

The MAK Collection for Occupational Health and Safety

Decahydronaphthalene

MAK Value Documentation, addendum – Translation of the German version from 2018

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Keywords: decahydronaphthalene; MAK value; maximum workplace concentration; peak limitation; nephrotoxicity

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Decahydronaphthalene¹⁾/ 1,2,3,4,4a,5,6,7,8,8a-Deca- hydronaphthalene

MAK Value Documentation

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Abstract

The German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area has re-evaluated the maximum concentration at the workplace (MAK value) for decahydronaphthalene [91-17-8].

Critical effect is kidney toxicity which is observed as increased activity of urinary lactate dehydrogenase (LDH) in a 14-week inhalation study with rats beginning at the lowest concentration of 25 ml/m³ with a lower confidence limit of the benchmark dose (BMDL) of 12 ml/m³. A MAK value of 5 ml/m³ has been set. This value is now reaffirmed even considering the increased respiratory volume at the workplace (see List of MAK and BAT Values, Sections I b and I c).

As there is no new data, Peak Limitation Category II with excursion factor of 2 is retained and decahydronaphthalene remains assigned to Pregnancy Risk Group D.

Keywords

decahydronaphthalene; bicyclo[4.4.0]decane; naphthalene; naphthane; perhydronaphthalene; absorption through the skin; occupational exposure; maximum workplace concentration; MAK value; toxicity; hazardous substance

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1) The substance can occur simultaneously as vapour and aerosol.

Decahydronaphthalene¹⁾

[493-01-6] (*cis*-decalin)
 [493-02-7] (*trans*-decalin)
 [91-17-8] (isomer mixture)

Supplement 2018

MAK value (2014)	5 ml/m³ \triangleq 29 mg/m³
Peak limitation (2014)	Category II, excursion factor 2
Absorption through the skin	–
Sensitization	–
Carcinogenicity	–
Prenatal toxicity (2014)	Pregnancy Risk Group D
Germ cell mutagenicity	–
BAT value	–
Vapour pressure at 25 °C	1.04 hPa (<i>cis</i> -decalin) (SRC 2014 a) 1.63 hPa (<i>trans</i> -decalin) (SRC 2014 b) 3.07 hPa (isomer mixture) (SRC 2014 c)
log K _{ow} ²⁾	4.2 (calculated) (SRC 2014 a, b, c)
1 ml/m³ (ppm) \triangleq 5.737 mg/m³	1 mg/m³ \triangleq 0.174 ml/m³ (ppm)

A documentation for decahydronaphthalene was published in 2015 (documentation “Decahydronaphthalene” 2015).

In 2016, the Commission began using a revised approach for assessing substances with a MAK value based on systemic effects and derived from inhalation studies in animals or studies with volunteers at rest; this new approach takes into account that the respiratory volume at the workplace is higher than under experimental conditions. However, this does not apply to gases or vapour with a blood:air partition coefficient of < 5 (see List of MAK and BAT Values, Sections I b and I c). A blood:air partition coefficient of 256.6 (NTP 2005) or 28 (Buist et al. 2012) was determined for decahydronaphthalene using two algorithms. This supplement assesses whether

1) The substance can occur simultaneously as vapour and aerosol.

2) octanol/water partition coefficient.

the MAK value for decahydronaphthalene needs to be changed as a result of the higher respiratory volume at the workplace.

Manifesto (MAK value/classification)

Nephrotoxicity is the critical effect of decahydronaphthalene.

MAK value. The MAK value of 5 ml/m³ was derived in 2014 based on the increased LDH activity in the urine of female rats observed in a 14-week inhalation study (NTP 2005). New data have not been published. A benchmark calculation of the increased LDH activity based on an increase by one standard deviation of the control value yielded a benchmark dose (BMD) of 28 ml/m³ with a lower confidence limit (BMDL) of 12 ml/m³. As LDH activity is a very sensitive parameter and no histopathological changes were detected in the kidneys of female rats in either the 14-week study or the 2-year study with exposure concentrations of up to 400 ml/m³, the increased respiratory volume at the workplace does not need to be taken into consideration in this case. For this reason, the MAK value of 5 ml/m³ has been retained.

Peak limitation. As no new data have become available, classification in Peak Limitation Category II with an excursion factor of 2 has been retained.

Prenatal toxicity. As no new data have become available, decahydronaphthalene remains classified in Pregnancy Risk Group D.

Absorption through the skin. There are no studies available for absorption through the skin in animals or humans. The dermal LD₅₀ is above 5000 mg/kg body weight (documentation "Decahydronaphthalene" 2015). Model calculations under standard conditions yielded amounts absorbed of 49.9, 0.703 and 0.234 mg (documentation "Decahydronaphthalene" 2015). The MAK value is derived from a systemic effect and is 29 mg/m³. Assuming 100% absorption by inhalation, 8-hour exposure and a respiratory volume of 10 m³, the amount absorbed is expected to be 290 mg. Therefore, the amount absorbed through the skin is less than 25% of the systemic NOAEL (no observed adverse effect level), even assuming worst case conditions. In addition, decahydronaphthalene has a relatively high vapour pressure, which further minimizes the extent to which the substance is absorbed through the skin. Prolonged, unnoticed contact with highly concentrated solutions of decahydronaphthalene is unlikely because the substance causes severe irritation of the skin. For this reason, decahydronaphthalene has not been designated with an "H" (for substances which can be absorbed through the skin in toxicologically relevant amounts).

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