# Hydrogen selenide (as se)

| CAS number: | 7783-07-5 |
| --- | --- |
| Synonyms: | — |
| Chemical formula: | H2Se |
| Structural formula: | — |

Workplace exposure standard (retained)

| TWA: | **0.05 ppm (0.16 mg/m3)** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **—** |
| **Sampling and analysis:** The recommended value is quantifiable through available sampling and analysis techniques. | |

## Recommendation and basis for workplace exposure standard

A TWA of 0.05 ppm (0.16 mg/m3) is recommended to protect for irritant effects in exposed workers.

## Discussion and conclusions

Hydrogen selenide is used in the preparation of semiconductor materials and in chemical synthesis by metal selenides, lasers and emulsions. It is readily produced by the action of acids on inorganic selenides.

Data on hydrogen selenide toxicity in humans and animals are limited. Critical effects of exposure include irritation of the eyes and respiratory tract and gastrointestinal distress. Exposure at 5 mg/m3 (1.5 ppm) is reported as intolerable due to eye and nose irritation, while no irritation is reported at 1 mg/m3 (0.3 ppm) for a few minutes (ACGIH, 2018; SCOEL, 1992). Five cases of industrial selenosis are reported to have been caused by inhalation at less than 0.2 ppm. Symptoms include nausea, vomiting, metallic taste in the mouth, garlic-like breath odour and extreme lassitude and fatigue (ACGIH, 2018).

A TWA of 0.05 ppm (0.16 mg/m3) is recommended to protect for irritation effects and reduce the risk of selenosis. A STEL is not recommended as the TWA is sufficiently low to protect for transient short-term increases in exposure.

## Recommendation for notations

Not classified as a carcinogen according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Not classified as a skin sensitiser or respiratory sensitiser according to the GHS.

There are insufficient data to recommend a skin notation.

# Appendix

### Primary sources with reports

| Source Year set Standard |
| --- |
| SWA 1991 TWA: 0.05 ppm (0.16 mg/m3) | |
|  |
| ACGIH 2001 TLV-TWA: 0.05 ppm (0.16 mg/m3, as Se) |
| TLV-TWA recommended to minimise the potential for irritation of the eyes and respiratory tract and gastrointestinal distress.  Summary of data:  Human data:   * Toxicity data in humans limited * 5 mg/m3 (1.5 ppm) intolerable eye and nose irritation * 1 mg/m3 (0.3 ppm) no irritation with a few minutes of exposure * 5 cases of industrial selenosis; caused by inhalation <0.2 ppm: * nausea, vomiting, metallic taste in the mouth, garlic-like breath odour and extreme lassitude and fatigue reported; no duration information.   Animal data:   * LC50: 1 mg/m3 (0.3 ppm), 8 h; guinea pigs; respiratory irritation and liver injury.   Insufficient data to recommend skin, sensitiser or carcinogen notations or a TLV-STEL. |
| DFG 2015 MAK: 0.006 ppm (0.02 mg/m3) |
| Summary of additional data:   * Evaluation includes selenium and its inorganic compounds * Chronic selenium exposure associated with diabetes mellitus; previous selenium MAK of 0.02 ppm based on reported NOAEL of 15 µg/kg/d * Case report of hydrogen selenide poisoning: a chemist developed severe hyperglycaemia, which could only be brought under control by increasingly high insulin doses * No explanation on derivation of hydrogen selenide MAK * Skin notation not warranted. |
| SCOEL 1992 TWA: 0.02 ppm (0.07 mg/m3); STEL: 0.05 ppm (0.17 mg/m3) |
| Summary of additional data:   * Hydrogen selenide likely oxidised to red elemental selenium by moist mucous membrane surfaces; possibly contribution to chronic effects due to selenium absorption * Critical effect is irritation from hydrogen selenide itself * Considers 1 mg/m3 (0.3 ppm) (ACGIH, 2018) as NOAEL; applies UF 20 for uncertainty * Supported by WHO LOAEL of 0.2 mg/kg/d: * ≈20 mg over 5 d working week is ≡2 mg/m3 airborne concentration. |
| OARS/AIHA NA NA |
| No report. |
| HCOTN NA NA |
| No report. |

### Secondary source reports relied upon

NIL.

### Carcinogenicity — non-threshold based genotoxic carcinogens

| Is the chemical mutagenic? | No |
| --- | --- |
| **The chemical is not a non-threshold based genotoxic carcinogen.** |  |

## Notations

| Source | Notations |
| --- | --- |
| SWA | NA |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | NA |
| DFG | Carcinogenicity – 3B |
| SCOEL | NA |
| HCOTN | NA |
| IARC | NA |
| US NIOSH | NA |

NA = not applicable (a recommendation has not been made by this Agency); — = the Agency has assessed available data for this chemical but has not recommended any notations

### Skin notation assessment

| Calculation |
| --- |
| Insufficient data to assign a skin notation. |

### IDLH

| Is there a suitable IDLH value available? | No |
| --- | --- |

## Additional information

| Molecular weight: | 80.98 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = Number mg/m3; 1 mg/m3 = Number ppm |
| This chemical is used as a pesticide: |  |
| This chemical is a biological product: |  |
| This chemical is a by-product of a process: |  |
| A biological exposure index has been recommended by these agencies: | ACGIH  DFG  SCOEL |

## Workplace exposure standard history

| Year | Standard |
| --- | --- |
| Click here to enter year |  |

## References

American Conference of Industrial Hygienists (ACGIH®) (2018) TLVs® and BEIs® with 7th Edition Documentation, CD-ROM, Single User Version. Copyright 2018. Reprinted with permission. See the [*TLVs® and BEIs® Guidelines section*](http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations) on the ACGIH website.

Deutsche Forschungsgemeinschaft (DFG) (2018) Selenium and its inorganic compounds – MAK value documentation.

EU Scientific Committee on Occupational Exposure Limits (SCOEL) (1992) Recommendation from the Scientific Committee on Occupational Exposure Limits for selenium and its inorganic compounds. SCOEL/SUM/022.