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**Chemical Name: Acrolein****CAS: 107-02-8****Synonyms: Acrylaldehyde, Allyl aldehyde, Acrylic aldehyde, Propenal, Prop-2-en-al****Acute Health Based Value (HBV) = 5 µg/m<sup>3</sup>**

$$\begin{aligned} &= \frac{[\text{Point of Departure (LOAEC)}]}{[\text{Uncertainty Factors}]} \times [\text{Factor to convert mg to } \mu\text{g}] \\ &= \frac{0.16 \text{ mg/m}^3 \times 1000}{30} \\ &= \mathbf{5.33} \text{ rounded to } \mathbf{5 \mu\text{g/ m}^3} \end{aligned}$$

Source of Toxicity Value: MDH 2012  
Critical Study: Weber-Tschopp et al., 1977 (study with healthy human volunteers)  
Point of Departure: 0.07 ppm (0.16 mg/m<sup>3</sup>) LOAEC  
Human Equivalent Concentration: N/A  
Total Uncertainty Factor: 30 [10 for intraspecies variability (1 for toxicokinetics and 10\* for toxicodynamics); 3 for use of a mild LOAEC]  
Critical Effect(s): Subjective ocular irritation

**Subchronic Health Based Value (HBV<sub>subchronic</sub>) = 1 µg/ m<sup>3</sup>**

$$\begin{aligned} &= \frac{[\text{Point of Departure (NOAEC)}]}{[\text{Uncertainty Factors}]} \times [\text{Factor to convert mg to } \mu\text{g}] \\ &= \frac{0.069 \text{ mg/m}^3 \times 1000}{60} \\ &= \mathbf{1.15} \text{ rounded to } \mathbf{1 \mu\text{g/ m}^3} \end{aligned}$$

Source of Toxicity Value: MDH 2012  
Critical Study: Doorman et al., 2008 study in Fischer 344 rats  
Point of Departure: 0.20 ppm (0.46 mg/m<sup>3</sup>) NOAEC

Human Equivalent Concentration: 0.069 mg/m<sup>3</sup>  
 Total Uncertainty Factor: 60 [6 for interspecies variability (2 for toxicokinetics for a dose adjustment factor with an analogue chemical\*\* and 3 for toxicodynamics); 10 for intraspecies variability (1 for toxicokinetics and 10\* for toxicodynamics)]  
 Critical Effect(s): Upper respiratory lesions  
 Additivity Endpoint(s): Upper respiratory system

**Chronic Health Based Value (HBV<sub>chronic</sub>) = 0.4 µg/ m<sup>3</sup>**

$$= \frac{[\text{Point of Departure (NOAEC)}]}{[\text{Uncertainty Factors}]} \times [\text{Factor to convert mg to } \mu\text{g}]$$

$$= \frac{0.069 \text{ mg/m}^3 \times 1000}{180}$$

$$= 0.383 \text{ rounded to } 0.4 \text{ } \mu\text{g/ m}^3$$

Source of Toxicity Value: MDH 2012  
 Critical Study: Doorman et al., 2008 study in Fischer 344 rats  
 Point of Departure: 0.20 ppm (0.46 mg/m<sup>3</sup>) NOAEC  
 Human Equivalent Concentration: 0.069 mg/m<sup>3</sup>  
 Total Uncertainty Factor: 180 [6 for interspecies variability (2 for toxicokinetics for a dose adjustment factor with an analogue chemical\*\* and 3 for toxicodynamics); 10 for intraspecies variability (1 for toxicokinetics and 10\* for toxicodynamics) and 3 for use of a subchronic study with a mild adverse endpoint]  
 Critical Effect(s): Upper respiratory lesions  
 Additivity Endpoint(s): Respiratory system

\* The MDH's air program currently includes a factor of three in the toxicodynamic portion of the intraspecies uncertainty factor as a default to protect infants and children.

\*\* For the subchronic and chronic HBVs where rodent studies were used as the critical studies for development, a chemical specific dosimetric adjustment factor (DAF) of 0.85 was used as an interspecies toxicokinetic correction (OEHHA, 2008 a,b). An additional uncertainty factor of 2 was used because the DAF was developed using modeled data for formaldehyde.

**Cancer Health Based Value (HBV<sub>cancer</sub>) = Not Applicable**

No studies of the carcinogenicity of acrolein in humans were found. Several studies in rodents using both oral and inhalation exposure routes found no treatment related increases in tumors (HEI, 2007). NTP, IARC and EPA have all been unable to classify acrolein as a carcinogen (Faroon et al., 2008).

**Volatile: Yes**

**Summary of Guidance Value History:**

The 2012 guidance for acute and subchronic exposures are higher in value than the 2004 acute HBV of 2 µg/m<sup>3</sup> and the promulgated subchronic HRV of 0.2 µg/m<sup>3</sup>. This is the result of using newer studies and newer methods. The 2012 chronic HBV is a new guidance value as no previous chronic HRV was developed for acrolein.

**Summary of toxicity testing for health effects identified in the Health Standards Statute:**

	Endocrine	Immunotoxicity	Development	Reproductive	Neurotoxicity
Tested?	No <sup>1</sup>	Yes	Yes	Yes	Yes
Effects?	No <sup>2</sup>	No <sup>3</sup>	No	No	No

Note: Even if testing for a specific health effect was not conducted for this chemical, information about that effect might be available from studies conducted for other purposes. Most chemicals have been subject to multiple studies in which researchers identify a concentration where no effects were observed, and the lowest concentration that caused one or more effects. A toxicity value based on the effect observed at the lowest concentration across all available studies is considered protective of all other effects that occur at higher concentrations.

**Comments on extent of testing or effects:**

<sup>1</sup> No information was found regarding endocrine effects of acrolein.

<sup>2</sup> Based on the mechanism of toxicity and data from animal studies acrolein is not expected to be capable of endocrine disruption

<sup>3</sup> No information regarding the immunological effects of acrolein in humans after inhalation exposure was located. Inhalation studies in animals showed that acrolein decreased ability of alveolar macrophages to remove bacteria (Faroon et al., 2008).

**References:**

Dorman, D.C., Struve, M.F., Wong, B.A., Marshall, M.W., Gross, E.A. and Wilson, G.A. (2008). Respiratory tract responses in male rats following subchronic acrolein inhalation. *Inhalation Toxicol* 20(3): 205-216.

HEI Air Toxics Review Panel (2007). Mobile-source air toxics: a critical review of the literature on exposure and health effects. Acrolein Chapter, pgs. 37-47. HEI Special Report 16. Health Effects Institute, Boston, MA. <https://www.healtheffects.org/system/files/SR16-Acrolein.pdf>

Faroon, O., Roney, N., Taylor, J., Ashizawa, A., Lumpkin and Plewak, D.J. (2008 a). Acrolein health effects. *Toxicol. Ind. Health* 24: 447-490.

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OEHHA (2008b). Technical Support Document for Non-Cancer RELs, Kinetic Modeling in Interspecies Extrapolation, pgs. 57-61.

Weber-Tschopp, A., Fischer, T., Gierer, R. and Grandjean, E. (1977). Experimentally induced irritating effects of acrolein on men. *Int Arch Occup Environ Health* 40(2): 117-130.