The MAK Collection for Occupational Health and Safety

Addendum to Ethylene glycol dinitrate

Assessment Values in Biological Material – Translation of the German version from 2018

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The commission established rules and measures to avoid conflicts of interest.

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BAT 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 biological tolerance value (BAT value) for ethylene glycol dinitrate [CAS No. 628-96-6] in 2017.
Aim of this re-evaluation was the lowering of the MAK value from 0.05 to 0.01 mL/m³ (for the sum of ethylene glycol dinitrate, nitroglycerin and propylene glycol dinitrate). The former BAT value of 0.3 µg ethylene glycol dinitrate/L blood was based on a correlation between external and internal exposure to the former MAK value of 0.05 ml/m³. The limit of detection of the applied analytical method was 0.2 µg ethylene glycol dinitrate/L blood. Correlating values of ethylene glycol dinitrate to the present MAK value would result in values below the limit of detection. Further studies and more sensitive analytical methods are missing. Therefore, the BAT value was withdrawn.

Keywords

ethylene glycol dinitrate; EGDN; glycide nitrate; glycol dinitrate; nitroglycide; BAT value; biological guidance value; occupational exposure; toxicity

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BAT (2017)	**not established**
MAK value (2016)	**0.01 mL/m³ ≙ 0.063 mg/m³** [a), b)]
Absorption through the skin (1978)	H
Carcinogenicity	–

The BAT value of 0.3 µg ethylene glycol dinitrate/L blood from 1995 was evaluated on the basis of the relationship between the ethylene glycol dinitrate concentration in air and in blood and corresponds to the correlate of the MAK value of 0.05 mL/m³. Due to the lowering of the MAK value to 0.01 mL/m³ in 2016 (for the sum of concentrations of ethylene glycol dinitrate, propylene glycol dinitrate and nitroglycerin in air), re-evaluation of the BAT value has become necessary. The most sensitive endpoint for ethylene glycol dinitrate toxicity in humans is considered to be the antihypertensive effect and the development of headaches, which are probably associated with cerebral vasodilation. The substance can be absorbed through the skin and dermal absorption ("H" designation) is the primary route of exposure in most workplaces (Hartwig 2017, translated).

10 Re-evaluation

10.1 Test Methods

Reliable and tested analytical methods for the determination of ethylene glycol dinitrate in blood or in urine or of its metabolites in urine are not available to the Commission.

The instability of the reference substance makes it difficult to develop a reliable analytical method. Furthermore, there is no suitable internal standard to compensate for analytical unreliability. In addition, the biological half-life of ethylene glycol dinitrate in erythrocytes from blood samples taken from exposed subjects is very short (0.4–1.4 hours) (Götell 1976), so that sampling must take place during exposure or directly at the end of exposure.

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a) MAK value for the sum of air concentrations of ethylene glycol dinitrate, propylene glycol dinitrate and nitroglycerin.

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

10.2 Re-evaluation of the BAT Value

The previous BAT value of 0.3 µg/L blood was derived from data from the Götell (1976) study, in which skin contact with ethylene glycol dinitrate was avoided. There was a good correlation between the ethylene glycol dinitrate concentrations in air and in blood. The previous BAT value of 0.3 µg/L is within the detection limit of 0.2 µg/L blood of the analytical method used in this study. Lowering the MAK value from 0.05 to 0.01 mL/m^3 would yield a correlating BAT value below the detection limit of this analytical method. Further studies and valid, more sensitive analytical methods for the determination of ethylene glycol dinitrate in biological material are currently not available.

Therefore, the BAT value for ethylene glycol dinitrate was withdrawn.

11 References

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