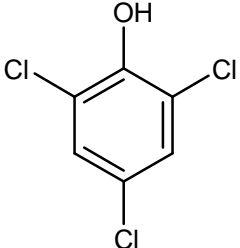


| | | |
|---|------------------|--|
| 10 | CAS No.: 88-06-2 | Substance: 2,4,6-Trichlorophenol |
| Chemical Substances Control Law Reference No.: 3-931 (Trichlorophenol (and its sodium salts)) PRTR Law Cabinet Order No.: 1-287 Molecular Formula: C ₆ H ₃ Cl ₃ O Structural Formula: Molecular Weight: 197.45 | | |
| | |  |

1. General information

The aqueous solubility of this substance is 690 mg/1,000g (25°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 3.69, and the vapor pressure is 0.024 mmHg (3.2 Pa) (25°C). Biodegradability (aerobic degradation) is judged to be good. Furthermore, its half-life for hydrolysis exceeds 8×10⁶ years (neutrality).

This substance is designated as 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). The main uses of this substance are as a raw material for dyestuffs and bactericides, and as preservatives for timber. The production and import quantity from fiscal 2011 to fiscal 2013 was not disclosed because the number of reporting businesses was not more than two.

2. Exposure assessment

Total release to the environment in fiscal 2013 under the PRTR Law was 0 t. In addition, approximately 0.037 t was transferred to waste materials. The sole source of reported releases was the chemical industry. Predictions of proportions distributed to individual media by using a Mackay-type level III fugacity model indicated that if equal quantities were released to the atmosphere, water bodies, and soil, the proportions distributed to soil and water bodies would be largest.

The maximum expected concentration of exposure to humans via inhalation, based on general environmental atmospheric data, was around less than 0.013 µg/m³. The maximum expected oral exposure was estimated to be around 0.0011 µg/kg/day on the basis of calculations from data for public freshwater bodies. In addition, past data show that estimating oral exposure through ingestion of fish for a limited water body area using seawater data is likely to be higher than when using public freshwater body data.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was reported to be around 0.027 µg/L for public freshwater bodies and around 0.004 µg/L for seawater. Furthermore, although the data are not from within the past 10 years, there is a report (1997) of around 5.4 µg/L in a survey of a limited area of seawater.

3. Initial assessment of health risk

This substance is severely irritating to the eyes, skin and respiratory tract. Contact with the eyes or skin causes redness and pain. Inhalation of the substance causes coughs and sore throat. Oral exposure to the substance causes vomiting, burning sensation and diarrhea.

As sufficient information on the carcinogenicity of the substance was not available, the initial assessment was conducted on the basis of information on its non-carcinogenic effects.

The NOAEL of 0.3 mg/kg/day for oral exposure (based on liver weight gain), determined from reproductive and developmental toxicity tests in rats, was divided by a factor of 10 to account for extrapolation from

sub-chronic to chronic exposure. The obtained value of 0.030 mg/kg/day was deemed to be the lowest reliable dose and was identified as the ‘non-toxic level*’ of the substance for oral exposure.

The ‘non-toxic level*’ for inhalation exposure could not be identified.

With regard to oral exposure, assuming the substance is absorbed via public freshwater bodies, the predicted maximum exposure level was approximately 0.0011 µg/kg/day. The MOE (Margin of Exposure) would be 550, when calculated from the predicted maximum exposure level and the ‘non-toxic level*’ of 0.030 mg/kg/day, and subsequently divided by a factor of 10 to account for extrapolation from animals to humans and another factor of 5 to account for carcinogenicity. Therefore, no further work would be required at present to assess the health risk of this substance via oral exposure. It should be noted that the MOE could be less than 100, if the oral exposure level is determined based on the 1997 data of some enclosed marine areas, with the assumption that the substance is ingested via fish.

With regard to inhalation exposure, owing to lack of identified ‘non-toxic level*’, the health risk could not be assessed. For comparison, assuming that 100% of the ingested substance is absorbed, the ‘non-toxic level*’ of inhalation exposure, derived by converting that of oral exposure, would be 0.1 mg/m³. The MOE would be over 150, when calculated from the converted ‘non-toxic level*’ of inhalation exposure and the predicted maximum exposure concentration of less than 0.013 µg/m³ approximately, and subsequently divided by a factor of 10 to account for extrapolation from animals to humans and another factor of 5 to account for carcinogenicity. Therefore, collection of further information would not be required to assess the health risk of this substance via inhalation in ambient air.

| Exposure Path | Toxicity | | | Animal | Criteria for diagnoses (endpoint) | Exposure assessment | | Result of risk assessment | | | Judgment |
|---------------|------------------------------|-------|-------------------|--------|-----------------------------------|--------------------------|---|---------------------------|-----|---|----------|
| | Criteria for risk assessment | | | | | Exposure medium | Predicted maximum exposure dose and concentration | MOE | | | |
| Oral | ‘Non-toxic level*’ | 0.030 | mg/kg/day | Rat | Increased liver weight | Drinking water | — µg/kg/day | MOE | — | × | ○ |
| | | | | | | Public freshwater bodies | 0.0011 µg/kg/day | MOE | 550 | ○ | |
| Inhalation | ‘Non-toxic level*’ | — | mg/m ³ | — | — | Ambient air | <0.013 µg/m ³ | MOE | — | × | (○) |
| | | | | | | Indoor air | — µg/m ³ | MOE | — | × | × |

Non-toxic level *

- When a LOAEL is available, it is divided by 10 to obtain a NOAEL-equivalent level.
- When an adverse effect level for the short-term exposure is available, it is divided by 10 to obtain a level equivalent to an adverse effect level for the long-term exposure.

4. Initial assessment of ecological risk

With regard to acute toxicity, the following reliable data were obtained: a 96-h EC₅₀ of 820 µg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*, a 48-h EC₅₀ of 1,170 µg/L for swimming inhibition in the crustacean *Daphnia magna*, a 96-h LC₅₀ of 410 µg/L in the fish species *Lepomis macrochirus* (bluegill), and a 96-h LC₅₀ of 1,200 µg/L for the African clawed frog *Xenopus laevis*. Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 4.1 µg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 21-d NOEC of 500 µg/L for reproductive inhibition in the crustacean *D. magna*, an NOEC of 970 µg/L for mortality or 30-d post-hatching growth inhibition in the fish species *Pimephales promelas* (fathead minnow), and a 48-h NOEC of 300 µg/L for reproductive inhibition in the marine rotifer *Brachionus calyciflorus*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a PNEC of 5 µg/L was obtained.

The value of 4.1 µg/L obtained from the acute toxicity to the fish species was used as the PNEC for this substance.

The PEC/PNEC ratio is 0.007 for freshwater bodies and 0.001 for seawater. Accordingly, further work is considered unnecessary at this time. Furthermore, although not reported within the past 10 years, there is a report (1997) of around 5.4 µg/L for a limited area of seawater. Because the ratio of this concentration to the PNEC is 1.3, no further collection of data regarding this area of seawater is considered necessary.

| Hazard Assessment (Basis for PNEC) | | | Assessment Coefficient | Predicted no effect concentration PNEC (µg/L) | Exposure Assessment | | PEC/PNEC ratio | Judgment based on PEC/PNEC ratio | Assessment result |
|------------------------------------|---------------|----------------------------|------------------------|---|---------------------|--|----------------|----------------------------------|-------------------|
| Species | Acute/chronic | Endpoint | | | Water body | Predicted environmental concentration PEC (µg/L) | | | |
| Fish (bluegill) | Acute | LC ₅₀ mortality | 100 | 4.1 | Freshwater | 0.027 | 0.007 | ○ | ○ |
| | | | | | Seawater | 0.004 | 0.001 | | |

5. Conclusions

| | Conclusions | | Judgment |
|-----------------|--------------------------------------|--|----------|
| Health risk | Oral exposure | No need for further work at present. | ○ |
| | Inhalation exposure | Although risk to human health could not be confirmed, collection of further information would not be required. | (○) |
| Ecological risk | No need for further work at present. | | ○ |

[Risk judgments] ○: No need for further work ▲: Requiring information collection
 ■: Candidates for further work ×: Impossibility of risk characterization
 (○) : Although risk to human health could not be confirmed, collection of further information would not be required.
 (▲) : Further information collection would be required for risk characterization.