4,5	4,1	4,1	9,1	12,9	22,5	34,9	**12,1**
2	2.0	5,2	5,2	5,5	5,5	9,5	14,3	24,2	31,8	**12,7**
2	4.0	3,2	3,2	4,9	4,9	5,6	10,6	15,8	23,2	**8,9**
3	0.2	4,5	4,5	2,7	2,7	3,4	5,2	8,1	12,5	**5,5**
3	0.5	4,3	4,3	2,0	2,0	5,4	8,2	19,0	24,3	**8,7**
3	1.0	5,8	5,8	4,0	4,0	5,1	11,1	17,8	31,9	**10,7**
3	2.0	7,4	7,4	5,8	5,8	18,7	16,2	28,4	36,9	**15,8**
3	4.0	5,6	5,6	5,6	5,6	9,0	27,3	28,4	38,4	**15,7**
6	0.2	2,2	2,2	2,6	2,6	3,1	3,8	6,2	9,9	**4,1**
6	0.5	2,3	2,3	2,6	2,6	3,8	4,8	10,3	15,1	**5,5**
6	1.0	3,2	3,2	3,7	3,7	5,2	7,1	15,3	23,7	**8,1**
6	2.0	4,9	4,9	7,0	7,0	9,8	12,6	26,6	37,6	**13,8**
6	4.0	5,3	5,3	8,2	8,2	12,3	14,0	31,6	41,1	**15,8**
12	0.2	1,2	1,2	1,2	1,2	1,4	2,6	3,8	5,7	**2,3**
12	0.5	1,5	1,5	1,8	1,8	2,5	4,0	8,1	12,5	**4,2**
12	1.0	2,3	2,3	2,6	2,6	3,7	6,3	12,8	20,3	**6,6**
12	2.0	3,1	3,1	4,9	4,9	7,5	12,6	22,8	35,1	**11,8**
12	4.0	3,8	3,8	5,9	5,9	9,5	11,8	30,1	39,5	**13,8**
18	0.2	1,2	1,2	1,1	1,1	1,4	2,0	3,3	5,7	**2,1**
18	0.5	1,7	1,7	1,8	1,8	2,7	5,0	8,4	14,2	**4,7**
18	1.0	3,6	3,6	2,8	2,8	4,7	7,9	14,1	23,9	**7,9**
18	2.0	9,7	9,7	4,3	4,3	8,7	14,3	24,1	35,7	**13,9**
18	4.0	4,8	4,8	5,9	5,9	6,1	10,7	19,6	45,0	**12,9**
24	0.2	0,8	0,8	1,3	1,3	1,3	1,9	3,4	6,2	**2,1**
24	0.5	0,9	0,9	1,9	1,9	2,3	3,7	7,4	13,7	**4,1**
24	1.0	1,6	1,6	2,9	2,9	3,7	7,0	13,3	23,3	**7,0**
24	2.0	2,0	2,0	3,3	3,3	7,1	12,3	24,3	34,0	**11,0**
24	4.0	2,1	2,1	4,0	4,0	6,7	11,2	23,4	37,9	**11,4**
36	0.2	0,9	0,9	1,0	1,0	1,1	1,6	2,7	4,0	**1,7**
36	0.5	1,5	1,5	1,6	1,6	2,6	6,4	7,5	12,4	**4,4**
36	1.0	2,3	2,3	2,0	2,0	2,9	5,5	9,5	16,4	**5,4**
36	2.0	1,7	1,7	2,6	2,6	3,6	6,7	13,6	22,6	**6,9**
36	4.0	2,4	2,4	4,2	4,2	4,6	9,8	16,9	28,6	**9,1**
52	0.2	0,8	0,8	0,9	0,9	1,1	1,6	2,4	3,8	**1,5**
52	0.5	1,1	1,1	1,3	1,3	1,7	2,9	4,7	8,6	**2,8**
52	1.0	1,2	1,2	1,5	1,5	2,3	4,0	6,7	12,4	**3,9**
52	2.0	1,6	1,6	2,3	2,3	4,2	7,4	13,3	25,2	**7,2**
52	4.0	2,2	2,2	3,6	3,6	7,1	13,0	20,8	35,1	**11,0**
	MIN	0,8	0,8	0,9	0,9	1,1	1,6	2,4	3,8	
	MAX	9,7	9,7	8,2	8,2	18,7	27,3	31,6	45,0	
	Mittelwer	3,0	3,0	3,3	3,3	5,3	8,6	14,3	21,4	
	50% Perc	2,4	2,4	2,9	2,9	4,6	7,9	13,3	22,6	
	90% Perc	5,3	5,3	5,7	5,7	9,3	14,1	25,7	37,8	
	95% Perc	5,8	5,8	5,9	5,9	9,7	14,3	28,4	39,3	
BERLIN	**99% Perc**	8,7	8,7	7,7	7,7	15,9	22,4	30,9	43,3	BERLIN

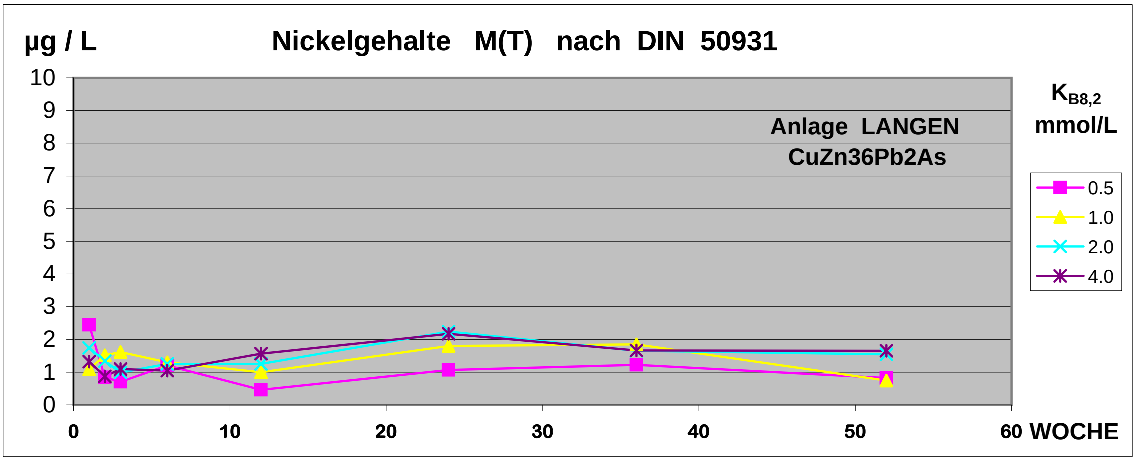
Legierung D NICKELKONZENTRATION NACH STAGNATION (µg / L)

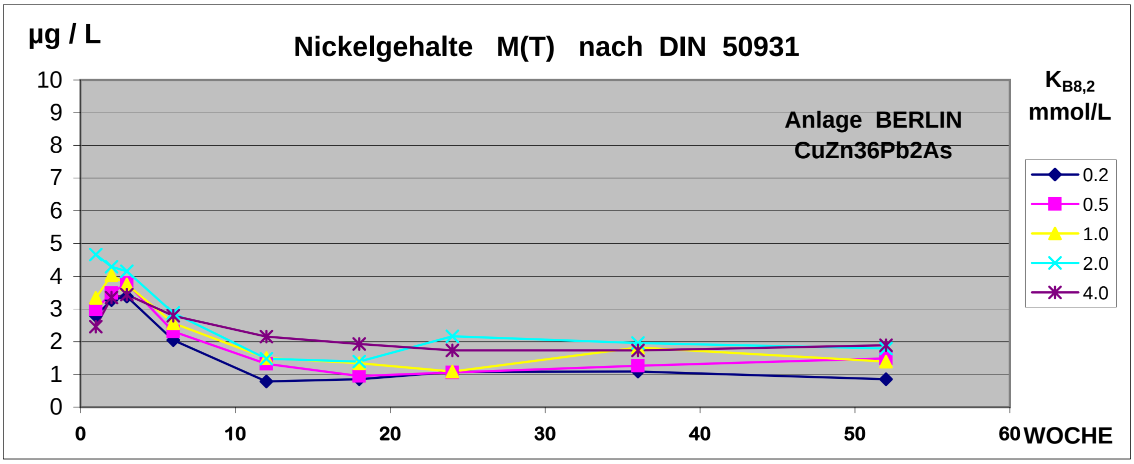
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	1,7	1,7	1,6	1,6	1,8	2,1	3,5	5,3	**2,4**
1	1.2	1,9	1,9	1,9	1,9	2,7	3,1	7,2	9,4	**3,8**
1	1.2+X	2,2	2,2	2,2	2,2	3,0	3,6	7,8	13,7	**4,6**
1	2.0	1,8	1,8	2,1	2,1	2,6	3,7	7,9	13,1	**4,4**
1	4.0	2,0	2,0	2,4	2,4	2,6	4,3	8,8	13,9	**4,8**
2	0.5	2,3	2,3	9,3	9,3	3,8	5,1	10,1	13,0	**6,9**
2	1.2	3,1	3,1	19,3	19,3	7,8	13,0	17,6	21,9	**13,1**
2	1.2+X	2,0	2,0	11,7	11,7	3,5	6,5	9,7	14,9	**7,8**
2	2.0	2,4	2,4	19,1	19,1	4,0	9,7	10,1	21,5	**11,0**
2	4.0	1,7	1,7	11,9	11,9	2,9	6,4	7,6	14,7	**7,4**
3	0.5	2,0	2,0	3,6	3,6	3,9	5,3	10,3	13,6	**5,5**
3	1.2	2,8	2,8	6,0	6,0	7,5	11,8	18,9	20,9	**9,6**
3	1.2+X	2,6	2,6	5,5	5,5	6,2	9,6	16,4	20,4	**8,6**
3	2.0	6,6	6,6	13,7	13,7	16,1	19,4	32,2	37,4	**18,2**
3	4.0	3,7	3,7	8,1	8,1	11,5	12,1	28,3	29,4	**13,1**
6	0.5	2,3	2,3	8,8	8,8	3,4	7,1	8,8	12,4	**6,7**
6	1.2	2,8	2,8	16,1	16,1	5,4	8,3	18,0	24,2	**11,7**
6	1.2+X	2,2	2,2	16,6	16,6	4,3	6,8	11,2	19,0	**9,9**
6	2.0	4,2	4,2	8,4	8,4	9,0	14,5	24,3	13,8	**10,9**
6	4.0	5,1	5,1	25,3	25,3	10,2	16,5	25,5	40,0	**19,1**
12	0.5	2,4	2,4	2,6	2,6	8,0	5,5	10,6	17,9	**6,5**
12	1.2	2,6	2,6	3,0	3,0	6,2	9,0	18,5	29,0	**9,2**
12	1.2+X	4,4	4,4	3,5	3,5	..318	7,0	14,4	24,5	**8,8**
12	2.0	5,4	5,4	5,8	5,8	17,3	17,0	34,3	48,9	**17,5**
12	4.0	2,2	2,2	5,6	5,6	11,4	13,0	26,4	48,9	**14,4**
		Ausreißer mit 318µg/L (ED3T12) nicht berücksichtigt								
18	0.5	1,8	1,8	8,0	8,0	5,0	6,0	11,2	18,3	**7,5**
18	1.2	2,1	2,1	10,2	10,2	5,7	9,3	16,0	25,0	**10,1**
18	1.2+X	1,5	1,5	8,5	8,5	3,1	6,2	9,5	14,8	**6,7**
18	2.0	2,9	2,9	21,9	21,9	7,4	12,8	18,3	37,2	**15,7**
18	4.0	1,8	1,8	8,7	8,7	9,3	20,4	31,3	41,3	**15,4**
24	0.5	1,5	1,5	6,0	6,0	3,3	5,1	10,9	17,7	**6,5**
24	1.2	1,1	1,1	9,1	9,1	2,7	4,3	8,4	14,4	**6,3**
24	1.2+X	1,2	1,2	6,4	6,4	1,9	3,1	5,7	9,4	**4,4**
24	2.0	1,8	1,8	13,4	13,4	4,7	7,7	17,7	21,6	**10,3**
24	4.0	1,2	1,2	2,6	2,6	2,7	5,5	10,2	31,0	**7,1**
36	0.5	1,6	1,6	1,9	1,9	3,2	5,5	2,0	2,7	**2,6**
36	1.2	1,1	1,1	1,4	1,4	2,3	3,5	7,2	12,3	**3,8**
36	1.2+X	1,2	1,2	1,5	1,5	2,4	4,8	7,2	11,7	**3,9**
36	2.0	1,3	1,3	1,7	1,7	2,9	4,3	2,7	15,1	**3,9**
36	4.0	2,1	2,1	3,1	3,1	6,7	10,1	3,6	2,2	**4,1**
52	0.5	1,2	1,2	1,9	1,9	2,9	4,8	8,2	11,4	**4,2**
52	1.2	1,1	1,1	1,7	1,7	2,3	3,9	7,0	13,0	**4,0**
52	1.2+X	1,5	1,5	2,4	2,4	2,8	4,4	8,1	13,2	**4,5**
52	2.0	1,7	1,7	2,8	2,8	4,1	7,6	11,4	23,5	**7,0**
52	4.0	1,8	1,8	3,1	3,1	4,9	9,0	18,0	32,8	**9,3**
	Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !									
	MIN	1,1	1,1	1,4	1,4	1,8	2,1	2,0	2,2	
	MAX	6,6	6,6	25,3	25,3	17,3	20,4	34,3	48,9	
	Mittelwer	2,3	2,3	7,3	7,3	5,4	8,0	13,4	20,2	
	50% Perc	2,0	2,0	5,8	5,8	4,0	6,5	10,3	17,7	
	90% Perc	4,0	4,0	16,4	16,4	9,9	13,9	26,0	37,3	
	95% Perc	5,0	5,0	19,3	19,3	11,5	16,9	30,7	41,0	
WÜRZBURG	**99% Perc**	6,1	6,1	23,8	23,8	16,8	20,0	33,4	48,9	WÜRZBURG

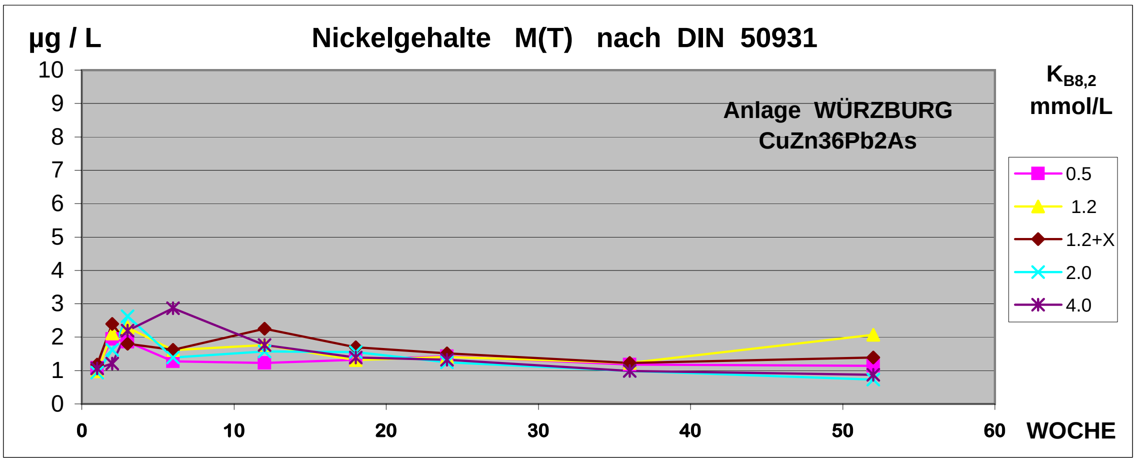
A 6 Ni

Nickelgehalte nach M (T) **Werkstoff : CuZn36Pb2As**









Legierung E NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	1,3	1,3	1,2	1,2	1,1	1,1	2,5	1,8	**1,4**
1	0.5	1,5	1,5	1,4	1,4	1,7	1,6	2,2	2,5	**1,7**
1	1.0	1,4	1,4	1,3	1,3	1,8	1,6	2,8	2,9	**1,8**
1	2.0	3,5	3,5	1,3	1,3	1,5	1,6	2,1	1,7	**2,1**
1	4.0	1,7	1,7	1,5	1,5	1,8	1,4	2,4	2,0	**1,8**
2	0,04	0,7	0,7	1,1	1,1	0,8	1,1	1,2	1,2	**1,0**
2	0.5	0,9	0,9	0,9	0,9	1,0	1,1	1,5	2,2	**1,2**
2	1.0	0,9	0,9	0,9	0,9	1,0	1,1	1,3	2,0	**1,1**
2	2.0	0,8	0,8	0,9	0,9	0,9	1,5	1,2	1,9	**1,1**
2	4.0	0,9	0,9	1,0	1,0	1,0	1,2	1,6	2,6	**1,3**
3	0,04	0,8	0,8	0,8	0,8	0,9	0,9	0,9	1,1	**0,9**
3	0.5	0,8	0,8	0,9	0,9	0,9	1,0	1,3	1,5	**1,0**
3	1.0	0,8	0,8	0,9	0,9	1,0	1,0	1,0	1,5	**1,0**
3	2.0	0,8	0,8	1,1	1,1	1,0	1,1	1,1	1,7	**1,1**
3	4.0	0,9	0,9	1,6	1,6	1,0	1,3	1,3	1,9	**1,3**
6	0,04	1,0	1,0	0,6	0,6	1,0	0,6	0,9	1,3	**0,9**
6	0.5	0,8	0,8	0,9	0,9	1,1	0,9	1,1	1,6	**1,0**
6	1.0	0,8	0,8	1,0	1,0	1,3	1,0	0,9	1,5	**1,0**
6	2.0	0,8	0,8	0,9	0,9	1,0	1,1	0,9	1,6	**1,0**
6	4.0	0,8	0,8	1,8	1,8	1,1	1,2	1,3	1,8	**1,3**
12	0,04	1,1	1,1	1,1	1,1	1,5	1,1	1,2	1,2	**1,2**
12	0.5	1,1	1,1	1,1	1,1	1,1	1,1	1,3	1,4	**1,2**
12	1.0	1,1	1,1	1,1	1,1	1,1	1,3	1,2	1,3	**1,2**
12	2.0	1,0	1,0	1,1	1,1	1,0	1,3	1,3	1,5	**1,2**
12	4.0	1,1	1,1	1,7	1,7	1,3	1,3	1,6	1,8	**1,5**
18	0,04	1,1	1,1	1,4	1,4	1,1	1,0	1,0	1,3	**1,2**
18	0.5	1,2	1,2	1,3	1,3	1,4	1,4	1,8	1,5	**1,4**
18	1.0	1,2	1,2	1,7	1,7	0,9		1,2	1,4	**1,3**
18	2.0	1,1	1,1	2,4	2,4	1,1	1,8	1,3	2,0	**1,7**
18	4.0	1,3	1,3	2,2	2,2	1,6	2,5	1,9	3,7	**2,1**
24	0,04	1,6	1,6	1,7	1,7	1,6	1,5	1,4	1,8	**1,6**
24	0.5	1,4	1,4	1,8	1,8	1,3	1,4	1,7	1,7	**1,6**
24	1.0	2,8	2,8	7,8	7,8	1,4	1,4	1,5	1,7	**3,4**
24	2.0	1,6	1,6	1,5	1,5	1,3	1,4	1,5	1,7	**1,5**
24	4.0	1,6	1,6			1,4	1,6	1,8	2,2	**1,7**
36	0,04	1,0	1,0	1,1	1,1	2,3	1,0	1,8	1,0	**1,3**
36	0.5	1,0	1,0	1,0	1,0	0,9	1,0	1,1	1,2	**1,0**
36	1.0	0,9	0,9	1,4	1,4	0,9	1,0	1,2	2,3	**1,3**
36	2.0	0,8	0,8	0,9	0,9	1,0	1,2	1,3	1,6	**1,1**
36	4.0	0,9	0,9	1,0	1,0	1,0	1,3	1,7	4,4	**1,5**
52	0,04	1,3	1,3	1,2	1,2	1,3	1,2	1,4	1,5	**1,3**
52	0.5	1,2	1,2	1,3	1,3	1,2	1,1	1,3	1,4	**1,3**
52	1.0	1,2	1,2	1,4	1,4	1,3	1,2	1,5	7,0	**2,0**
52	2.0	1,2	1,2	1,3	1,3	1,3	1,2	1,5	1,7	**1,3**
52	4.0	1,4	1,4	1,3	1,3	1,4	1,4	2,1	2,8	**1,6**
	MIN	0,7	0,7	0,6	0,6	0,8	0,6	0,9	1,0	
	MAX	3,5	3,5	7,8	7,8	2,3	2,5	2,8	7,0	
	Mittelwer	1,2	1,2	1,4	1,4	1,2	1,3	1,5	1,9	
	50% Perc	1,1	1,1	1,2	1,2	1,1	1,2	1,3	1,7	
	90% Perc	1,6	1,6	1,8	1,8	1,6	1,6	2,1	2,7	
	95% Perc	1,7	1,7	2,1	2,1	1,8	1,6	2,4	3,5	
THALFANG	**99% Perc**	3,2	3,2	5,5	5,5	2,1	2,2	2,7	5,9	THALFANG

Legierung E — NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	0,1	0,1	5,8	5,8	1,3	1,1	2,6	2,8	**2,5**
1	1.0	0,1	0,1	0,6	0,6	0,9	0,8	2,1	3,5	**1,1**
1	2.0	0,3	0,3	0,3	0,3	0,8	1,5	3,2	7,2	**1,7**
1	4.0	0,1	0,1	1,2	1,2	0,7	1,0	2,1	4,2	**1,3**
2	0.5	0,1	0,1	0,4	0,4	0,5	1,1	1,3	2,8	**0,8**
2	1.0	0,2	0,2	0,5	0,5	0,9	1,1	2,8	5,9	**1,5**
2	2.0	0,2	0,2	0,4	0,4	0,6	0,9	3,8	4,2	**1,3**
2	4.0	0,3	0,3	0,4	0,4	0,6	0,6	1,3	3,1	**0,9**
3	0.5	0,4	0,4	0,3	0,3	0,4	0,6	1,2	2,0	**0,7**
3	1.0	0,5	0,5	0,5	0,5	0,9	1,5	2,8	5,7	**1,6**
3	2.0	0,3	0,3	0,5	0,5	0,7	0,8	1,5	3,3	**1,0**
3	4.0	0,7	0,7	0,4	0,4	0,7	1,0	1,9	3,0	**1,1**
6	0.5	0,1	0,1	0,4	0,4	0,6	1,2	2,8	4,0	**1,2**
6	1.0	0,2	0,2	0,4	0,4	1,0	1,1	3,8	3,3	**1,3**
6	2.0	0,1	0,1	0,3	0,3	0,5	0,9	4,2	3,6	**1,3**
6	4.0	0,2	0,2	0,2	0,2	0,3	0,9	2,6	3,8	**1,1**
12	0.5	0,1	0,1	0,2	0,2	0,3	0,4	1,0	1,4	**0,5**
12	1.0	0,1	0,1	0,3	0,3	0,5	0,8	2,0	3,9	**1,0**
12	2.0	0,4	0,4	0,5	0,5	0,9	1,3	1,8	4,2	**1,3**
12	4.0	0,3	0,3	0,6	0,6	1,0	1,6	2,9	5,2	**1,6**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	0,6	0,6	0,7	0,7		1,0	1,4	2,5	**1,1**
24	1.0	1,1	1,1	0,9	0,9	1,4	1,5	2,9	4,6	**1,8**
24	2.0	0,6	0,6	3,3	3,3	1,0	2,0	2,3	4,8	**2,2**
24	4.0	0,7	0,7	2,9	2,9	1,1	2,1	2,5	4,5	**2,2**
36	0.5	0,4	0,4	0,6	0,6	0,7	1,5	1,9	3,7	**1,2**
36	1.0	0,5	0,5	0,9	0,9	1,3	2,2	3,6	4,9	**1,9**
36	2.0	0,5	0,5	0,7	0,7	1,1	1,9	3,5	4,3	**1,7**
36	4.0	0,5	0,5	0,7	0,7	1,0	1,7	2,6	5,6	**1,7**
52	0.5	0,3	0,3	0,3	0,3	1,5	0,7	1,2	2,0	**0,8**
52	1.0	0,2	0,2	0,4	0,4	0,4		1,4	2,2	**0,7**
52	2.0	0,6	0,6	0,8	0,8	0,9	1,7	2,8	4,2	**1,6**
52	4.0	0,4	0,4	0,6	0,6	1,1	1,9	3,1	5,1	**1,7**
	MIN	0,1	0,1	0,2	0,2	0,3	0,4	1,0	1,4	
	MAX	1,1	1,1	5,8	5,8	1,5	2,2	4,2	7,2	
	Mittelwer	0,4	0,4	0,8	0,8	0,8	1,2	2,4	3,9	
	50% Perc	0,3	0,3	0,5	0,5	0,9	1,1	2,6	4,0	
	90% Perc	0,6	0,6	1,2	1,2	1,3	1,9	3,6	5,6	
	95% Perc	0,7	0,7	3,1	3,1	1,4	2,1	3,8	5,8	
	99% Perc	1,0	1,0	5,0	5,0	1,5	2,2	4,1	6,8	

Legierung E NICKELKONZENTRATION NACH STAGNATION (µg / L)

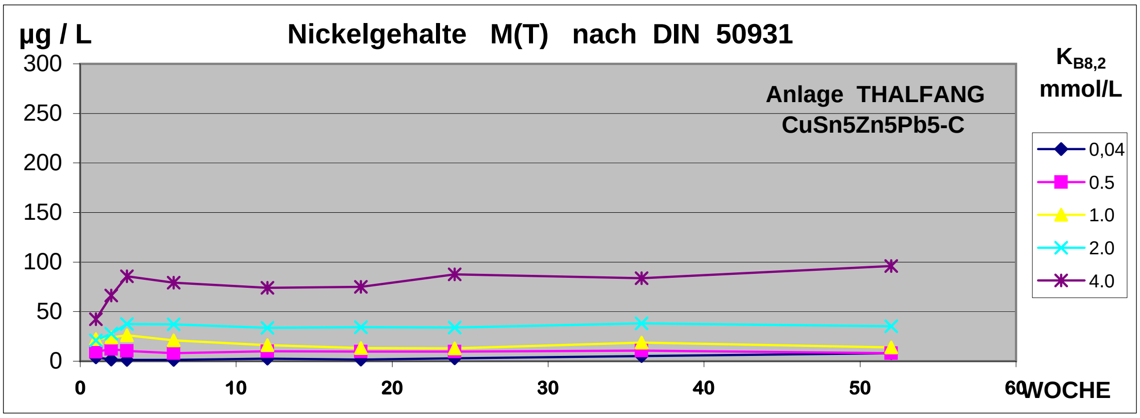
ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	2,1	2,1	2,5	2,5	2,7	3,6	3,8	3,0	**2,8**
1	0.5	2,4	2,4	2,0	2,0	2,8	4,4	4,0	3,9	**3,0**
1	1.0	4,0	4,0	2,5	2,5	2,9	3,7	3,6	3,5	**3,3**
1	2.0	4,0	4,0	3,4	3,4	4,0	7,6	3,6	7,3	**4,7**
1	4.0	1,7	1,7	2,0	2,0	2,3	3,4	3,5	3,1	**2,5**
2	0.2	2,3	2,3	2,1	2,1	3,2	3,8	4,9	5,5	**3,3**
2	0.5	2,1	2,1	2,2	2,2	3,1	3,5	5,7	7,0	**3,5**
2	1.0	2,5	2,5	3,2	3,2	3,4	3,4	5,9	8,2	**4,0**
2	2.0	3,4	3,4	2,4	2,4	4,2	5,9	6,9	5,7	**4,3**
2	4.0	2,2	2,2	3,4	3,4	2,4	4,9	3,8	4,5	**3,4**
3	0.2	4,1	4,1	2,2	2,2	2,5	3,4	3,5	5,0	**3,4**
3	0.5	3,7	3,7	2,3	2,3	2,4	4,0	5,1	6,8	**3,8**
3	1.0	4,0	4,0	2,0	2,0	2,1	3,9	4,7	7,3	**3,8**
3	2.0	4,4	4,4	2,4	2,4	2,4	6,0	5,4	5,8	**4,2**
3	4.0	2,7	2,7	1,7	1,7	2,4	4,4	4,9	7,0	**3,4**
6	0.2	1,9	1,9	1,7	1,7	1,9	2,5	2,1	2,7	**2,1**
6	0.5	1,6	1,6	1,7	1,7	2,2	2,4	2,9	4,4	**2,3**
6	1.0	1,8	1,8	1,9	1,9	2,2	2,8	3,2	4,9	**2,6**
6	2.0	2,3	2,3	2,1	2,1	2,5	3,2	3,9	4,6	**2,9**
6	4.0	1,8	1,8	1,9	1,9	2,3	2,8	4,2	5,6	**2,8**
12	0.2	0,7	0,7	0,7	0,7	0,6	0,9	0,9	1,1	**0,8**
12	0.5	0,8	0,8	0,8	0,8	1,0	1,3	2,1	3,0	**1,3**
12	1.0	1,1	1,1	0,9	0,9	1,0	1,7	1,9	3,4	**1,5**
12	2.0	1,1	1,1	0,9	0,9	1,0	1,6	2,0	3,2	**1,5**
12	4.0	1,0	1,0	1,1	1,1	1,5	2,2	3,8	5,5	**2,2**
18	0.2	0,8	0,8	0,5	0,5	0,7	0,8	1,0	1,7	**0,9**
18	0.5	0,8	0,8	0,6	0,6	0,5	0,8	1,3	2,2	**1,0**
18	1.0	1,0	1,0	0,6	0,6	0,9	1,2	2,0	3,4	**1,3**
18	2.0	0,9	0,9	0,6	0,6	0,8	1,4	2,3	3,6	**1,4**
18	4.0	0,8	0,8	0,7	0,7	1,0	2,9	2,9	5,6	**1,9**
24	0.2	1,0	1,0	0,9	0,9	0,8	0,9	1,2	1,9	**1,1**
24	0.5	0,5	0,5	1,0	1,0	0,8	0,9	1,4	2,4	**1,1**
24	1.0	0,6	0,6	1,4	1,4	1,0	1,4	2,3	0,0	**1,1**
24	2.0	0,8	0,8	1,3	1,3	1,6	2,2	3,6	5,7	**2,2**
24	4.0	0,7	0,7	0,9	0,9	1,4	1,7	2,8	4,8	**1,7**
36	0.2	0,8	0,8	0,9	0,9	1,5	1,0	1,1	1,7	**1,1**
36	0.5	1,0	1,0	0,8	0,8	0,9	1,4	1,7	2,5	**1,3**
36	1.0	0,9	0,9	1,0	1,0	1,4	1,9	2,9	4,6	**1,8**
36	2.0	1,1	1,1	1,1	1,1	1,5	2,1	3,1	4,6	**2,0**
36	4.0	0,9	0,9	0,9	0,9	1,2	1,7	2,7	4,7	**1,7**
52	0.2	0,8	0,8	0,8	0,8	0,7	1,0	0,8	1,1	**0,9**
52	0.5	1,3	1,3	0,9	0,9	1,1	1,4	2,1	2,9	**1,5**
52	1.0	0,9	0,9	0,9	0,9	1,1	1,4	2,1	2,9	**1,4**
52	2.0	1,0	1,0	1,1	1,1	1,3	2,0	2,7	4,1	**1,8**
52	4.0	0,9	0,9	1,0	1,0	1,5	2,1	2,8	4,9	**1,9**
	MIN	0,5	0,5	0,5	0,5	0,5	0,8	0,8	0,0	
	MAX	4,4	4,4	3,4	3,4	4,2	7,6	6,9	8,2	
	Mittelwer	1,7	1,7	1,5	1,5	1,8	2,6	3,1	4,2	
	50% Perc	1,1	1,1	1,1	1,1	1,5	2,2	2,9	4,4	
	90% Perc	3,9	3,9	2,5	2,5	3,0	4,4	5,0	6,9	
	95% Perc	4,0	4,0	3,1	3,1	3,4	5,7	5,6	7,2	
BERLIN	**99% Perc**	4,3	4,3	3,4	3,4	4,1	6,9	6,5	7,8	BERLIN

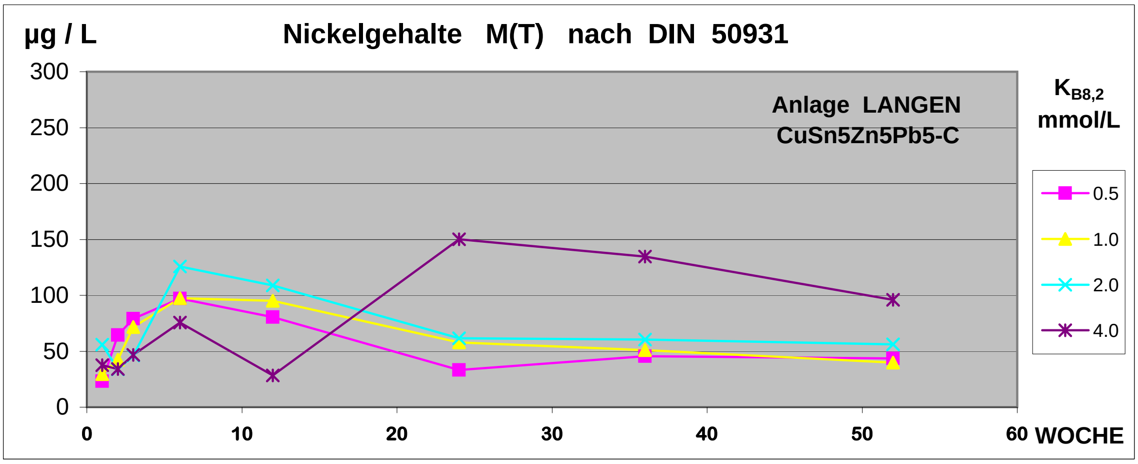
Legierung E NICKELKONZENTRATION NACH STAGNATION (µg / L)

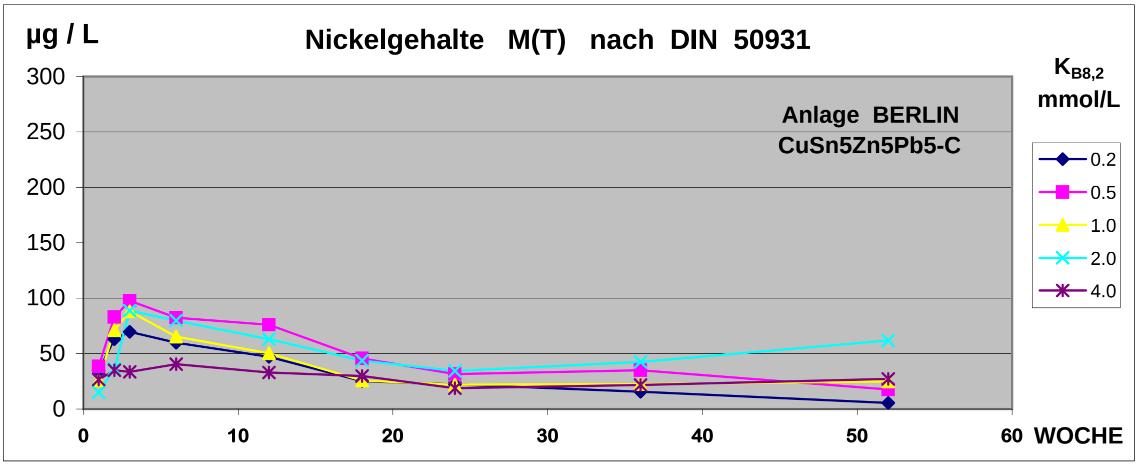
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	1,1	1,1	0,7	0,7	0,8	1,1	1,3	1,9	**1,1**
1	1.2	0,9	0,9	0,7	0,7	0,9	0,9	1,1	1,7	**1,0**
1	1.2+X	0,9	0,9	0,8	0,8	1,0	1,2	1,7	2,1	**1,2**
1	2.0	0,8	0,8	0,7	0,7	0,8	0,9	1,0	1,8	**0,9**
1	4.0	1,0	1,0	0,7	0,7	0,9	1,2	1,2	1,8	**1,1**
2	0.5	1,2	1,2	2,5	2,5	1,4	1,6	2,5	2,7	**2,0**
2	1.2	1,1	1,1	3,0	3,0	1,4	1,9	2,4	3,0	**2,1**
2	1.2+X	1,1	1,1	2,8	2,8	1,4	1,8	2,6	5,6	**2,4**
2	2.0	1,0	1,0	2,3	2,3	1,1	1,6	1,5	2,2	**1,6**
2	4.0	0,9	0,9	1,3	1,3	1,0	1,1	1,5	1,7	**1,2**
3	0.5	1,5	1,5	1,5	1,5	1,3	1,8	2,6	3,2	**1,9**
3	1.2	1,4	1,4	1,8	1,8	1,4	1,9	3,5	5,1	**2,3**
3	1.2+X	1,5	1,5	1,5	1,5	1,2	1,6	2,5	3,1	**1,8**
3	2.0	1,5	1,5	1,7	1,7	1,7	2,1	4,4	6,4	**2,6**
3	4.0	1,5	1,5	1,7	1,7	1,4	1,9	2,8	5,1	**2,2**
6	0.5	1,0	1,0	1,6	1,6	1,0	1,1	1,5	1,4	**1,3**
6	1.2	1,1	1,1	1,7	1,7	1,1	1,3	2,6	2,3	**1,6**
6	1.2+X	1,1	1,1	1,9	1,9	1,0	2,1	1,3	2,6	**1,6**
6	2.0	1,1	1,1	1,3	1,3	1,1	1,2	1,8	2,2	**1,4**
6	4.0	1,8	1,8	2,3	2,3	3,0	3,7	5,2	2,8	**2,9**
12	0.5	0,7	0,7	1,3	1,3	0,9	0,9	1,5	2,5	**1,2**
12	1.2	0,9	0,9	1,2	1,2	1,3	1,8	2,7	4,1	**1,8**
12	1.2+X	1,0	1,0	1,0	1,0	8,3	2,0	1,6	2,1	**2,3**
12	2.0	1,0	1,0	1,0	1,0	1,3	1,6	2,6	3,1	**1,6**
12	4.0	1,3	1,3	1,0	1,0	1,4	1,7	2,8	3,6	**1,8**
18	0.5	0,6	0,6	1,3	1,3	0,9	1,2	2,0	2,7	**1,3**
18	1.2	0,6	0,6	1,2	1,2	1,1	1,1	2,4	2,3	**1,3**
18	1.2+X	0,8	0,8	1,4	1,4	1,1	1,4	1,9	4,8	**1,7**
18	2.0	0,7	0,7	1,3	1,3	1,1	1,7	2,2	3,4	**1,6**
18	4.0	0,7	0,7	0,8	0,8	1,4	1,4	2,3	3,0	**1,4**
24	0.5	0,7	0,7	1,8	1,8	0,9	1,3	1,8	2,4	**1,4**
24	1.2	0,9	0,9	1,5	1,5	1,0	1,3	1,8	2,4	**1,4**
24	1.2+X	1,2	1,2	1,6	1,6	1,2	1,8	1,5	2,0	**1,5**
24	2.0	0,8	0,8	1,1	1,1	1,0	1,1	1,8	2,3	**1,3**
24	4.0	0,8	0,8	0,9	0,9	1,1	1,4	2,0	2,7	**1,3**
36	0.5	0,8	0,8	1,0	1,0	1,0	1,3	0,9	2,6	**1,2**
36	1.2	0,9	0,9	1,0	1,0	1,0	1,2	1,7	2,1	**1,2**
36	1.2+X	1,0	1,0	1,0	1,0	1,2	1,2	1,6	1,8	**1,2**
36	2.0	0,9	0,9	0,8	0,8	0,9	1,1	1,6	1,9	**1,1**
36	4.0	0,8	0,8	0,9	0,9	1,1	1,0	1,3	1,1	**1,0**
52	0.5	0,7	0,7	1,1	1,1	0,8	1,2	1,4	2,1	**1,1**
52	1.2	1,2	1,2	1,1	1,1	1,5	2,2	3,3	5,0	**2,1**
52	1.2+X	1,0	1,0	1,0	1,0	1,2	1,3	1,8	2,8	**1,4**
52	2.0	0,6	0,6	0,6	0,6	0,6	0,8	0,8	1,2	**0,7**
52	4.0	0,6	0,6	0,7	0,7	0,8	0,9	1,1	1,6	**0,9**
	Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !									
	MIN	0,6	0,6	0,6	0,6	0,6	0,8	0,8	1,1	
	MAX	1,8	1,8	3,0	3,0	8,3	3,7	5,2	6,4	
	Mittelwer	1,0	1,0	1,3	1,3	1,3	1,5	2,0	2,8	
	50% Perc	1,0	1,0	1,2	1,2	1,1	1,3	1,8	2,4	
	90% Perc	1,5	1,5	2,1	2,1	1,4	2,0	2,8	4,9	
	95% Perc	1,5	1,5	2,5	2,5	1,7	2,1	3,5	5,1	
WÜRZBURG	**99% Perc**	1,7	1,7	2,9	2,9	6,0	3,0	4,8	6,0	WÜRZBURG

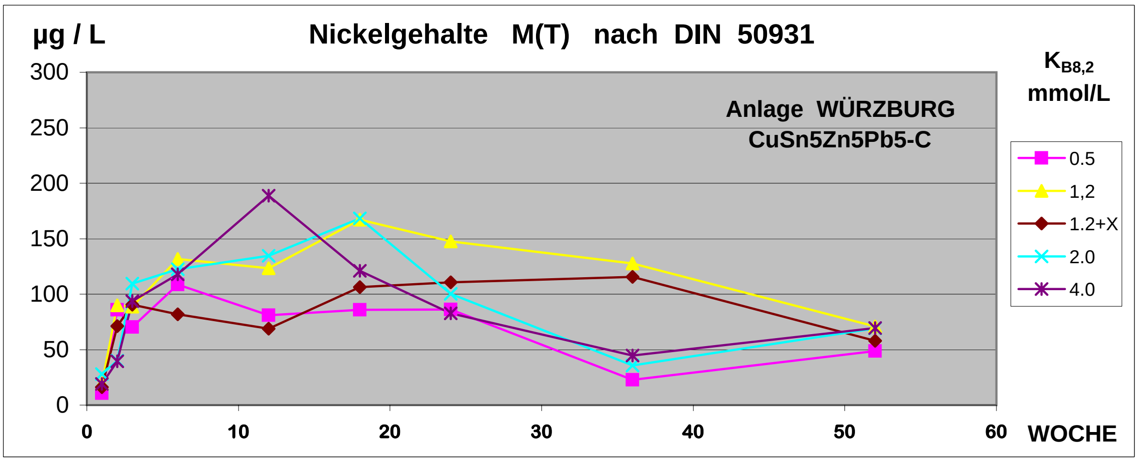
A 6 Ni

Nickelgehalte nach M (T)   Werkstoff : CuSn5Zn5Pb5-C









Legierung F   NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	1,5	1,5	1,6	1,6	1,1	1,9	17,4	4,6	**4**
1	0.5	2,8	2,8	5,9	5,9	9,1	7,6	13,4	26,3	**9**
1	1.0	5,4	5,4	10,2	10,2	16,1	20,5	41,4	69,3	**22**
1	2.0	4,6	4,6	8,8	8,8	13,3	22,3	35,5	71,4	**21**
1	4.0	11,2	11,2	15,7	15,7	30,1	43,8	72,4	139,0	**42**
2	0,04	1,0	1,0	1,4	1,4	1,0	1,6	2,1	2,7	**2**
2	0.5	2,9	2,9	3,8	3,8	7,4	13,5	23,0	41,1	**12**
2	1.0	6,2	6,2	10,3	10,3	14,9	26,1	47,6	68,7	**24**
2	2.0	6,7	6,7	10,4	10,4	17,0	30,8	55,2	85,9	**28**
2	4.0	12,6	12,6	25,6	25,6	41,1	74,0	126,9	212,7	**66**
3	0,04	0,8	0,8	0,6	0,6	1,6	1,4	1,4	2,9	**1**
3	0.5	3,4	3,4	4,0	4,0	2,8	13,1	19,0	33,0	**10**
3	1.0	6,5	6,5	10,9	10,9	16,1	27,3	51,6	78,6	**26**
3	2.0	8,2	8,2	14,3	14,3	24,4	38,4	77,0	115,9	**38**
3	4.0	18,3	18,3	33,9	33,9	52,8	96,7	167,8	263,4	**86**
6	0,04	1,1	1,1	0,6	0,6	1,5	0,9	1,8	2,6	**1**
6	0.5	2,0	2,0	4,0	4,0	5,3	8,1	11,5	27,8	**8**
6	1.0	12,7	12,7	6,3	6,3	10,6	18,2	38,3	63,2	**21**
6	2.0	8,0	8,0	12,8	12,8	21,8	36,5	82,8	114,0	**37**
6	4.0	17,1	17,1	27,6	27,6	49,5	89,6	175,0	229,0	**79**
12	0,04	2,3	2,3	1,5	1,5	1,8	2,1	3,6	4,6	**2**
12	0.5	3,2	3,2	3,8	3,8	6,1	9,4	18,5	31,4	**10**
12	1.0	7,5	7,5	6,6	6,6	8,6	16,2	34,9	42,2	**16**
12	2.0	7,6	7,6	12,1	12,1	19,5	34,7	75,3	101,0	**34**
12	4.0	13,7	13,7	26,0	26,0	43,4	91,1	156,0	222,0	**74**
18	0,04	0,9	0,9	1,3	1,3	1,1	1,7	2,1	3,0	**2**
18	0.5	2,3	2,3	4,6	4,6	5,3	8,9	20,4	29,5	**10**
18	1.0	3,0	3,0	5,3	5,3	10,3	12,8	25,7	41,4	**13**
18	2.0	7,4	7,4	12,2	12,2	18,0	34,7	78,3	103,0	**34**
18	4.0	14,0	14,0	34,7	34,7	41,6	105,0	135,0	222,0	**75**
24	0,04	1,8	1,8	1,9	1,9	2,2	3,0	4,2	6,2	**3**
24	0.5	4,0	4,0	3,9	3,9	5,0	8,7	16,5	30,6	**10**
24	1.0	4,6	4,6	5,3	5,3	7,9	13,2	22,5	39,6	**13**
24	2.0	8,5	8,5	11,7	11,7	18,2	30,3	66,7	116,0	**34**
24	4.0	18,8	18,8	42,5	42,5	47,7	83,8	154,0	293,0	**88**
36	0,04	2,2	2,2	2,8	2,8	3,9	5,5	9,3	13,7	**5**
36	0.5	2,4	2,4	3,9	3,9	6,7	11,0	22,0	33,7	**11**
36	1.0	4,4	4,4	7,0	7,0	11,2	19,5	35,5	61,0	**19**
36	2.0	6,5	6,5	12,5	12,5	21,1	39,9	73,2	134,0	**38**
36	4.0	14,6	14,6	28,0	28,0	44,9	87,4	167,0	285,0	**84**
52	0,04	2,5	2,5	4,0	4,0	5,4	8,3	15,9	22,5	**8**
52	0.5	2,2	2,2	3,2	3,2	4,3	7,9	15,1	27,6	**8**
52	1.0	3,1	3,1	5,7	5,7	7,6	13,4	25,7	47,2	**14**
52	2.0	6,3	6,3	10,1	10,1	18,2	33,3	71,7	125,0	**35**
52	4.0	15,7	15,7	46,0	46,0	47,8	81,9	212,0	303,0	**96**
	MIN	0,8	0,8	0,6	0,6	1,0	0,9	1,4	2,6	
	MAX	19	19	46	46	53	105	212	303	
	Mittelwe	7	7	11	11	17	30	56	89	
	50% Pe	5	5	7	7	11	18	36	61	
	90% Pe	14	14	28	28	44	86	155	226	
	95% Pe	17	17	35	35	48	91	168	281	
THALFANG	**99% Pe**	19	19	44	44	51	101	196	299	THALFANG

Legierung F NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	6,5	6,5	7,0	7,0	22,8	20,0	55,6	59,4	**23**
1	1.0	4,6	4,6	8,2	8,2	13,1	27,1	59,9	109,9	**29**
1	2.0	5,7	5,7	14,8	14,8	25,2	59,1	120,4	201,4	**56**
1	4.0	5,8	5,8	11,5	11,5	19,8	39,0	78,8	128,2	**38**
2	0.5	13,5	13,5	18,3	18,3	34,1	65,5	139,0	212,8	**64**
2	1.0	7,4	7,4	10,5	10,5	20,7	41,2	80,0	161,7	**42**
2	2.0	6,1	6,1	8,8	8,8	27,6	35,6	63,1	114,9	**34**
2	4.0	8,0	8,0	10,9	10,9	19,3	34,3	71,6	110,0	**34**
3	0.5	11,6	11,6	21,6	21,6	47,6	76,3	159,1	282,6	**79**
3	1.0	16,7	16,7	24,0	24,0	45,7	71,8	161,9	212,8	**72**
3	2.0	6,6	6,6	14,4	14,4	24,7	46,6	91,5	164,1	**46**
3	4.0	8,1	8,1	16,9	16,9	25,3	44,7	87,5	167,2	**47**
6	0.5	14,8	14,8	34,0	34,0	56,5	100,3	209,8	314,0	**97**
6	1.0	23,2	23,2	50,0	50,0	78,9	112,1	175,5	267,2	**98**
6	2.0	29,8	29,8	62,6	62,6	95,5	159,6	237,8	328,7	**126**
6	4.0	12,3	12,3	23,6	23,6	41,7	72,3	157,8	260,7	**76**
12	0.5	13,0	13,0	24,4	24,4	50,6	80,1	174,6	264,5	**81**
12	1.0	16,4	16,4	30,6	30,6	63,3	100,7	198,3	305,3	**95**
12	2.0	15,4	15,4	29,0	29,0	67,7	106,5	236,7	371,1	**109**
12	4.0	3,5	3,5	8,9	8,9	19,1	26,0	66,5	89,5	**28**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	4,6	4,6	7,7	7,7	17,8	33,5	62,4	127,0	**33**
24	1.0	7,9	7,9	15,6	15,6	30,3	57,6	113,0	216,0	**58**
24	2.0	7,0	7,0	22,2	22,2	30,9	60,7	122,0	221,0	**62**
24	4.0	13,8	13,8	77,8	77,8	58,4	164,0	190,0	605,0	**150**
36	0.5	6,2	6,2	13,5	13,5	21,3	38,8	81,4	184,0	**46**
36	1.0	7,6	7,6	14,5	14,5	26,8	48,0	97,3	192,0	**51**
36	2.0	8,1	8,1	17,4	17,4	32,9	57,7	117,0	224,0	**60**
36	4.0	15,6	15,6	56,1	56,1	66,1	118,0	213,0	537,0	**135**
52	0.5	7,9	7,9	16,3	16,3	23,8	45,6	91,9	139,0	**44**
52	1.0	6,2	6,2	10,5	10,5	20,5	42,2	82,4	140,0	**40**
52	2.0	6,4	6,4	14,7	14,7	27,5	53,2	114,0	212,0	**56**
52	4.0	13,8	13,8	24,2	24,2	46,9	94,9	192,0	359,0	**96**
	MIN	3,5	3,5	7,0	7,0	13,1	20,0	55,6	59,4	
	MAX	30	30	78	78	96	164	238	605	
	Mittelw	10	10	23	23	38	67	128	228	
	50% Pe	8	8	17	17	29	58	116	212	
	90% Pe	16	16	48	48	66	112	209	356	
	95% Pe	20	20	59	59	73	137	224	446	
	99% Pe	28	28	73	73	90	163	237	584	

Legierung F NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	6,1	6,1	11,2	11,2	24,0	41,2	86,8	90,0	**35**
1	0.5	7,9	7,9	12,3	12,3	27,1	47,8	107,0	84,2	**38**
1	1.0	4,5	4,5	8,1	8,1	18,7	46,4	50,0	65,6	**26**
1	2.0	8,6	8,6	9,7	9,7	20,3	26,9	23,0	14,5	**15**
1	4.0	6,4	6,4	12,0	12,0	20,4	4,1	51,1	99,2	**26**
2	0.2	12,3	12,3	24,1	24,1	37,1	70,6	127,0	196,0	**63**
2	0.5	18,7	18,7	40,5	40,5	74,1	109,0	132,0	231,0	**83**
2	1.0	14,5	14,5	28,7	28,7	43,6	81,5	168,0	189,0	**71**
2	2.0	11,4	11,4	47,8	47,8	44,6	48,9	51,5	27,2	**36**
2	4.0	23,3	23,3	16,8	16,8	32,0	44,8	52,8	69,7	**35**
3	0.2	20,9	20,9	22,0	22,0	42,2	70,3	127,0	232,0	**70**
3	0.5	28,3	28,3	38,9	38,9	61,1	86,5	160,0	340,0	**98**
3	1.0	23,5	23,5	25,0	25,0	48,4	86,7	157,0	316,0	**88**
3	2.0	26,6	26,6	33,1	33,1	56,7	91,5	163,0	279,0	**89**
3	4.0	26,8	26,8	18,5	18,5	28,1	55,3	42,7	52,3	**34**
6	0.2	18,1	18,1	23,8	23,8	41,1	57,7	120,0	175,0	**60**
6	0.5	24,8	24,8	35,1	35,1	59,6	89,0	156,0	234,0	**82**
6	1.0	16,4	16,4	21,6	21,6	40,7	63,1	130,0	212,0	**65**
6	2.0	21,8	21,8	31,5	31,5	57,5	92,3	167,0	214,0	**80**
6	4.0	29,0	29,0	32,5	32,5	44,5	51,7	55,1	49,0	**40**
12	0.2	12,7	12,7	20,4	20,4	28,6	51,1	88,1	142,0	**47**
12	0.5	19,8	19,8	29,0	29,0	44,4	74,2	148,0	244,0	**76**
12	1.0	10,3	10,3	16,1	16,1	26,7	49,3	97,5	176,0	**50**
12	2.0	15,3	15,3	21,4	21,4	36,0	68,2	126,0	201,0	**63**
12	4.0	16,9	16,9	25,5	25,5	38,7	42,3	49,3	48,2	**33**
18	0.2	7,6	7,6	9,1	9,1	15,2	27,3	45,3	80,6	**25**
18	0.5	11,6	11,6	14,4	14,4	23,5	45,3	80,3	164,0	**46**
18	1.0	6,8	6,8	8,1	8,1	11,5	22,3	48,9	94,1	**26**
18	2.0	8,9	8,9	21,4	21,4	19,9	74,8	73,0	121,0	**44**
18	4.0	12,1	12,1	31,9	31,9	24,9	59,2	32,2	34,1	**30**
24	0.2	4,7	4,7	7,5	7,5	13,7	24,0	43,4	72,5	**22**
24	0.5	5,3	5,3	9,3	9,3	18,1	31,5	61,2	113,0	**32**
24	1.0	3,3	3,3	6,5	6,5	9,7	17,2	45,0	84,5	**22**
24	2.0	5,0	5,0	12,0	12,0	19,5	36,0	64,1	121,0	**34**
24	4.0	7,1	7,1	13,1	13,1	21,3	26,6	31,1	30,2	**19**
36	0.2	4,8	4,8	6,3	6,3	10,6	18,5	25,8	47,9	**16**
36	0.5	7,5	7,5	11,1	11,1	23,5	43,3	71,9	104,0	**35**
36	1.0	4,9	4,9	7,3	7,3	11,8	24,2	50,3	70,6	**23**
36	2.0	7,4	7,4	15,2	15,2	23,1	42,3	98,2	130,0	**42**
36	4.0	10,1	10,1	16,0	16,0	30,4	37,5	17,7	35,5	**22**
52	0.2	2,4	2,4	3,0	3,0	3,4	5,9	9,6	14,4	**6**
52	0.5	5,0	5,0	8,6	8,6	8,9	18,8	31,8	53,4	**18**
52	1.0	4,3	4,3	7,2	7,2	10,8	23,6	53,8	86,8	**25**
52	2.0	10,2	10,2	19,2	19,2	36,5	58,4	126,0	214,0	**62**
52	4.0	10,3	10,3	15,8	15,8	36,8	43,2	41,5	42,5	**27**
	MIN	2,4	2,4	3,0	3,0	3,4	4,1	9,6	14,4	
	MAX	29	29	48	48	74	109	168	340	
	Mittelwe	13	13	19	19	30	50	82	127	
	50% Per	10	10	16	16	27	46	64	99	
	90% Per	24	24	33	33	53	87	157	233	
	95% Per	27	27	38	38	59	91	162	272	
BERLIN	**99% Per**	29	29	45	45	68	102	168	329	BERLIN

Legierung F NICKELKONZENTRATION NACH STAGNATION (µg / L)

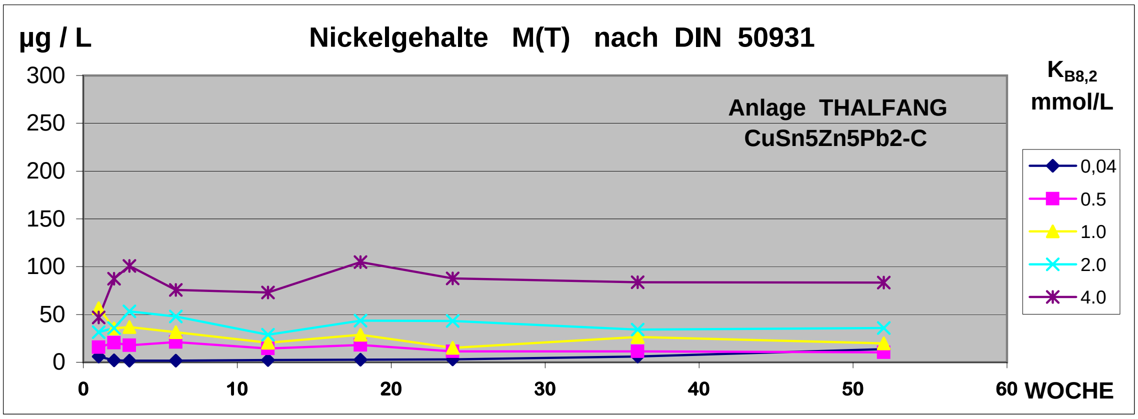
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	4,0	4,0	5,2	5,2	6,6	9,3	20,5	30,4	**11**
1	1,2	5,3	5,3	8,2	8,2	12,2	16,2	37,5	61,9	**19**
1	1.2+X	3,8	3,8	6,6	6,6	9,7	13,8	36,9	47,6	**16**
1	2.0	6,9	6,9	11,2	11,2	14,4	25,9	46,8	101,0	**28**
1	4.0	5,3	5,3	9,2	9,2	11,0	17,6	33,5	60,8	**19**
2	0.5	20,3	20,3	81,4	81,4	45,7	79,7	140,0	218,0	**86**
2	1.2	9,9	9,9	147,0	147,0	32,4	68,5	103,0	201,0	**90**
2	1.2+X	7,8	7,8	103,0	103,0	26,1	63,3	93,4	165,0	**71**
2	2.0	5,7	5,7	55,4	55,4	18,1	29,2	53,3	97,7	**40**
2	4.0	5,7	5,7	53,8	53,8	14,8	38,1	47,4	96,4	**39**
3	0.5	16,4	16,4	40,1	40,1	60,8	83,8	144,0	160,0	**70**
3	1.2	14,2	14,2	53,5	53,5	54,2	92,9	173,0	255,0	**89**
3	1.2+X	14,4	14,4	54,6	54,6	52,2	118,0	146,0	269,0	**90**
3	2.0	40,2	40,2	72,9	72,9	90,8	94,0	185,0	279,0	**109**
3	4.0	18,9	18,9	61,0	61,0	89,9	112,0	166,0	221,0	**94**
6	0.5	22,7	22,7	167,0	167,0	50,5	73,2	129,0	237,0	**109**
6	1.2	39,9	39,9	191,0	191,0	76,0	95,6	181,0	240,0	**132**
6	1.2+X	13,3	13,3	152,0	152,0	32,1	51,8	93,6	146,0	**82**
6	2.0	42,4	42,4	174,0	174,0	79,2	109,0	151,0	207,0	**122**
6	4.0	48,7	48,7	93,6	93,6	106,0	148,0	210,0	195,0	**118**
12	0.5	21,5	21,5	24,2	24,2	69,3	76,7	150,0	260,0	**81**
12	1.2	38,5	38,5	42,5	42,5	93,2	121,0	246,0	365,0	**123**
12	1.2+X	16,2	16,2	18,5	18,5	55,8	66,3	141,0	219,0	**69**
12	2.0	40,1	40,1	43,8	43,8	112,0	134,0	274,0	390,0	**135**
12	4.0	31,3	31,3	33,0	33,0	419,0	139,0	295,0	529,0	**189**
18	0.5	20,6	20,6	82,8	82,8	39,1	68,0	125,0	249,0	**86**
18	1.2	36,3	36,3	240,0	240,0	76,6	121,0	243,0	343,0	**167**
18	1.2+X	18,7	18,7	149,0	149,0	44,6	78,8	152,0	239,0	**106**
18	2.0	35,8	35,8	136,0	136,0	88,5	147,0	297,0	471,0	**168**
18	4.0	18,9	18,9	43,0	43,0	78,1	118,0	240,0	408,0	**121**
24	0.5	11,9	11,9	72,2	72,2	38,1	73,6	156,0	253,0	**86**
24	1.2	18,3	18,3	216,0	216,0	60,6	112,0	207,0	332,0	**148**
24	1.2+X	13,6	13,6	173,0	173,0	40,7	79,9	163,0	228,0	**111**
24	2.0	11,9	11,9	44,2	44,2	45,9	90,3	207,0	347,0	**100**
24	4.0	7,7	7,7	16,6	16,6	30,8	76,4	152,0	354,0	**83**
36	0.5	11,5	11,5	20,1	20,1	30,6	57,6	15,5	14,4	**23**
36	1.2	27,5	27,5	44,8	44,8	74,8	118,0	261,0	422,0	**128**
36	1.2+X	16,2	16,2	28,0	28,0	44,7	151,0	181,0	460,0	**116**
36	2.0	18,0	18,0	26,3	26,3	44,9	94,2	36,5	21,7	**36**
36	4.0	20,7	20,7	30,7	30,7	59,9	88,5	52,1	54,0	**45**
52	0.5	9,2	9,2	31,8	31,8	23,5	74,1	78,2	131,0	**49**
52	1.2	15,6	15,6	31,8	31,8	42,9	83,3	129,0	218,0	**71**
52	1.2+X	10,7	10,7	20,7	20,7	31,9	61,9	119,0	188,0	**58**
52	2.0	13,6	13,6	27,0	27,0	38,5	77,3	134,0	223,0	**69**
52	4.0	16,6	16,6	29,9	29,9	36,2	72,1	125,0	230,0	**70**

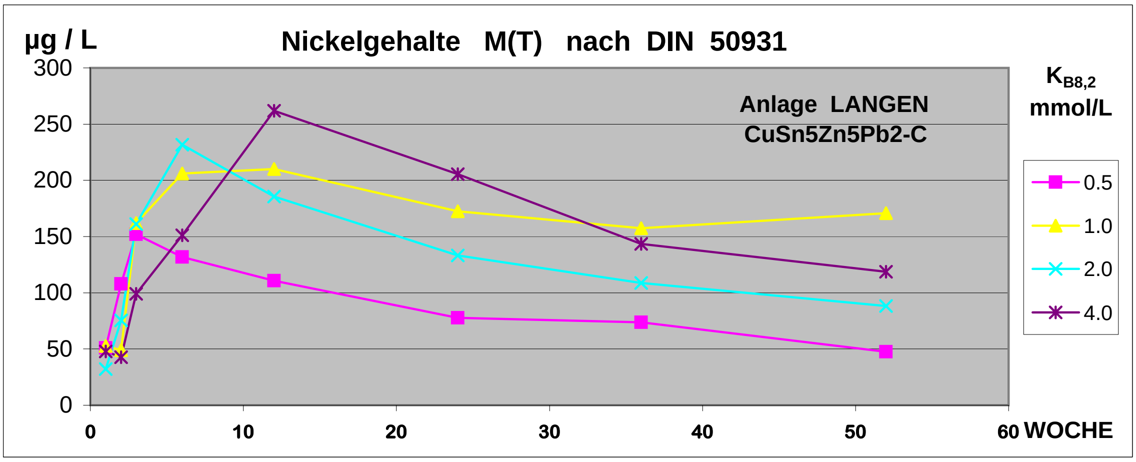
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

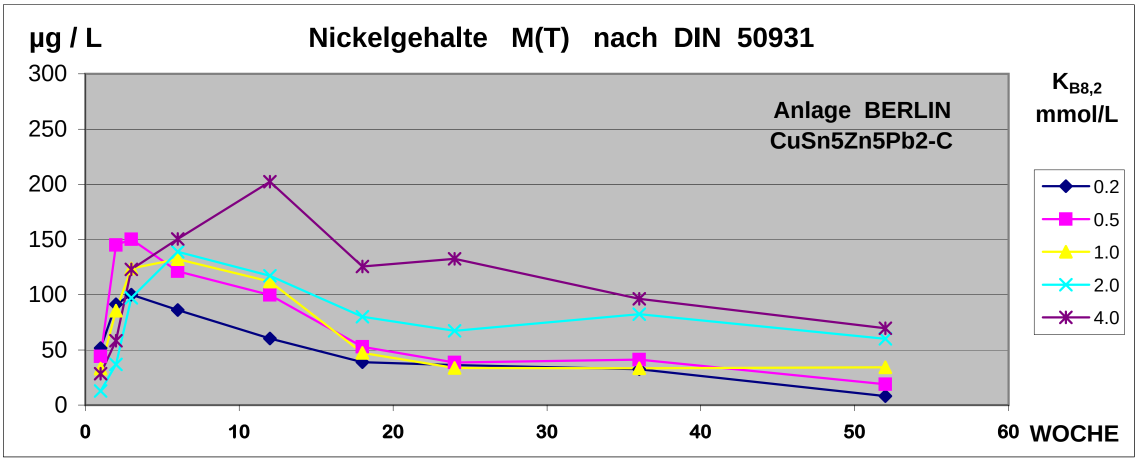
		0,5H	0,5H	1H	1H	2H	4H	8H	16H	
	MIN	3,8	3,8	5,2	5,2	6,6	9,3	15,5	14,4	
	MAX	49	49	240	240	419	151	297	529	
	Mittelwe	19	19	70	70	58	83	142	228	
	50% Per	16	16	44	44	45	80	144	223	
	90% Per	39	39	171	171	90	129	245	401	
	95% Per	40	40	188	188	103	145	271	452	
WÜRZBURG	**99% Per**	46	46	229	229	284	150	296	503	WÜRZBURG

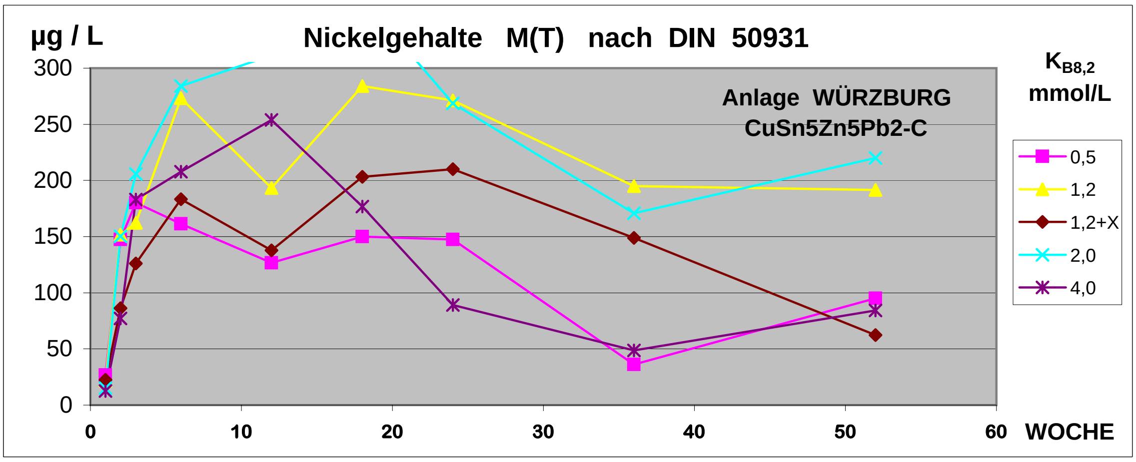
A 6 Ni

Nickelgehalte nach M (T) **Werkstoff : CuSn5Zn5Pb2-C**









Legierung G NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0,04	1,4	1,4	1,9	1,9	2,0	3,2	25,0	12,3	**6**
1	0.5	3,8	3,8	5,6	5,6	13,1	14,3	26,9	53,3	**16**
1	1.0	12,2	12,2	22,3	22,3	37,3	63,4	84,7	197,3	**56**
1	2.0	7,0	7,0	12,2	12,2	19,2	29,9	54,0	110,3	**31**
1	4.0	6,5	6,5	14,3	14,3	27,3	41,9	107,6	157,5	**47**
2	0,04	1,0	1,0	1,4	1,4	1,7	2,2	3,6	4,5	**2**
2	0.5	4,0	4,0	5,5	5,5	7,4	20,2	38,2	77,6	**20**
2	1.0	7,9	7,9	12,3	12,3	17,8	35,1	63,5	128,2	**36**
2	2.0	7,9	7,9	13,5	13,5	23,5	40,8	61,3	117,2	**36**
2	4.0	19,5	19,5	32,7	32,7	62,6	105,4	163,8	262,8	**87**
3	0,04	0,9	0,9	0,8	0,8	1,4	1,8	2,3	4,5	**2**
3	0.5	4,0	4,0	5,2	5,2	9,3	18,8	33,6	61,8	**18**
3	1.0	7,4	7,4	12,4	12,4	20,4	37,0	79,3	117,7	**37**
3	2.0	10,8	10,8	18,0	18,0	34,4	52,2	120,0	161,8	**53**
3	4.0	20,6	20,6	36,0	36,0	76,6	124,3	190,6	300,5	**101**
6	0,04	1,1	1,1	0,8	0,8	1,7	1,1	2,3	4,0	**2**
6	0.5	3,7	3,7	7,2	7,2	8,8	18,4	48,0	72,2	**21**
6	1.0	6,8	6,8	11,8	11,8	12,1	27,1	87,8	86,9	**31**
6	2.0	8,5	8,5	14,1	14,1	24,3	44,8	117,0	153,0	**48**
6	4.0	13,1	13,1	40,6	40,6	42,0	76,0	156,0	223,0	**76**
12	0,04	1,2	1,2	1,6	1,6	1,7	2,3	3,7	5,0	**2**
12	0.5	5,7	5,7	4,4	4,4	7,0	12,7	27,9	46,1	**14**
12	1.0	3,5	3,5	7,2	7,2	10,3	19,9	46,7	65,7	**21**
12	2.0	4,8	4,8	8,8	8,8	14,1	27,0	66,9	96,2	**29**
12	4.0	9,8	9,8	23,8	23,8	29,4	60,6	121,0	305,0	**73**
18	0,04	1,1	1,1	1,3	1,3	1,9	2,8	5,4	6,8	**3**
18	0.5	3,0	3,0	4,6	4,6	8,4	16,9	36,3	66,8	**18**
18	1.0	4,8	4,8	9,4	9,4	17,0		56,1	99,3	**29**
18	2.0	7,6	7,6	12,6	12,6	20,0	41,9	109,0	137,0	**44**
18	4.0	8,8	8,8	23,9	23,9	27,9	74,3	111,0	559,0	**105**
24	0,04	1,8	1,8	1,9	1,9	2,3	3,0	4,5	6,8	**3**
24	0.5	2,6	2,6	5,4	5,4	5,3	10,1	19,8	40,4	**11**
24	1.0	3,8	3,8	0,0	0,0	9,6	16,5	31,0	56,9	**15**
24	2.0	6,2	6,2	11,8	11,8	17,1	30,0	74,5	187,0	**43**
24	4.0	12,8	12,8	59,4	59,4	34,0	95,8	149,0	279,0	**88**
36	0,04	2,7	2,7	3,2	3,2	4,3	6,7	7,3	17,3	**6**
36	0.5	2,6	2,6	4,1	4,1	7,4	13,6	21,1	35,2	**11**
36	1.0	8,7	8,7	17,1	17,1	14,4	25,0	47,9	73,5	**27**
36	2.0	11,9	11,9	11,5	11,5	24,8	29,7	58,0	113,0	**34**
36	4.0	12,8	12,8	26,3	26,3	50,2	87,0	176,0	277,0	**84**
52	0,04	3,5	3,5	5,9	5,9	9,4	17,5	24,6	39,7	**14**
52	0.5	2,3	2,3	3,6	3,6	5,9	10,8	21,0	32,8	**10**
52	1.0	3,1	3,1	5,5	5,5	14,0	19,3	53,8	52,5	**20**
52	2.0	5,0	5,0	10,4	10,4	17,3	50,4	67,0	120,0	**36**
52	4.0	13,8	13,8	24,4	24,4	52,2	85,4	186,0	268,0	**84**
	MIN	0,9	0,9	0,0	0,0	1,4	1,1	2,3	4,0	
	MAX	21	21	59	59	77	124	191	559	
	Mittelwe	6	6	12	12	19	34	66	118	
	50% Pe	5	5	9	9	14	26	54	87	
	90% Pe	13	13	26	26	40	83	153	273	
	95% Pe	14	14	35	35	52	94	174	296	
THALFANG	**99% Pe**	20	20	51	51	70	116	189	447	THALFANG

Legierung G NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	14,9	14,9	19,3	19,3	31,2	43,7	132,5	132,2	**51**
1	1.0	5,5	5,5	12,7	12,7	21,4	45,6	111,2	206,6	**53**
1	2.0	4,5	4,5	9,0	9,0	15,0	31,5	64,8	119,7	**32**
1	4.0	6,3	6,3	13,4	13,4	45,9	45,2	94,0	157,3	**48**
2	0.5	30,0	30,0	39,1	39,1	75,0	124,3	238,3	286,7	**108**
2	1.0	14,5	14,5	15,1	15,1	30,3	45,5	96,3	160,8	**49**
2	2.0	33,5	33,5	25,6	25,6	50,2	62,4	181,9	189,7	**75**
2	4.0	10,5	10,5	11,7	11,7	23,4	40,3	87,1	145,5	**43**
3	0.5	28,5	28,5	52,5	52,5	108,4	165,2	265,8	515,4	**152**
3	1.0	50,8	50,8	75,6	75,6	129,3	190,9	360,1	363,4	**162**
3	2.0	53,7	53,7	89,9	89,9	138,9	208,6	287,1	367,3	**161**
3	4.0	29,0	29,0	31,6	31,6	59,9	93,4	205,9	311,0	**99**
6	0.5	24,7	24,7	54,7	54,7	88,3	135,6	267,4	403,8	**132**
6	1.0	46,5	46,5	109,6	109,6	154,3	219,6	371,5	590,0	**206**
6	2.0	51,1	51,1	105,6	105,6	168,2	243,9	440,2	688,9	**232**
6	4.0	35,4	35,4	74,7	74,7	101,6	159,3	305,7	422,6	**151**
12	0.5	21,4	21,4	45,8	45,8	81,4	103,4	223,0	342,9	**111**
12	1.0	48,0	48,0	97,1	97,1	166,5	221,2	371,3	631,0	**210**
12	2.0	33,2	33,2	68,6	68,6	131,1	192,8	354,6	602,2	**186**
12	4.0	64,7	64,7	113,0	113,0	212,5	293,1	486,9	746,9	**262**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	13,4	13,4	23,8	23,8	45,1	83,5	145,0	273,0	**78**
24	1.0	32,3	32,3	61,6	61,6	95,5	186,0	349,0	562,0	**173**
24	2.0	18,8	18,8	52,2	52,2	64,5	136,0	264,0	459,0	**133**
24	4.0	32,7	32,7	85,8	85,8	95,6	300,0	395,0	617,0	**206**
36	0.5	10,3	10,3	23,2	23,2	37,3	63,7	130,0	291,0	**74**
36	1.0	26,6	26,6	54,8	54,8	98,3	150,0	321,0	528,0	**158**
36	2.0	14,6	14,6	33,3	33,3	61,9	99,3	220,0	393,0	**109**
36	4.0	20,3	20,3	49,3	49,3	86,4	130,0	289,0	502,0	**143**
52	0.5	6,8	6,8	14,7	14,7	24,0	46,3	98,4	168,0	**47**
52	1.0	31,9	31,9	53,0	53,0	101,0	152,0	344,0	599,0	**171**
52	2.0	10,5	10,5	23,5	23,5	44,7	79,5	185,0	328,0	**88**
52	4.0	15,7	15,7	29,8	29,8	63,8	111,0	243,0	440,0	**119**
	MIN	4,5	4,5	9,0	9,0	15,0	31,5	64,8	119,7	
	MAX	65	65	113	113	213	300	487	747	
	Mittelwe	26	26	49	49	83	131	248	392	
	50% Pe	26	26	48	48	78	127	254	380	
	90% Pe	51	51	96	96	153	221	371	616	
	95% Pe	52	52	107	107	167	266	415	657	
	99% Pe	61	61	112	112	199	298	472	729	

Legierung G NICKELKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.2	25,8	25,8	26,4	26,4	48,5	79,1	144,0	35,8	**51**
1	0.5	10,3	10,3	21,5	21,5	45,0	86,4	135,0	23,4	**44**
1	1.0	6,4	6,4	10,6	10,6	25,9	56,2	75,4	73,1	**33**
1	2.0	10,3	10,3	12,7	12,7	15,0	17,6	12,4	12,0	**13**
1	4.0	7,5	7,5	17,2	17,2	27,2	34,4	73,5	41,8	**28**
2	0.2	21,4	21,4	45,5	45,5	51,3	115,0	158,0	272,0	**91**
2	0.5	32,8	32,8	50,9	50,9	90,1	149,0	227,0	527,0	**145**
2	1.0	18,0	18,0	35,7	35,7	67,7	99,0	69,5	340,0	**85**
2	2.0	18,7	18,7	20,0	20,0	55,1	72,3	60,5	29,5	**37**
2	4.0	10,3	10,3	17,1	17,1	33,4	75,3	108,0	195,0	**58**
3	0.2	30,8	30,8	43,9	43,9	75,3	124,0	181,0	271,0	**100**
3	0.5	39,3	39,3	60,6	60,6	89,3	157,0	337,0	419,0	**150**
3	1.0	42,6	42,6	65,5	65,5	78,8	156,0	121,0	418,0	**124**
3	2.0	44,7	44,7	53,3	53,3	97,2	169,0	98,7	216,0	**97**
3	4.0	33,1	33,1	35,3	35,3	67,4	142,0	260,0	378,0	**123**
6	0.2	20,6	20,6	41,8	41,8	66,5	91,1	161,0	245,0	**86**
6	0.5	34,2	34,2	52,0	52,0	92,9	127,0	242,0	335,0	**121**
6	1.0	34,2	34,2	49,3	49,3	93,1	136,0	266,0	396,0	**132**
6	2.0	54,6	54,6	84,3	84,3	141,0	218,0	261,0	213,0	**139**
6	4.0	39,0	39,0	64,2	64,2	105,0	164,0	310,0	419,0	**151**
12	0.2	19,8	19,8	1,3	1,3	42,3	71,8	129,0	197,0	**60**
12	0.5	25,5	25,5	37,4	37,4	63,1	104,0	202,0	302,0	**100**
12	1.0	24,4	24,4	39,1	39,1	62,7	117,0	229,0	359,0	**112**
12	2.0	44,4	44,4	64,9	64,9	102,0	164,0	249,0	203,0	**117**
12	4.0	52,7	52,7	89,8	89,8	152,0	180,0	453,0	549,0	**202**
18	0.2	10,9	10,9	14,6	14,6	20,6	41,8	68,4	129,0	**39**
18	0.5	14,2	14,2	18,4	18,4	25,7	55,0	88,6	187,0	**53**
18	1.0	11,9	11,9	14,5	14,5	20,3	43,7	81,0	180,0	**47**
18	2.0	27,5	27,5	40,3	40,3	53,8	99,3	167,0	185,0	**80**
18	4.0	31,8	31,8	44,8	44,8	69,1	140,0	241,0	401,0	**126**
24	0.2	6,9	6,9	12,2	12,2	24,1	47,3	81,6	98,8	**36**
24	0.5	7,1	7,1	13,1	13,1	26,0	50,8	63,0	128,0	**39**
24	1.0	5,7	5,7	10,8	10,8	22,0	42,7	54,0	118,0	**34**
24	2.0	15,8	15,8	28,1	28,1	61,9	101,0	142,0	145,0	**67**
24	4.0	17,3	17,3	30,5	30,5	68,7	134,0	168,0	593,0	**132**
36	0.2	6,9	6,9	9,6	9,6	26,5	44,0	59,0	97,0	**32**
36	0.5	7,6	7,6	10,6	10,6	28,5	51,7	77,4	135,0	**41**
36	1.0	5,4	5,4	8,3	8,3	19,8	36,6	65,2	117,0	**33**
36	2.0	17,4	17,4	28,2	28,2	69,8	124,0	187,0	187,0	**82**
36	4.0	14,8	14,8	25,9	25,9	65,3	107,0	201,0	316,0	**96**
52	0.2	2,9	2,9	4,4	4,4	4,7	10,0	16,4	20,3	**8**
52	0.5	6,0	6,0	10,8	10,8	10,0	21,8	34,6	51,2	**19**
52	1.0	6,8	6,8	12,4	12,4	16,8	34,4	68,8	115,0	**34**
52	2.0	14,2	14,2	26,1	26,1	51,1	84,5	134,0	130,0	**60**
52	4.0	17,3	17,3	15,4	15,4	50,2	75,0	119,0	248,0	**70**
	MIN	2,9	2,9	1,3	1,3	4,7	10,0	12,4	12,0	
	MAX	55	55	90	90	152	218	453	593	
	Mittelwe	21	21	32	32	56	94	148	223	
	50% Pe	17	17	26	26	54	91	134	195	
	90% Pe	41	41	63	63	96	161	261	419	
	95% Pe	45	45	65	65	104	168	301	505	
BERLIN	**99% Pe**	54	54	87	87	147	201	402	574	BERLIN

Legierung G NICKELKONZENTRATION NACH STAGNATION (µg / L)

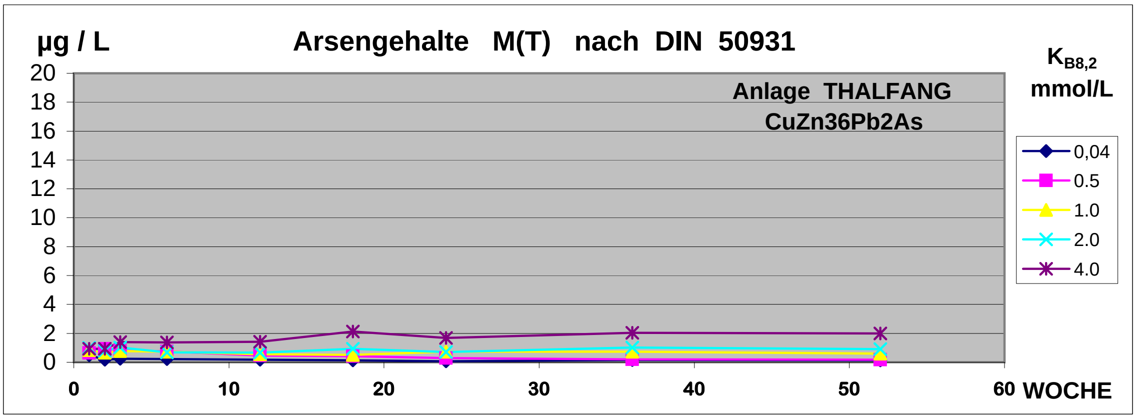
ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,5	4,6	4,6	14,8	14,8	20,8	20,6	58,8	74,9	**27**
1	1,2	4,9	4,9	9,2	9,2	14,5	17,3	45,4	67,0	**22**
1	1,2+X	3,5	3,5	7,1	7,1	12,1	18,6	46,0	81,4	**22**
1	2,0	4,7	4,7	5,3	5,3	7,9	15,1	25,8	52,2	**15**
1	4,0	4,2	4,2	7,7	7,7	10,4	16,7	0,0	49,3	**13**
2	0.5	38,4	38,4	124,0	124,0	111,0	176,0	225,0	343,0	**147**
2	1.2	17,9	17,9	312,0	312,0	59,0	114,0	128,0	254,0	**152**
2	1.2+X	10,3	10,3	157,0	157,0	31,5	58,0	99,1	167,0	**86**
2	2.0	13,3	13,3	298,0	298,0	47,9	133,0	122,0	277,0	**150**
2	4.0	13,7	13,7	82,6	82,6	30,3	85,8	89,4	219,0	**77**
3	0.5	55,2	55,2	110,0	110,0	145,0	210,0	325,0	432,0	**180**
3	1.2	54,4	54,4	98,9	98,9	131,0	162,0	313,0	385,0	**162**
3	1.2+X	29,5	29,5	101,0	101,0	103,0	129,0	223,0	292,0	**126**
3	2.0	82,7	82,7	157,0	157,0	151,0	167,0	334,0	514,0	**206**
3	4.0	56,1	56,1	134,0	134,0	131,0	162,0	332,0	459,0	**183**
6	0.5	43,9	43,9	253,0	253,0	88,3	142,0	238,0	228,0	**161**
6	1.2	67,6	67,6	449,0	449,0	153,0	210,0	362,0	428,0	**273**
6	1.2+X	32,5	32,5	251,0	251,0	76,8	135,0	230,0	457,0	**183**
6	2.0	99,3	99,3	244,0	244,0	260,0	363,0	401,0	561,0	**284**
6	4.0	80,3	80,3	223,0	223,0	191,0	323,0	441,0	100,0	**208**
12	0.5	38,4	38,4	42,5	42,5	149,0	114,0	230,0	359,0	**127**
12	1.2	54,3	54,3	61,9	61,9	167,0	181,0	394,0	572,0	**193**
12	1.2+X	38,6	38,6	45,4	45,4	119,0	160,0	273,0	381,0	**138**
12	2.0	104,0	104,0	115,0	115,0	270,0	312,0	624,0	846,0	**311**
12	4.0	54,9	54,9	49,8	49,8	189,0	645,0	371,0	616,0	**254**
18	0.5	36,7	36,7	167,0	167,0	74,2	120,0	212,0	387,0	**150**
18	1.2	63,7	63,7	437,0	437,0	127,0	192,0	387,0	565,0	**284**
18	1.2+X	44,3	44,3	293,0	293,0	106,0	156,0	291,0	398,0	**203**
18	2.0	93,6	93,6	333,0	333,0	212,0	306,0	602,0	925,0	**362**
18	4.0	30,8	30,8	70,5	70,5	118,0	171,0	390,0	533,0	**177**
24	0.5	23,3	23,3	78,9	78,9	74,5	140,0	307,0	453,0	**147**
24	1.2	36,9	36,9	358,0	358,0	136,0	193,0	406,0	645,0	**271**
24	1.2+X	26,7	26,7	294,0	294,0	109,0	186,0	324,0	421,0	**210**
24	2.0	53,5	53,5	131,0	131,0	174,0	329,0	492,0	786,0	**269**
24	4.0	9,2	9,2	19,5	19,5	45,1	93,1	185,0	332,0	**89**
36	0.5	15,4	15,4	23,8	23,8	42,4	83,8	20,1	65,5	**36**
36	1.2	56,2	56,2	73,9	73,9	138,0	191,0	387,0	584,0	**195**
36	1.2+X	33,5	33,5	51,3	51,3	85,4	149,0	301,0	487,0	**149**
36	2.0	73,4	73,4	93,6	93,6	171,0	197,0	157,0	508,0	**171**
36	4.0	17,2	17,2	23,3	23,3	51,6	112,0	23,7	120,0	**49**
52	0.5	31,8	31,8	44,7	44,7	70,6	144,0	173,0	219,0	**95**
52	1.2	51,7	51,7	94,5	94,5	131,0	215,0	333,0	560,0	**191**
52	1.2+X	11,8	11,8	23,3	23,3	34,1	66,3	124,0	204,0	**62**
52	2.0	67,6	67,6	124,0	124,0	161,0	281,0	342,0	593,0	**220**
52	4.0	18,3	18,3	37,0	37,0	50,7	107,0	159,0	247,0	**84**

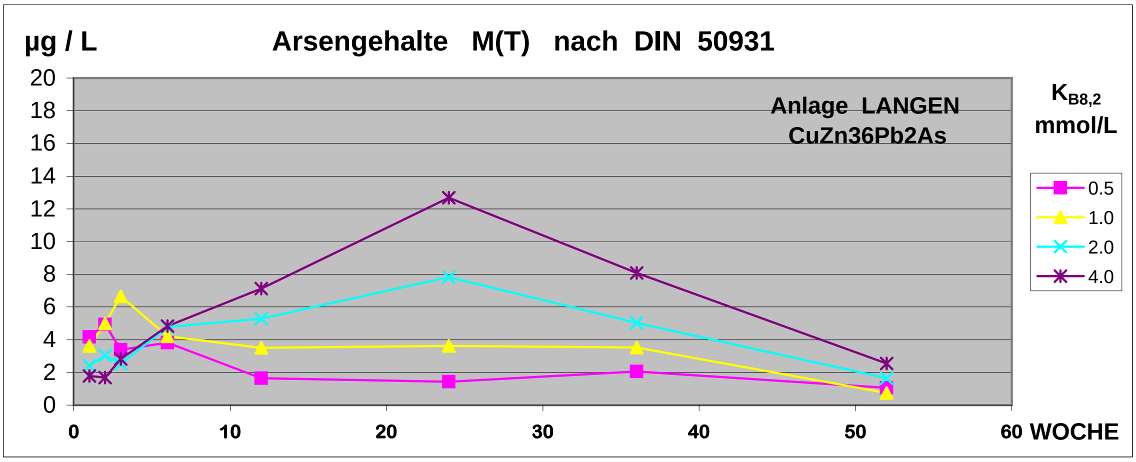
Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

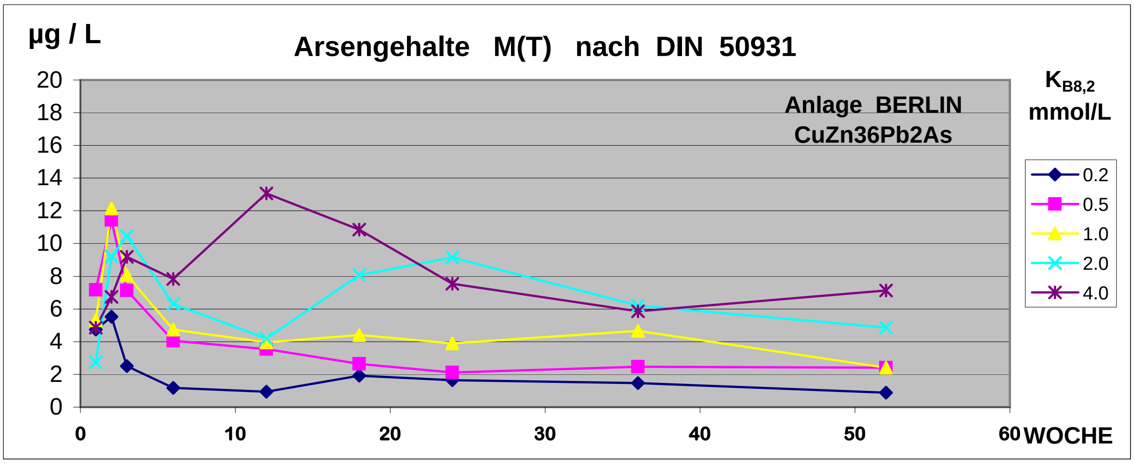
	0,5H	0,5H	1H	1H	2H	4H	8H	16H
MIN	3,5	3,5	5,3	5,3	7,9	15,1	0,0	49,3
MAX	104	104	449	449	270	645	624	925
Mittelwe	40	40	136	136	106	167	257	383
50% Per	37	37	99	99	109	156	273	387
90% Per	78	78	306	306	183	310	404	607
95% Per	91	91	353	353	208	328	482	758
99% Per	102	102	444	444	266	521	614	890

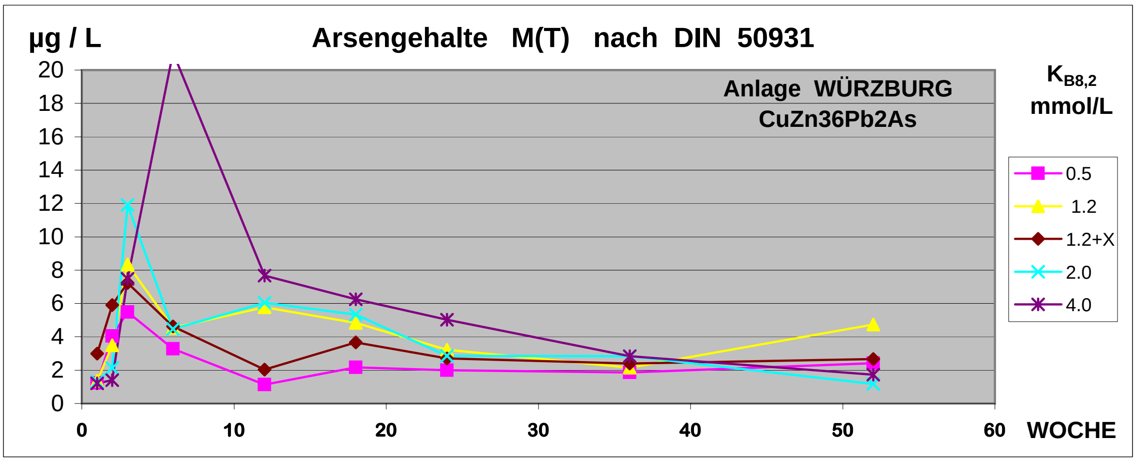
A 6 As

Arsengehalte nach M (T) **Werkstoff : CuZn36Pb2As**









Legierung E ARSENKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0,04	0,1	0,1	0,2	0,2	0,2	0,3	2,3	0,5	**0,5**
1	0.5	0,2	0,2	0,2	0,2	0,5	0,5	1,2	2,1	**0,6**
1	1.0	0,2	0,2	0,3	0,3	0,6	0,9	2,2	2,1	**0,9**
1	2.0	0,3	0,3	0,5	0,5	0,7	1,0	2,1	2,6	**1,0**
1	4.0	0,2	0,2	0,4	0,4	0,7	1,1	1,4	3,0	**0,9**
2	0,04	0,0	0,0	0,1	0,1	0,2	0,3	0,3	0,5	**0,2**
2	0.5	0,2	0,2	0,2	0,2	0,5	0,9	1,8	3,5	**0,9**
2	1.0	0,1	0,1	0,2	0,2	0,5	0,9	0,9	2,5	**0,7**
2	2.0	0,2	0,2	0,2	0,2	0,7	0,9	1,2	2,8	**0,8**
2	4.0	0,2	0,2	0,5	0,5	0,7	1,0	1,4	2,9	**0,9**
3	0,04	0,1	0,1	0,1	0,1	0,2	0,3	0,4	0,6	**0,2**
3	0.5	0,2	0,2	0,3	0,3	0,4	0,8	1,5	2,6	**0,8**
3	1.0	0,2	0,2	0,3	0,3	0,6	1,0	1,0	2,6	**0,8**
3	2.0	0,3	0,3	0,5	0,5	0,8	1,3	1,5	3,0	**1,0**
3	4.0	0,4	0,4	1,0	1,0	1,0	1,7	2,2	3,4	**1,4**
6	0,04	0,1	0,1	0,1	0,1	0,2	0,2	0,4	0,5	**0,2**
6	0.5	0,2	0,2	0,3	0,3	0,4	0,7	1,6	2,4	**0,8**
6	1.0	0,3	0,3	0,5	0,5	0,5	0,9	1,0	1,9	**0,7**
6	2.0	0,2	0,2	0,4	0,4	0,5	0,9	0,8	2,1	**0,7**
6	4.0	0,4	0,4	1,1	1,1	0,9	1,6	2,5	3,0	**1,4**
12	0,04	0,1	0,1	0,1	0,1	0,2	0,2	0,3	0,3	**0,2**
12	0.5	0,1	0,1	0,2	0,2	0,3	0,5	1,0	1,4	**0,5**
12	1.0	0,2	0,2	0,3	0,3	0,4	0,6	0,8	1,7	**0,6**
12	2.0	0,2	0,2	0,3	0,3	0,4	0,8	1,2	1,9	**0,7**
12	4.0	0,4	0,4	0,7	0,7	1,1	1,9	2,9	3,3	**1,4**
18	0,04	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	**0,1**
18	0.5	0,1	0,1	0,2	0,2	0,3	0,5	0,8	1,2	**0,4**
18	1.0	0,2	0,2	0,3	0,3	0,4	0,0	1,0	1,7	**0,5**
18	2.0	0,3	0,3	0,6	0,6	0,6	1,4	1,3	2,3	**0,9**
18	4.0	0,6	0,6	1,2	1,2	1,4	3,0	3,0	6,0	**2,1**
24	0,04	0,1	0,1	0,1	0,1	0,1	0,0	0,0	0,0	**0,1**
24	0.5	0,3	0,3	0,2	0,2	0,3	0,1	0,3	0,6	**0,3**
24	1.0	0,8	0,8	0,3	0,3	0,5	0,5	1,0	1,7	**0,7**
24	2.0	0,4	0,4	0,4	0,4	0,4	0,7	1,1	1,8	**0,7**
24	4.0	0,9	0,9	0,9	0,9	1,3	1,8	3,0	3,8	**1,7**
36	0,04	0,1	0,1	0,1	0,1	0,3	0,1	0,2	0,2	**0,2**
36	0.5	0,2	0,2	0,1	0,1	0,1	0,2	0,3	0,4	**0,2**
36	1.0	0,3	0,3	0,3	0,3	0,5	0,7	1,1	2,4	**0,7**
36	2.0	0,3	0,3	0,5	0,5	0,8	1,2	1,9	2,6	**1,0**
36	4.0	0,6	0,6	1,0	1,0	1,7	2,6	3,9	4,9	**2,0**
52	0,04	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	**0,1**
52	0.5	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,5	**0,2**
52	1.0	0,1	0,1	0,3	0,3	0,3	0,5	0,8	2,4	**0,6**
52	2.0	0,2	0,2	0,4	0,4	0,6	1,1	1,6	2,7	**0,9**
52	4.0	0,4	0,4	0,8	0,8	1,3	2,2	4,4	5,7	**2,0**
	MIN	0,0	0,0	0,1	0,1	0,1	0,0	0,0	0,0	
	MAX	0,9	0,9	1,2	1,2	1,7	3,0	4,4	6,0	
	Mittelwer	0,3	0,3	0,4	0,4	0,5	0,8	1,3	2,1	
	50% Perc	0,2	0,2	0,3	0,3	0,5	0,8	1,1	2,1	
	90% Perc	0,4	0,4	0,9	0,9	1,1	1,8	2,7	3,5	
	95% Perc	0,6	0,6	1,0	1,0	1,3	2,1	3,0	4,7	
THALFANG	**99% Perc**	0,9	0,9	1,2	1,2	1,6	2,8	4,2	5,9	THALFANG

Legierung E ARSENKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	0,5H	0,5H	1H	1H	2H	4H	8H	16H	M(T)
1	0.5	1,2	1,2	1,4	1,4	2,5	4,7	9,7	11,3	**4,2**
1	1.0	0,7	0,7	1,1	1,1	1,9	4,3	7,3	11,8	**3,6**
1	2.0	0,4	0,4	0,7	0,7	1,2	2,9	4,8	8,2	**2,4**
1	4.0	0,3	0,3	0,3	0,3	0,9	1,9	3,7	6,6	**1,8**
2	0.5	1,0	1,0	1,7	1,7	3,0	5,6	9,8	15,7	**4,9**
2	1.0	1,1	1,1	1,5	1,5	3,1	5,7	10,8	15,2	**5,0**
2	2.0	0,5	0,5	0,9	0,9	1,6	3,2	5,5	11,1	**3,0**
2	4.0	0,3	0,3	0,6	0,6	1,0	1,6	3,2	5,8	**1,7**
3	0.5	0,1	0,1	0,0	0,0	2,3	3,7	6,2	14,7	**3,4**
3	1.0	0,5	0,5	1,6	1,6	3,3	7,1	12,2	26,5	**6,7**
3	2.0	0,0	0,0	0,4	0,4	1,6	3,1	4,9	9,8	**2,5**
3	4.0	0,0	0,0	0,7	0,7	1,7	2,6	6,2	10,7	**2,8**
6	0.5	0,6	0,6	1,8	1,8	2,5	4,8	7,8	10,6	**3,8**
6	1.0	0,5	0,5	1,4	1,4	2,2	4,9	7,9	14,9	**4,2**
6	2.0	0,7	0,7	1,7	1,7	2,7	5,2	9,1	16,4	**4,8**
6	4.0	0,7	0,7	1,8	1,8	2,5	5,1	8,7	17,4	**4,8**
12	0.5	0,6	0,6	0,8	0,8	1,2	1,4	3,0	4,8	**1,7**
12	1.0	0,6	0,6	1,4	1,4	2,7	3,5	6,5	11,4	**3,5**
12	2.0	1,2	1,2	2,1	2,1	3,8	5,4	7,7	18,7	**5,3**
12	4.0	1,2	1,2	2,6	2,6	5,0	8,2	14,3	21,9	**7,1**
18	0.5									
18	1.0									
18	2.0									
18	4.0									
24	0.5	0,6	0,6	0,9	0,9	0,0	1,9	2,7	3,9	**1,4**
24	1.0	1,1	1,1	1,8	1,8	3,4	4,0	6,6	9,1	**3,6**
24	2.0	1,2	1,2	6,6	6,6	4,4	9,6	12,5	20,6	**7,8**
24	4.0	1,4	1,4	7,5	7,5	5,4	10,3	12,6	55,4	**12,7**
36	0.5	0,8	0,8	1,3	1,3	1,0	2,8	3,5	5,0	**2,1**
36	1.0	1,2	1,2	2,2	2,2	3,3	5,7	7,0	5,4	**3,5**
36	2.0	1,2	1,2	2,2	2,2	3,9	7,1	10,1	12,4	**5,0**
36	4.0	1,5	1,5	3,3	3,3	5,8	10,6	15,7	22,9	**8,1**
52	0.5	0,7	0,7	0,8	0,8	1,1	1,5	1,5	1,4	**1,1**
52	1.0	0,5	0,5	0,6	0,6	0,8		1,2	1,0	**0,7**
52	2.0	0,9	0,9	1,1	1,1	1,8	2,2	2,7	2,4	**1,6**
52	4.0	1,2	1,2	1,5	1,5	2,3	4,0	3,6	5,1	**2,6**
	MIN	0,0	0,0	0,0	0,0	0,0	1,4	1,2	1,0	
	MAX	1,5	1,5	7,5	7,5	5,8	10,6	15,7	55,4	
	Mittelwer	0,8	0,8	1,7	1,7	2,5	4,7	7,2	12,8	
	50% Perc	0,7	0,7	1,4	1,4	2,4	4,3	6,8	11,2	
	90% Perc	1,2	1,2	2,6	2,6	4,4	8,2	12,5	21,8	
	95% Perc	1,3	1,3	4,8	4,8	5,2	10,0	13,4	24,5	
	99% Perc	1,5	1,5	7,2	7,2	5,7	10,5	15,3	46,4	

Legierung E **ARSENKONZENTRATION NACH STAGNATION (µg / L)**

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.2	1,1	1,1	2,1	2,1	4,0	7,3	13,2	7,1	**4,8**
1	0.5	1,3	1,3	2,4	2,4	6,0	12,0	19,4	12,5	**7,2**
1	1.0	1,0	1,0	1,8	1,8	3,7	8,9	13,0	11,2	**5,3**
1	2.0	1,2	1,2	2,0	2,0	2,1	6,7	4,3	2,4	**2,7**
1	4.0	1,3	1,3	2,0	2,0	3,6	7,3	12,8	8,6	**4,9**
2	0.2	1,3	1,3	2,3	2,3	2,8	6,2	9,1	18,9	**5,5**
2	0.5	2,6	2,6	4,8	4,8	7,5	13,3	21,3	34,6	**11,4**
2	1.0	2,7	2,7	5,2	5,2	6,4	14,0	22,7	38,3	**12,2**
2	2.0	1,7	1,7	3,5	3,5	7,3	11,0	24,5	20,4	**9,2**
2	4.0	1,9	1,9	4,0	4,0	3,7	10,9	11,0	16,5	**6,7**
3	0.2	1,3	1,3	1,3	1,3	1,9	2,4	4,9	5,7	**2,5**
3	0.5	3,0	3,0	3,4	3,4	4,6	8,5	15,5	15,7	**7,1**
3	1.0	2,7	2,7	3,2	3,2	4,8	9,1	15,7	23,2	**8,1**
3	2.0	3,2	3,2	3,8	3,8	7,0	13,8	21,4	27,5	**10,5**
3	4.0	2,3	2,3	2,9	2,9	5,1	9,8	19,6	28,6	**9,2**
6	0.2	0,7	0,7	0,8	0,8	1,1	1,2	1,9	2,2	**1,2**
6	0.5	1,6	1,6	2,1	2,1	3,2	4,4	6,7	10,8	**4,1**
6	1.0	1,8	1,8	2,4	2,4	3,6	5,1	8,1	12,8	**4,8**
6	2.0	1,8	1,8	2,6	2,6	4,4	6,0	12,8	18,4	**6,3**
6	4.0	2,0	2,0	2,8	2,8	5,2	5,7	16,5	25,7	**7,8**
12	0.2	0,6	0,6	0,7	0,7	0,8	1,0	1,5	1,7	**1,0**
12	0.5	1,3	1,3	1,7	1,7	2,5	4,4	6,5	8,9	**3,5**
12	1.0	1,3	1,3	1,8	1,8	2,7	5,0	6,8	11,0	**4,0**
12	2.0	1,2	1,2	1,4	1,4	2,5	4,4	7,7	13,8	**4,2**
12	4.0	3,8	3,8	5,3	5,3	9,2	14,9	26,4	35,9	**13,1**
18	0.2	0,9	0,9	1,0	1,0	1,5	2,6	3,2	4,2	**1,9**
18	0.5	1,2	1,2	1,3	1,3	2,1	3,7	4,5	5,9	**2,7**
18	1.0	1,7	1,7	1,8	1,8	3,1	5,4	8,1	11,6	**4,4**
18	2.0	2,1	2,1	2,7	2,7	5,6	10,3	15,3	23,8	**8,1**
18	4.0	3,4	3,4	4,2	4,2	6,9	14,8	19,6	30,3	**10,9**
24	0.2	0,7	0,7	1,1	1,1	1,5	2,3	2,6	3,2	**1,7**
24	0.5	0,8	0,8	1,2	1,2	1,8	3,0	3,4	4,8	**2,1**
24	1.0	1,2	1,2	2,4	2,4	3,1	5,5	6,9	8,5	**3,9**
24	2.0	2,3	2,3	4,1	4,1	7,4	12,8	17,1	23,1	**9,2**
24	4.0	1,7	1,7	3,0	3,0	5,5	10,1	14,2	21,2	**7,6**
36	0.2	0,7	0,7	1,0	1,0	1,7	2,2	1,9	2,5	**1,5**
36	0.5	1,3	1,3	1,4	1,4	2,8	3,7	3,4	4,5	**2,5**
36	1.0	2,0	2,0	2,9	2,9	5,3	6,7	7,3	8,2	**4,7**
36	2.0	3,0	3,0	3,6	3,6	6,6	8,2	9,2	12,4	**6,2**
36	4.0	2,2	2,2	2,6	2,6	6,0	7,7	9,5	14,1	**5,9**
52	0.2	0,5	0,5	0,6	0,6	0,8	1,1	1,3	1,6	**0,9**
52	0.5	1,4	1,4	2,0	2,0	2,0	2,9	3,4	4,1	**2,4**
52	1.0	1,2	1,2	2,0	2,0	2,0	3,1	3,4	4,4	**2,4**
52	2.0	2,0	2,0	3,2	3,2	4,2	6,8	8,2	9,2	**4,9**
52	4.0	2,1	2,1	3,7	3,7	5,4	9,2	11,1	19,8	**7,1**
	MIN	0,5	0,5	0,6	0,6	0,8	1,0	1,3	1,6	
	MAX	3,8	3,8	5,3	5,3	9,2	14,9	26,4	38,3	
	Mittelwer	1,7	1,7	2,5	2,5	4,0	7,0	10,6	14,0	
	50% Perc	1,6	1,6	2,4	2,4	3,7	6,7	9,1	11,6	
	90% Perc	2,9	2,9	4,1	4,1	7,0	13,1	20,6	28,2	
	95% Perc	3,2	3,2	4,7	4,7	7,4	14,0	22,4	33,7	
BERLIN	**99% Perc**	3,6	3,6	5,3	5,3	8,5	14,9	25,6	37,2	BERLIN

A 6 As

Legierung E   ARSENKONZENTRATION NACH STAGNATION (µg / L)

ZEIT(Woche)	$K_{B8,2}$	**0,5H**	**0,5H**	**1H**	**1H**	**2H**	**4H**	**8H**	**16H**	**M(T)**
1	0.5	0,5	0,5	0,6	0,6	0,8	1,2	2,1	3,5	**1,2**
1	1.2	0,4	0,4	0,6	0,6	1,0	1,3	2,7	3,9	**1,4**
1	1.2+X	0,6	0,6	1,1	1,1	1,8	2,9	6,0	9,8	**3,0**
1	2.0	0,5	0,5	0,6	0,6	0,8	1,2	2,2	4,1	**1,3**
1	4.0	0,5	0,5	0,6	0,6	0,8	1,2	1,9	3,6	**1,2**
2	0.5	0,8	0,8	6,1	6,1	2,1	3,7	4,5	8,3	**4,1**
2	1.2	0,6	0,6	6,4	6,4	1,4	3,1	2,9	6,5	**3,5**
2	1.2+X	1,1	1,1	7,7	7,7	2,8	4,4	9,2	13,2	**5,9**
2	2.0	0,5	0,5	3,1	3,1	1,0	1,9	2,4	4,5	**2,1**
2	4.0	0,5	0,5	1,5	1,5	0,8	1,3	2,0	3,1	**1,4**
3	0.5	1,6	1,6	2,7	2,7	4,2	6,0	10,6	14,5	**5,5**
3	1.2	1,8	1,8	3,6	3,6	5,1	8,2	15,8	26,9	**8,4**
3	1.2+X	1,7	1,7	3,3	3,3	4,2	8,3	12,5	22,8	**7,2**
3	2.0	2,4	2,4	4,5	4,5	7,0	12,0	21,9	40,5	**11,9**
3	4.0	1,6	1,6	4,1	4,1	4,0	9,2	9,7	25,6	**7,5**
6	0.5	1,1	1,1	4,7	4,7	2,1	3,2	5,3	4,1	**3,3**
6	1.2	1,2	1,2	5,8	5,8	2,2	4,7	6,1	9,3	**4,5**
6	1.2+X	1,0	1,0	5,7	5,7	1,8	5,0	5,2	11,5	**4,6**
6	2.0	1,3	1,3	3,3	3,3	2,8	4,6	8,6	10,5	**4,5**
6	4.0	9,5	9,5	13,2	13,2	18,3	33,1	52,6	19,0	**21,1**
12	0.5	0,0	0,0	0,0	0,0	0,0	1,4	2,8	4,9	**1,1**
12	1.2	1,8	1,8	1,9	1,9	4,6	6,9	10,4	16,9	**5,8**
12	1.2+X	0,6	0,6	0,0	0,0	1,1	2,8	2,8	8,3	**2,0**
12	2.0	0,0	0,0	0,5	0,5	3,8	7,1	15,6	20,8	**6,0**
12	4.0	2,2	2,2	2,4	2,4	3,9	6,7	18,9	22,6	**7,7**
18	0.5	0,9	0,9	2,5	2,5	1,5	1,9	2,7	4,5	**2,2**
18	1.2	1,1	1,1	5,0	5,0	2,4	4,2	7,4	12,4	**4,8**
18	1.2+X	0,7	0,7	3,6	3,6	1,4	2,2	3,7	13,4	**3,7**
18	2.0	1,4	1,4	4,8	4,8	2,8	5,1	8,3	14,1	**5,3**
18	4.0	1,2	1,2	2,1	2,1	3,7	6,8	11,5	21,4	**6,3**
24	0.5	0,7	0,7	2,6	2,6	1,2	2,0	2,7	3,5	**2,0**
24	1.2	0,8	0,8	3,5	3,5	1,7	3,1	4,8	7,5	**3,2**
24	1.2+X	0,7	0,7	3,4	3,4	1,3	2,2	3,7	6,2	**2,7**
24	2.0	0,9	0,9	2,4	2,4	1,7	3,0	4,8	6,8	**2,9**
24	4.0	0,8	0,8	1,4	1,4	2,8	5,3	11,2	16,5	**5,0**
36	0.5	1,3	1,3	1,8	1,8	1,2	2,0	1,3	4,2	**1,9**
36	1.2	1,4	1,4	1,8	1,8	1,5	2,2	3,1	4,0	**2,2**
36	1.2+X	1,4	1,4	1,4	1,4	1,2	2,0	4,0	6,3	**2,4**
36	2.0	1,4	1,4	1,6	1,6	1,5	2,1	3,2	4,4	**2,2**
36	4.0	1,8	1,8	1,7	1,7	2,1	3,5	4,8	5,3	**2,8**
52	0.5	0,9	0,9	1,6	1,6	2,8	2,5	4,1	4,9	**2,4**
52	1.2	1,8	1,8	3,3	3,3	3,4	5,8	7,5	11,0	**4,7**
52	1.2+X	0,7	0,7	1,2	1,2	1,7	2,8	5,1	7,9	**2,7**
52	2.0	0,5	0,5	0,7	0,7	0,8	1,3	1,9	3,0	**1,2**
52	4.0	0,6	0,6	1,0	1,0	1,2	1,7	3,1	4,6	**1,7**

Bei 1h Stagnation in der 2., 6., 18. u. 24. Woche Fehler bei Probenahme !

	MIN	0,0	0,0	0,0	0,0	0,0	1,2	1,3	3,0
	MAX	9,5	9,5	13,2	13,2	18,3	33,1	52,6	40,5
	Mittelwer	1,2	1,2	2,9	2,9	2,6	4,5	7,4	10,7
	50% Perc	0,9	0,9	2,4	2,4	1,8	3,1	4,8	7,9
	90% Perc	1,8	1,8	5,8	5,8	4,2	7,8	14,4	22,1
	95% Perc	2,1	2,1	6,3	6,3	5,0	9,0	18,3	25,0
WÜRZBURG	**99% Perc**	6,4	6,4	10,8	10,8	13,3	23,8	39,1	34,5