# Vinylidene Fluoride

| CAS number: | 75-38-7 |
| --- | --- |
| Synonyms: | Ethene 1,1-difluoro-, 1,1-difluoroethylene -, Halocarbon 1132A, VDF, vinylidene difluoride |
| Chemical formula: | C2H2F2 |

Workplace exposure standard (interim)

| TWA: | **—** |
| --- | --- |
| STEL: | **—** |
| Peak limitation: | **—** |
| Notations: | **—** |
| IDLH: | **—** |
| **Sampling and analysis:** N/A | |

## Recommendation and basis for workplace exposure standard

Insufficient data to recommend a TWA.

Insufficient data exists to perform a risk-based assessment and therefore it is recommended that a priority review be undertaken at the next scheduled review of the WES.

## Discussion and conclusions

Vinylidene fluoride (VDF) is used as an intermediate in chemical synthesis, primarily production of elastomeric copolymers and polyvinylidene fluoride.

The critical effect of exposure is liver injury. No human data are available. Limited data in animals are available. Increased liver enzyme activity is reported in sub-chronic inhalation studies in rat at exposure of 25,000 ppm. Experimental rats were treated with phenobarbital and polychlorinated biphenyls to increase the activity of liver metabolic enzymes. The results of this study suggest hepatotoxicity requires metabolism of VDF to a reactive epoxide, a process also identified with toxicity associated with other closely related chloroethenes, vinyl chloride and vinylidene chloride. VDF is metabolised slowly compared with other chloroethylene organics and considered less toxic (ACGIH, 2018).

A TWA is not recommended as insufficient data is available to perform a full assessment. A review of additional data sources is recommended at the next scheduled review.

## 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 NA NA | |
| No report. |
| ACGIH 2018 TLV-TWA: 500 ppm (1,310 mg/m3) |
| TLV-TWA is intended to minimise the potential for liver injury, including increased liver enzyme activity and necrosis reported in animal studies.  Summary of data:   * Potential hepatotoxicity requires metabolism of VDF to a reactive epoxide, a process also identified with toxicity associated with other closely related chloroethenes * Maximal rate of metabolism 100 times lower than metabolic rates of closely related vinyl chloride and vinylidene chloride * Based on much lower rate of metabolism compared with vinylidene chloride, recommended TLV-TWA of 500 ppm * No human studies reported.   Animal data:   * Hind leg incoordination and unsteady gait reported in rats exposed at 400,000 ppm for 30 min; liver, kidney and lung lesions not detected by microscopic examination * Study in untreated rats and rats treated with agents to increase the activity of liver metabolic enzymes (phenobarbital and polychlorinated biphenyls) at concentrations of 0, 5,000, 15,000 and 25,000 ppm for 6 h: * no overt toxicity in control or phenobarbital-pre-treated rats at 25,000 ppm * hepatocyte swelling and occasional focal necrosis noted by microscopic examination of liver sections from phenobarbital-pre-treated rats exposed to VDF * deaths reported at 25,000 ppm in polychlorinated biphenyl-pre-treated rats * increased serum sorbitol dehydrogenase activity and liver weights observed at all exposures investigated * hepatotoxicity extensive in polychlorinated biphenyl-pretreated rats, with vacuolisation and coagulative necrosis * Exposure of male rats 6 h/d, 5 d/wk for 2 wk at 25,000 ppm caused transient tracheal inflammation and mucosal hyperplasia. Effects subsided following 14-d recovery period * Reported to produce limited increase in liposarcomas and lipomas in rats treated by gavage, however, biological significance of these effects unknown based on historical control data for such neoplasms.   Insufficient data to recommend a skin or sensitiser notation or TLV-STEL. |
| DFG 1993 Not assigned |
| Insufficient data in humans and animals to establish a MAK.  No additional data. |
| SCOEL NA NA |
| No report. |
| 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? | Insufficient data |
| --- | --- |
| Is the chemical carcinogenic with a mutagenic mechanism of action? | Insufficient data |
| **Insufficient data are available to determine if the chemical is a non-threshold based genotoxic carcinogen.** | |

## Notations

| Source | Notations |
| --- | --- |
| SWA | NA |
| HCIS | NA |
| NICNAS | NA |
| EU Annex | NA |
| ECHA | NA |
| ACGIH | Carcinogenicity – A4 |
| DFG | Carcinogenicity – 3B |
| SCOEL | NA |
| HCOTN | NA |
| IARC | Carcinogenicity – Group 3 |
| 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

Insufficient evidence to recommend a skin notation.

### IDLH

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

## Additional information

| Molecular weight: | 64.03 |
| --- | --- |
| Conversion factors at 25°C and 101.3 kPa: | 1 ppm = 2.62 mg/m3; 1 mg/m3 = 0.38 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) (1993) 1,1-Difluoroethylene – MAK value documentation.

International Agency for Research on Cancer (IARC) (1999) Vinylidene fluoride. IARC Monographs on the evaluation of the carcinogenic risk to humans.