Rolling Revision of the
WHO Guidelines for Drinking-Water Quality

Draft for review and comments
(Not for citation)

Formaldehyde in drinking-water
(Summary statement)

World Health Organization
January 2005
Formaldehyde

Formaldehyde occurs in industrial effluents and is emitted into air from plastic materials and resin glues. Formaldehyde in drinking-water results primarily from the oxidation of natural organic matter during ozonation and chlorination. Concentrations of up to 30 µg/litre have been found in ozonated drinking-water. It can also be found in drinking-water as a result of release from polyacetal plastic fittings. Formaldehyde’s physicochemical properties suggest that it will be very unlikely to volatilize from water, so that exposure by inhalation during showering is expected to be low.

Rats and mice exposed to formaldehyde by inhalation exhibited an increased incidence of carcinomas of the nasal cavity at doses that caused irritation of the nasal epithelium. Ingestion of formaldehyde in drinking-water for 2 years caused stomach irritation in rats. Papillomas of the stomach associated with severe tissue irritation were observed in one study. IARC has classified formaldehyde in Group 2A. The weight of evidence indicates that formaldehyde is not carcinogenic by the oral route.

A health-based value can be derived on the basis of a tolerable concentration, since irritation is a concentration-dependent outcome and is not directly related to dose. A tolerable concentration of 2.6 mg/litre for ingested formaldehyde has been established based on a NOEL of 260 mg/litre for histopathological effects in the oral and gastric mucosa of rats administered formaldehyde in their drinking-water for 2 years, using an uncertainty factor of 100 (10 for interspecies variation and 10 for intraspecies variation). In view of the significant difference between the expected concentrations of formaldehyde in drinking-water and the tolerable concentration, it is not considered necessary to set a formal guideline value for formaldehyde.

History of guideline development
The 1958, 1963 and 1971 WHO International Standards for Drinking-water and the first edition of the Guidelines for Drinking-water Quality, published in 1984, did not refer to formaldehyde. The 1993 Guidelines established a health-based guideline value of 0.9 mg/litre for formaldehyde in drinking-water. This value was brought forward to the third edition.

Assessment date
The risk assessment was conducted in 2004.

Principal references