| Compound | ACETALDEHYDE | *Data collection sheet* |
|---|---|---|
| **N° CAS: 75-07-0** | **EU classification:** 67/548/EEC: F+; R12, Carc. Cat. 3; R40, Xi; R36/37<br>**CLP:** Flam. Liqu. 1, Carc. 2, Eye Irrit. 2 STOT SE 3 | |
| 1 ppm = 1.83 mg/m³ | Supporting studies for inhalatory repeated toxicity on website available | |

| **Organization Name** | **OEHHA** | **Santé Canada** | **US EPA** |
|---|---|---|---|
| **Risk Value Name** | Inhalation REL | TC | RfC |
| **Risk Value (µg/m³)** | **140** | **390** | **9** |
| **Risk Value (ppb)** | 80 | 220 | 5 |
| **Reference period** | Chronic | Chronic | Chronic |
| **Year** | 2008 | 2000 | 1991 |
| **Key Study** | Appleman et al., 1982; 1986; supported by Saldiva et al., 1985; Woutersen et al., 1986, 1984; Woutersen and Feron, 1987 | Appleman et al. (1982, 1986). | Appleman, L.M., et al., 1986. Effect of variable versus fixed exposure levels on the toxicity of acetaldehyde in rats |
| **Study type** | 4-weeks study on rats | 4-weeks study on rats | 4-weeks study on rats |
| **Species** | Wistar rats | Wistar rats | Wistar rats |
| **Duration of exposure in key study** | Inhalation exposure 6 h/d, 5 d/w, 4 w | Inhalation exposure 6 h/d, 5 d/w, 4 w | Inhalation exposure 6 h/d, 5 d/w, 4 w |
| **Critical effect** | Respiratory system: degenerative, inflammatory ans hyperplasic changes of the nasal mucosa in animals | No neoplasic effects in respiratory system | Degeneration of olfactory epithelium |
| **Critical dose value** | NOAEL: 270 mg/m³ (150 ppm) | CA (acceptable concentration): 218 mg/m³ (120 ppm) | NOAEL: 275 mg/m³ (150 ppm) |
| | LOAEL: 720 mg/m³ (400 ppm) | | LOAEL: 728 mg/m³ (400 ppm) |
| **Adjusted critical dose** | $BMC_{05}$: 178 mg/m³ (99 ppm) | Temporal | Temporal + HEC |
| | Human equivalent concentration: 242.1 mg/ m³ (134.6 ppm) | 218 x 6/24 x 5/7 = 39 mg/m³ (0.20 ppm) | NOAEL(ADJ): 48.75 mg/cu.m (26 ppm) = 273 mg/m³ x 6/24 x 5 d/7 d |
| | Time-adjusted exposure: 43.2 mg/m³ (24 ppm) = (134.6x6/24x5/7) | | NOAEL(HEC): 8.7 mg/m³ * |
| **Single assessment factors (see table R.8.6)** | $UF_A$ $\sqrt{10}$ x $UF_S$ $\sqrt{10}$x $UF_H$ (10 x $\sqrt{10}$) = 300 | $UF_A$ 10 x $UF_H$ 10 = 100 | $UF_S$ 10 x $UF_A$ 10 x $UF_H$ 10 = 100 |
| **Other effects** | | | |

$UF_L$ used LOAEL; $UF_H$ intraspecies variability; $UF_A$ interspecies variability; $UF_S$ used subchronic study; $UF_D$ data deficiencies

* The NOAEL(HEC) was calculated for a gas:respiratory effect in the ExtraThoracic region.
MVa = 0.23 m³/day, MVh = 20 m³/day, Sa(ET) = 11.6 sq. cm, Sh(ET) = 177 sq. cm.
RGDR(ET) = (MVa/Sa) / (MVh/Sh) = 0.18.
NOAEL(HEC) = NOAEL(ADJ) x RGDR = 8.7 mg/m³

| Compound | ACETALDEHYDE | | *Factsheet* |
|---|---|---|---|
| **Parameter** | **Note** | **Comments** | **Value / descriptor** |
| **EU-LCI Value and Status** | | | |
| EU-LCI value | 1 | Mass/volume [µg/m$^3$] | 1200 |
| EU-LCI status | 2 | Draft / Final | Final |
| EU-LCI year of issue | 3 | Year when the EU-LCI value has been issued | 2012 |
| **General Information** | | | |
| CLP-INDEX-Nr. | 4 | INDEX | 605-003-00-6 |
| EC-Nr. | 5 | EINECS – ELINCS - NLP | 200-836-8 |
| CAS-Nr. | 6 | Chemical Abstracts Service number | 75-07-0 |
| Harmonised CLP classification | 7 | Human Health Risk related classification | Flam. Liq. 1<br>Eye Irrit. 2<br>STOT SE 3<br>Carc. 2 |
| Molar mass | 8 | [g/mol] | 44.1 |
| **Key Data / Database** | | | |
| Key study, Author(s), Year | 9 | Critical study with lowest relevant effect level | Appelman et al., (1982) Toxicol.23, 293-307 |
| Read across compound | 10 | Where applicable | |
| Species | 11 | Rat,… human | Rat<br>(also hamster inhalation studies available which show lower sensitivity) |
| Route/type of study | 12 | Inhalation, oral feed,… | Inhalation |
| Study length | 13 | Days, subchronic, chronic | 28 days |
| Exposure duration | 14 | Hrs/day, days/week | 6 hrs/ day, 5 days a week |
| Critical endpoint | 15 | Effect(s), site of | Nasal irritation |
| Point of departure (POD) | 16 | LOAEC*L, NOAEC*L, NOEC*L, Benchmark dose, …. | NOAEC |
| POD Value | 17 | [mg/m$^3$] or [ppm] | 275 mg/m$^3$ |
| **Assessment Factors (AF)** | **18** | | |
| Adjustment for exposure duration | 19 | Study exposure hrs/day, days/week | 5.6 |
| AF<br>Study Length | 20 | sa→ sc→ c<br>*(R8-5)* | 2 |
| Route-to-route extrapolation factor | 21 | | |
| AF<br>Dose-response | 22 a | Reliability of dose-response, LOAEL → NOAEL | |
| | 22 b | Severity of effect *(R 8-6d)* | 2 |
| Interspecies differences | 23 a | Allometric<br>Metabolic rate *(R8-3)* | |
| | 23 b | Kinetic + dynamic | |
| Intraspecies differences | 24 | Kinetic + dynamic<br>Worker - General population | 10 |

| | | | |
|---|---|---|---|
| AF (sensitive population) | 25 | Children or other sensitive groups | |
| Other adjustment factors<br>Quality of whole database | 26 | Completeness and consistency<br>Reliability of alternative data *(R8-6 d,e)* | |
| **Result** | | | |
| Summary of assessment factors | 27 | Total Assessment Factor (TAF) | 224 |
| POD/TAF | 28 | Calculated value (µg/m³ and ppb) | ……1227.6 µg/m³<br>…… 676.6 ppb |
| Molar adjustment factor | 29 | Used in read-across | |
| Rounded value | 30 | [µg/m³] | 1200 |
| **Additional Comments** | 31 | | |

| | | | |
|---|---|---|---|
| **Rationale Section** | 32 | | |

Canada (TC: 390 µg/m³) and US-EPA (Inhalation reference concentration: RfC: 800 µg/m³), all evaluations are based on the studies by Appleman et al., 1982 and 1986:

**POD and assessment factors**

The key study (Appleman et al., 1982) shows the key effect (nasal irritation) and the NOAEC in the course of a 28 days study. For acetic aldehyde and also for other aldehydes is has been experimentally consistently shown that the NOAECs for this local effect don't change much with exposure time. Hence, the time extrapolation factor for length of study could be confined to 2. A factor of 2 is proposed for severity of effects; this has been made with regard to the carcinogenic effect (nasal tumors in rats if concentrations were driven into a massive irritating state). Aldehydes react directly without metabolic activation, hence enzyme polymorphism is not considered to play a significant role. However, interindividual defense mechanisms may vary and this is considered by an intraspecies factor of 10.

**References:**

Acetaldehyde: CASRN 75-07-0. IRIS Risk information system. US-EPA: http://www.epa.gov/iris/subst/0290.htm

OEHHA: Office of Environmental Health Hazard Assessment, California: Acetaldehyde Reference Exposure Levels: Acetaldehyde: http://oehha.ca.gov/air/toxic_contaminants/pdf_zip/acetaldehyde_112508.pdf

Canadian Canadian Environmental Protection Act, 1999 Priority assessment substance list assessment report: Acetaldehyde: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/acetaldehyde/acetaldehyde_fin-eng.pdf