

The MAK Collection for Occupational Health and Safety

2,3,3,3-Tetrafluoropropene

MAK Value Documentation, addendum – Translation of the German version from 2019

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2,3,3,3-Tetrafluoropropene / 2,3,3,3-Tetrafluoroprop-1-ene

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) of 2,3,3,3-tetrafluoropropene [754-12-1]. As the blood:air partition coefficient of 2,3,3,3-tetrafluoropropene is < 5, the increased respiratory volume at the workplace (see List of MAK and BAT Values, Sections I b and I c) does not have to be taken into account for the derivation of the MAK value. Moreover, the extrapolation of 6-hour exposure in the animal experiment to 8-hour exposure at the workplace does not need to be applied because the effect is much more dependent on the concentration than on time. The MAK value for 2,3,3,3-tetrafluoropropene of 200 ml/m³ can therefore be retained.

Keywords

2,3,3,3-tetrafluoropropene; blood:air distribution coefficient; occupational exposure; maximum workplace concentration; MAK value; toxicity; hazardous substance

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2,3,3,3-Tetrafluoropropene

[754-12-1]

Supplement 2019

MAK value (2014)	200 ml/m³ (ppm) \triangleq 950 mg/m³
Peak limitation (2014)	Category II, excursion factor 2

Absorption through the skin	–
Sensitization	–
Carcinogenicity	–
Prenatal toxicity (2014)	Pregnancy Risk Group C
Germ cell mutagenicity	–
BAT value	–

1 ml/m³ (ppm) \triangleq 4.73 mg/m³	1 mg/m³ \triangleq 0.21 ml/m³ (ppm)
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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. This does not, however, apply to gases or vapours with a blood:air partition coefficient < 5 (see List of MAK and BAT Values, Sections I b and I c). The blood:air partition coefficient of 2,3,3,3-tetrafluoropropene calculated using the formula of Buist et al. (2012) is 0.21. The increased respiratory volume therefore does not have to be taken into account for the derivation of the MAK value for 2,3,3,3-tetrafluoropropene. In addition, extrapolation of the 6-hour exposure in the animal experiment to 8-hour exposure at the workplace must be considered. The MAK value was derived from a 28-day inhalation study in rabbits on the basis of effects on the heart and increased creatine kinase activity. As was already described in the documentation from 2015 (documentation “2,3,3,3-Tetrafluoropropene” 2015), the concentration in the range of the NOAEC (no observed adverse effect concentration) probably has a greater influence than the exposure duration; extrapolation of the 6-hour exposure in the animal experiment to 8-hour exposure at the workplace is thus not necessary for 2,3,3,3-tetrafluoropropene. The MAK value of 200 ml/m³ for 2,3,3,3-tetrafluoropropene can therefore be retained.

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References

Buist HE, de Wit-Bos L, Bouwman T, Vaes WHJ (2012) Predicting blood:air partition coefficients using basic physicochemical properties. *Regul Toxicol Pharmacol* 62: 23–28

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