

The MAK Collection for Occupational Health and Safety

Dimethyl sulfoxide (DMSO)

MAK Value Documentation, addendum – Translation of the German version from 2011

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Dimethyl sulfoxide / methylsulfinylmethane

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 designation with “H” (for substances for which skin contact is expected to contribute significantly to the systemic toxicity) for DMSO [67-68-5]. Based on a diffusion cell study with excised human skin, 35.2 g DMSO (about 500 mg/kg body weight) would be dermally absorbed each hour through an area of 2000 cm² of skin. This amount corresponds to about half of the LOAEL (lowest observed adverse effect level) established in volunteers. Therefore, skin contact is expected to contribute significantly to the systemic toxicity of DMSO, and DMSO is still designated with an “H”.

Keywords

dimethyl sulfoxide, methyl sulfoxide, methylsulfinylmethane, DMSO, sulfinylbismethane, absorption through the skin, occupational exposure, maximum workplace concentration, MAK value, toxicity, hazardous substance

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Dimethyl sulfoxide (DMSO)

[67-68-5]

Supplement 2010 (revised and published in 2011)

MAK value (2008) 50 ml/m³ (ppm) $\triangleq$ 160 mg/m³

Peak limitation (2008) Category I, excursion factor 2

Absorption through the skin (1990) H

Sensitization –

Carcinogenicity –

Prenatal toxicity (2008) Pregnancy Risk Group D

Germ cell mutagenicity –

BAT value –

Absorption through the skin

In a diffusion cell study with excised human skin, a dermal penetration rate of 176 ± 42 g/m² and hour was calculated for DMSO; this corresponds to 17.6 mg/cm² and hour (Ursin et al. 1995). The experimental design of this study (for example, unusually long storage of the excised skin in a liquid medium and stretching of the skin during exposure) deviates considerably from the OECD (2004) recommendations for conducting skin penetration studies by means of diffusion cells. However, when the fluxes determined for toluene, *N*-methyl-2-pyrrolidone and *N,N*-dimethylformamide in the study of Ursin et al. (1995) were compared with those given in the literature (Ahaghotu et al. 2005; Bader et al. 2005; Kezic et al. 2001; Larese et al. 1994) the level of agreement of the values was acceptable.

Dermal application of an 80% DMSO gel in a dose of 1000 mg/kg body weight and day induced central nervous symptoms in humans, transient eosinophilia and in some cases severe local skin reactions caused by the release of histamine (Brobyn 1975). A NOAEL (no observed adverse effect level) for humans is not known.

Manifesto (absorption through the skin)

On the basis of the flux from the study of Ursin et al. (1995), it was calculated that 35.2 g DMSO (about 500 mg/kg body weight assuming the body weight to be 70 kg) would be dermally absorbed each hour through an area of 2000 cm² of skin. This amount corresponds to about half the LOAEL (lowest observed adverse effect level) established in the study of Brobyn (1975). A NOAEL was not established in this study. Therefore, toxic effects of DMSO after dermal exposure cannot be ruled out. DMSO is thus still designated with an “H” (for substances that can be absorbed through the skin).

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