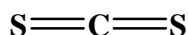| 1 1 | CAS No.: 75-15-0 | Substance: Carbon disulfide |
|---|---|---|

Chemical Substances Control Law Reference No.:1-172

PRTR Law Cabinet Order No.: 1-241

Molecular Formula: $CS_2$

Molecular Weight: 76.14

Structural Formula:

$$S\!=\!\!=\!C\!=\!\!=\!S$$

## 1. General information

The aqueous solubility of this substance is $1.19 \times 10^3$ mg/L (25°C), and the partition coefficient (1-octanol / water) (log Kow) is 2.14. The vapor pressure is 358 mmHg (= $4.77 \times 10^4$ Pa) (25°C). Degradability is 2% by GC degradation rate.

This substance is a Type 2 Monitoring Chemical Substance under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances and a Class 1 Designated Chemical Substance under the Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law). It is used primarily as a solvent in the manufacture of cellophane and rayon, and as a raw material for agricultural chemicals and pharmaceuticals. It is also used to increase the elasticity of the rubber in automobile tires. Domestic production in 2003 was 26,040 tons. Export and import quantities are 1,255 tons and 1,938 tons, respectively.

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## 2. Exposure assessment

Total release to the environment in FY2003 under the PRTR Law came to approximately 5,100 tons. Of this quantity, the amount reported came to approximately 5,100 tons. Release to the atmosphere accounted for a large part of the reported release. Pulp, paper and paper products and textile mill products accounted for high levels of release to the atmosphere. Textile mill products reported high levels of release to public water bodies.

When estimated releases outside notification are included, release to the atmosphere accounted for the greatest quantity of release to the environment. When the target region for prediction was the region with the greatest reported release, the distribution into the different media in the environment predicted by means of a multimedia model was 100.0 % for atmosphere. When the target region was the region with the greatest release to public water bodies, the distribution was 80.8% for atmosphere and 18.7% for water bodies.

The predicted maximum exposure concentration for inhalation exposure to human beings was approximately 1.3 µg/m³. When data for a limited region (Tokyo) were used, the predicted maximum value was approximately 3.8 µg/m³. The predicted maximum oral exposure was estimated to be approximately 0.026 µg/kg/day. As most of the substance is expected to be distributed in the atmosphere and bioaccumulation is judged to be zero or very low, exposure from environmental media via the food chain is assumed to be low.

The predicted environmental concentration (PEC) that indicates exposure to aquatic organisms was estimated to be approximately 1.1 µg/L for freshwater and approximately 1.2 µg/L for seawater public water bodies.

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## 3. Initial assessment of health risk

Even brief exposure to this substance may result in irritation of the eyes, skin and respiratory tract. If inhaled, it may cause dizziness, headache, nausea, shortness of breath, vomiting, weakness, high stimulus-sensitivity and hallucinations. If taken orally, in addition to the aforementioned symptoms it may cause chemical pneumonia due to vaporization of the substance. A dose of 30 - 60 mL is fatal to humans, and death may also result from a dose of 15 mL. Exposure to 6,400 - 10,000 mg/m³ for 30 - 60 minutes may cause symptoms of mild poisoning such as sensory abnormalities and irregular breathing. A dose of 15,000 mg/m³ for 30 minutes leads to death. In higher concentrations, the subject may lose consciousness after taking a few breaths.

There is insufficient information regarding the carcinogenicity of the substance, and it is not possible to make a judgment as to whether it causes cancer in humans. For this reason, an initial assessment of the substance was conducted based on information of non-carcinogenic effects.

As the 'Non-toxic level' was observed, used to estimate the margin of exposure (MOE), a lowest observed adverse effect level (LOAEL) of 25 mg/kg/day (increase in fetal resorption rate), obtained from rabbit reproductive and developmental toxicity testings, was obtained for oral exposure. As this value was a LOAEL value, it was divided by 10 to establish a value of 2.5 mg/kg/day. For inhalation exposure, a value of 3.2 mg/m$^3$ was established by correcting the no observed adverse effect level (NOAEL) of 16 mg/m$^3$ (decrease in motor nerve conduction velocity, etc.), derived from the effect on human beings, to match the exposure circumstances.

With regard to oral exposure, when intake through groundwater was postulated, the maximum predicted exposure was estimated to be approximately 0.026 µg/kg/day. As the 'Non-toxic level' of 2.5 mg/kg/day and the maximum predicted exposure were established by animal testing, the value was divided by 10 to derive an MOE of 9,600. The food-borne exposure originating in the environment was estimated to be minor, and it is thought that adding this exposure would not greatly affect the MOE. Accordingly, assessment of the health risk from oral exposure to this substance is thought to be unnecessary at this time.

With regard to inhalation exposure, the predicted maximum exposure concentration in ambient air was estimated at less than 1.3 µg/m$^3$. The MOE derived from the 'Non-toxic level' of 3.2 mg/m$^3$ and the predicted maximum exposure concentration was 2,500. Moreover, when ambient air data that have been reported for local areas were used to make estimates for reference purposes, the predicted maximum value was estimated at approximately 3.8 µg/m$^3$, and the MOE was 840. Accordingly, there is thought to be no need at this time for assessment of the health risk with regard to inhalation exposure to the substance in the ambient air.

| | Knowledge of toxicity | | | Exposure assessment | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Exposure path | Guidelines for risk assessment | Animal | Impact assessment guideline (endpoint) | Exposure medium | Predicted maximum exposure quantity and concentration | Result of risk assessment | | | Judgment |
| Oral | No observed adverse effect level | 2.5 mg/kg/day | Rabbit | Increase in fetal resorption rate | Drinking water | — µg/kg/day | MOE | — | × | O |
| | | | | | Groundwater | 0.026 µg/kg/day | MOE | 9,600 | O | |
| Inhalation | No observed adverse effect level | 3.2 mg/m$^3$ | Human | Decrease in motor nerve conduction velocity, etc. | Ambient air | 1.3 µg/m$^3$ | MOE | 2,500 | O | O |
| | | | | | Indoor air | — µg/m$^3$ | MOE | — | × | × |

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## 4. Initial assessment of ecological risk

With regard to acute toxicity, reliable information of a 96-hour EC$_{50}$ growth inhibition value of 10,600 µg/L was found for the algae *Chlorella pyrenoidosa*, a 48-hour LC$_{50}$ immobilization value of 2,100 µg/L was found for the crustacea *Daphnia magna* (water flea), and a 96-hour LC$_{50}$ value of 4,000 µg/L was found for the fish *Poecilia reticulata* (guppy). Accordingly, an assessment factor of 100 was used, and a predicted no effect concentration (PNEC) of 21 µg/L was obtained based on the acute toxicity values. With regard to chronic toxicity, no reliable information could be obtained. Accordingly, as the PNEC for the substance, a value of 21 µg/L obtained from the acute toxicity for the crustacea was used.

The PEC/PNEC ratio was less than 0.05 for freshwater bodies and 0.06 for seawater bodies. Accordingly, further work is thought to be unnecessary at this time.

| Hazard assessment (basis for PNEC) | | | Assessment factor | Predicted no effect concentration PNEC (µg/L) | Exposure assessment | | PEC/PNEC ratio | Result of assessment |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Acute / chronic | Endpoint | | | Water body | Predicted environmental concentration PEC (µg/L) | | |
| Crustacea | Acute | $LC_{50}$ Mortality | 100 | 21 | Freshwater | 1.1 | 0.05 | ○ |
| | | | | | Seawater | 1.2 | 0.06 | |

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## 5. Conclusions

| | | Conclusions | Judgment |
| --- | --- | --- | --- |
| Health risk | Oral exposure | Assessment is thought to be unnecessary at this time. | ○ |
| | Inhalation exposure | Assessment with regard to the ambient air is thought to be unnecessary at this time. | ○ |
| Ecological risk | | No need of further work. | ○ |

〔Risk judgments〕 ○: No need of further work　▲: Requiring information collection

■: Candidates for further work　×: Impossible of risk characterization