

The MAK Collection for Occupational Health and Safety

Dimethylformamide

MAK Value Documentation, addendum – Translation of the German version from 2017

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Dimethylformamide / N,N-dimethylformamide

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 evaluated the possibility to add the indication “prerequisite for Pregnancy Risk Group C” to the classification of Pregnancy Risk Group B for dimethylformamide [68-12-2] at the maximum concentration at the workplace (MAK value) of 5 ml/m³. The NOAECs for developmental toxicity are 32 ml/m³ in rats and 50 ml/m³ in rabbits. Only a LOAEL is available for mice. From this LOAEL of 182 mg/kg body weight/day, which after toxicokinetic scaling corresponds to a concentration of 67 ml/m³ at the workplace, the Commission estimated a NAEC of 22 ml/m³.

After whole body exposure of volunteers to dimethylformamide, the same amount was found to be taken up from the gas phase via the lung as via the skin. Therefore, damage to the embryo or foetus is unlikely at the concentration of 1 ml/m³ and less. An exposure to this concentration would be the prerequisite for an assignment to Pregnancy Risk Group C.

Keywords

dimethylformamide; N,N-dimethylmethanamide; DMF; DMFA; N-formyldimethylamine; formic acid dimethylamide; N,N-dimethylformamide; reproductive toxicity; occupational exposure; maximum workplace concentration; MAK value; toxicity; hazardous substance

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Dimethylformamide

[68-12-2]

Supplement 2017

MAK value (2005)	5 ml/m³ (ppm) $\triangleq$ 15 mg/m³
Peak limitation (2011)	Category II, excursion factor 2
Absorption through the skin (1969)	H
Sensitization	–
Carcinogenicity (2015)	Category 4
Prenatal toxicity (2016)	Pregnancy Risk Group B*
Germ cell mutagenicity	–
BAT value (2006)	35 mg <i>N</i>-methylformamide plus <i>N</i>-hydroxymethyl-<i>N</i>-methylformamide/l urine

*Prerequisite for Pregnancy Risk Group C

Assuming that above all the inhalation studies are the most relevant for exposure at the workplace, it can be concluded from the NOAEC (no observed adverse effect concentration) for developmental toxicity in rats of 31 ml/m³ (supplement “Dimethylformamide” 2016) that with exclusively inhalation exposure to 3 ml/m³ toxic effects on development are not to be expected. As there are only studies with oral administration available for the mouse and no NOAEL (no observed adverse effect level), but only a LOAEL (lowest observed adverse effect level) of 182 mg/kg body weight and day was determined, which after toxicokinetic extrapolation (supplement “Dimethylformamide” 2016) corresponds to a concentration in air of 67 ml/m³, a NAEC (no adverse effect concentration) of 22 ml/m³ can be calculated from this concentration in air. This means that with exclusively inhalation exposure to 2 ml/m³ no prenatal toxicity is to be expected. As in humans, however, around the same amount absorbed via inhalation can additionally be absorbed through the skin from the gaseous phase (supplement “Dimethylformamide” 2016), at a concen-

tration of 1 ml/m³ prenatal toxicity is unlikely. This concentration of 1 ml/m³ should be low enough, as after the inhalation exposure of rats only the foetal weights were impaired. In rabbits, also umbilical hernia occurred at 150 ml/m³ and above; the NOAEC was 50 ml/m³. It must also be taken into account that the animals were exposed in whole-animal chambers so that they were exposed not only by inhalation but probably also through the skin via the gaseous phase.

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