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RECOMMENDATION

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Occupational exposure limits for ethyl benzene, dimethyl terephthalate and hydrogen fluoride, and carcinogenicity and reproductive toxicant classifications

The Committee for Recommendation of Occupational Exposure Limits, Japan Society for Occupational Health

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1 | OCCUPATIONAL EXPOSURE LIMITS FOR CHEMICAL SUBSTANCES

Ethylbenzene [CAS No. 100-41-4] is a colorless liquid (boiling point 136.2℃, vapor pressure 1.27 kPa [25℃]) that is used as a raw material in the manufacture of styrene monomer, plastic, and rubber, and is a component of mixed xylene. This chemical was recommended at 100 ppm (430 mg/m^3) for OEL-M in 1978, and revised at 50 ppm (217 mg/m^3) and categorized Group 2B for class of carcinogenicity in 2001, and classified Group 2 as a reproductive toxicant in 2014. The JSOH reevaluated the occupational exposure limits (OEL) by examining subsequent reports this time, and proposed 20 ppm as OEL-M for ethylbenzene based on significant hearing loss in workers exposed to 30 ppm and noise in comparison with workers exposed to only nose,[1] significant loss of outer hair cell of cochlear nerve at concentrations ≧200 ppm in 13 weeks inhalation study (0, 200, 400, 600, 800 ppm) in SD rats,[2] and significant increase of auditory threshold ≧400 ppm in 5 days inhalation study (0, 300, 400, 550 ppm) in WAG/Rij rats.[3] Skin absorption notation is indicated, and classifications of carcinogenic (Group 2B) and reproductive toxicant (Group 2) remain the same.

Dimethyl terephthalate [CAS No. 120-61-6] is white flakes (melting point 140℃, boiling point 288℃), and used as a material in the manufacture of polybuthylene terephtharate, film, polyester fiber. The JSOH proposed 8 mg/m^3 as OEL-M for dimethyl terephthalate based on the results of animal experiment.[4] Nose rubbing, preening, and blinking were found at the concentration of 86.4 mg/m^3, but not at that of 16.5 mg/m^3 in male Long-Evans rats for 5 days 4-hour inhalation exposures per week for 58 days.

Hydrogen fluoride [CAS No. 7664-39-3] is colorless corrosive gas and/or fume (melting point − 83℃, boiling point 20℃, vapor pressure 122 kPa [25℃]). It is used as a raw material of fluorine compounds, alkylating agent, and etching agent for glass and silica. The OEL-Ceiling, defined as the reference value to the maximal exposure concentration of the substance during a working day at or below which adverse health effects do not appear in most workers, of 3.0 ppm (2.5 mg/m^3) is proposed based on the increased symptom scores from upper airways of human volunteer experiments.[5,6] Symptoms in upper airways in human volunteers exposed to 2.5-5.2 mg/m^3 were significantly increased compared to those exposed to 0.2-0.6 and 0.7-2.4 mg/m^3. In another human volunteer experiment, five volunteers suffered face flush at 5 days 6-hour exposures per week during 10-50 days. Skin absorption notation is indicated.

2 | CLASSIFICATIONS ON CARCINOGENICITY

N,N-dimethylformamide is proposed to be a Group 2A carcinogen. Proposed Group 2B carcinogens are ethylbenzene, 4-chlorobenzotrifluoride, and 1-bromo-3-chloropropane.

3 | OTHER CLASSIFICATIONS

Reproductive toxicants classification for ethylbenzene is proposed as Group 2.

The latest OEL recommendations (2020-2021) will appear in the Environmental and Occupational Health Practice (Volume 2) as an open access. A brief summary of the proposal will be posted at the society's website (https://www.sanei.or.jp/oel-eng) in September.

DISCLOSURE

Approval of the research protocol: N/A. *Informed consent*: N/A. *Registry and the registration no. of the study/trial*: N/A. *Animal studies*: N/A. *Conflict of interest*: None declared.

AUTHOR CONTRIBUTIONS

All the authors contributed draft preparation and deliberation of the proposals in the committee. The corresponding author (TN) developed and finalized the article based on the comments from all other authors' feedback.

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