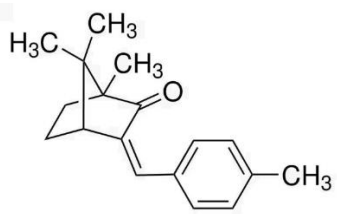
FACTSHEET **3-(4-methylbenzylidene) camphor**	**Update[1] of the derivation of HBM values** 		
Substance	**3-(4-methylbenzylidene)camphor (4-MBC)**		
Year of value derivation	**2016**		
Update	**2026**		
Underlying publication	**Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz 59** https://doi.org/10.1007/s00103-015-2272-9 [1]		
Parameters	**Value / Descriptor**	**Dimension**	**Comment**
HBM values			
HBM-I value (men/children)	3-4CBC: 0.060 3-4CBHC: 0.25 ∑3-4CBC, 3-4CBHC: 0.31	mg/L	Matrix: urine Biomarkers: 3-4CBC, 3-4CBHC
HBM-I value (women)	3-4CBC: 0.051 3-4CBHC: 0.22 ∑3-4CBC, 3-4CBHC: 0.27	mg/L	
HBM-II value	Not derived		
General informationen			
CAS number	36861-47-9 38102-62-4		
IUPAC name	(±)-1,7,7-trimethyl-3-(4-methylbenzylidene) bicyclo[2.2.1]heptan-2-one		
Molar mass 4-MBC	254.4	g/mol	
HBM biomarker of exposure	3-4CBC, 3-4CBHC		Specific metabolites, 3-4CBC: 3-(4-carboxybenzylidene)-camphor; 3-4CBHC: 3-(4-Carboxybenzylidene)-6-hydroxycamphor
Molar mass of metabolites	3-4CBC: 284.4 3-4CBHC: 300.4	g/mol	
Data base toxicology			
Key study/Author(s) (Year)	Durrer et al. (2007) [2]		
Species	Rat		
Method of application/Type of study	Oral (feed)		
Duration of exposure	≈ 120	d	1-generation study
Critical endpoint/Effect	♂ (F1): relative thyroid weight ↑, delayed puberty, prostate weight ↓, prostate volume ↑ ♀ (F1): mating behaviour ↓		Effects at LOAEL
POD (systemic)	0.42	mg/kg bw/d	Based on a NOAEL of 0.7 and 60 % absorption [3,4]
Assessment factors and external dose for deriving HBM values			
Time extrapolation	2		Subchronic to chronic
Interspecies factor	1		Allometric
	2.5		Dynamic
Intraspecies factor	10		General population, kinetic + dynamic
Total assessment factor (TAF)	50		

[1] The HBM values were updated on the basis of updated daily urine volumes normalised for body weight, and by systematically rounding the calculated values.

Parameters for calculating HBM values using the mass balance approach			
POD/TAF (rounded) = Tolerable daily systemic dose	0.01	mg/kg bw/d	0.42 / 50 = 0.0084 [1]
Mass/quantity in urine corresponding to the tolerable daily systemic dose	4-MBC: 0.008 / 0.000031	mg/kg bw/d corresponding to mmol/kg KG/d	80%
	3-4 CBC: 0.00179	mg/kg bw/d	Of the 80%: 20% (converted from mole to mass)
	3-4CBHC: 0.00756	mg/kg bw/d	Of the 80%: 80% (converted from mole to mass)
Urine volume per kg bw per day	Men/Children: 0,030 Women: 0,035	L/ (kg bw · d)	Default values [5]
Calculation of HBM values in accordance with the mass balance approach [6]			
Calculation for 3-4CBC			
HBM-I value (men/children))	Calculated: 0.0597 Rounded: 0.060	mg/L	HBM-I: 0.00179 / 0.030
HBM-I value (women)	Calculated: 0.0511 Rounded: 0.051	mg/L	HBM-I: 0.00179 / 0.035
Calculation for 3-4CBHC			
HBM-I value (men/children)	Calculated: 0.252 Rounded: 0.25	mg/L	HBM-I: 0.00756 / 0.030
HBM-I value (women)	Calculated: 0.216 Rounded: 0.22	mg/L	HBM-I: 0.00756/0.035
∑ **3-4CBC + 3-4CBC**			
Depending on the practicality of the analytical method, a decision should be made as to whether the HBM-I value should be used for the individual metabolites or for the total of the metabolites.			
HBM-I value (men/children)	0.31	mg/L	
HBM-I value (women)	0.27	mg/L	

Reasoning

The substance 3-(4-methylbenzylidene) camphor (4-MBC) is used as a UV filter in cosmetic products, primarily in sun creams.

The starting point for deriving the HBM-I values was the tolerable daily systemic dose of 0.01 mg 4-MBC per kg of body weight per day, from which the tolerable urinary concentration was calculated. In humans, approximately 80 per cent of the systemically available fraction is excreted in the urine, of which 80 per cent is accounted for by the major metabolite 3-(4-carboxybenzylidene)-6-hydroxycamphor (3-4CBHC) and 20 per cent by 3-(4-carboxybenzylidene)-camphor (3-4CBC).

References

1. Kommission Human-Biomonitoring des Umweltbundesamtes (2016) Stoffmonographie für 3-(4-Methylbenzyliden)-kampfer (4-MBC) – HBM-Werte für die Summe der Metaboliten 3-(4-Carboxybenzyliden)-kampfer (3-4CBC) und 3-(4-Carboxybenzyliden)-6-Hydroxykampfer (3-4CBHC) im Urin von Erwachsenen und Kindern. Bundesgesundheitsbl. 59: 132–150. https://doi.org/10.1007/s00103-015-2272-9

2. Durrer S, Ehnes C, Fuetsch M, Maerkel K, Schlumpf M, Lichtensteiger W (2007) Estrogen sensitivity of target genes and expression of nuclear receptor co-regulators in rat prostate after pre- and postnatal exposure to the ultraviolet filter 4-methylbenzylidene camphor. Environ Health Perspect 115 (Suppl 1): 42–50. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2174398/pdf/ehp0115s1-000042.pdf

3. Völkel W, Colnot T, Schauer UM, Broschard TH, Dekant W (2006) Toxicokinetics and biotransformation of 3-(4-methylbenzylidene)camphor in rats after oral administration. Toxicol Appl Pharmacol 216(2): 331–338. http://www.sciencedirect.com/science/article/pii/S0041008X0600189X

4. Schauer UM, Völkel W, Heusener A, Colnot T, Broschard TH, von Landenberg F, Dekant W (2006) Kinetics of 3-(4-methylbenzylidene)camphor in rats and humans after dermal application. Toxicol Appl Pharmacol 216(2): 339–346. http://www.sciencedirect.com/science/article/pii/S0041008X06001906

5. Kommission Human-Biomonitoring des Umweltbundesamtes (2025) Änderung des Leitwertes für die körpergewichtsnormierte tägliche Urinausscheidung von Erwachsenen. *Bundesgesundheitsbl* 68: 830–837. https://doi.org/10.1007/s00103-025-04062-0

6. Kommission Human-Biomonitoring des Umweltbundesamtes (2014) Grundsatzpapier zur Ableitung von HBM-Werten. Stellungnahme der Kommission Human-Biomonitoring des Umweltbundesamtes. Bundesgesundheitsbl Gesundheitsforsch Gesundheitsschutz 57(1):138-147 http://link.springer.com/article/10.1007/s00103-013-1867-2