7	CAS No.: 95-68-1	Substance: 2,4-Dimethylaniline

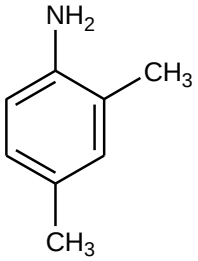
Chemical Substances Control Law Reference No.: 3-129 (dialkyl (C =1–5) aniline)

PRTR Law Cabinet Order No.: − (Cabinet Order No. after revision*: 1-214)

Structural Formula:

Molecular Formula: $C_8H_{11}N$

Molecular Weight: 121.18



*Note: No. according to revised order enacted on October 1, 2009.

1. General information

The aqueous solubility of this substance is 3.7×10^3 mg/L (25°C, calculated value), the partition coefficient (1-octanol/water) (log K_{ow}) is 1.68 (pH =7.5), and the vapor pressure is 0.133 mmHg (=17.7 Pa) (25°C). The biodegradability (aerobic degradation) is characterized by a BOD degradation rate of 0%, and bioaccumulation is thought to be nonexistent or low. The substance does not have any hydrolyzable groups.

Based on the revision of substances regulated by the Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law) (enacted on October 1, 2009), this substance was newly designated as a Class 1 Designated Chemical Substance. Its main applications are as a dyestuff and pigment intermediate. The production quantity (mixture) between 1997 and 2006 was 250 t/y (estimated). The production (shipments) and import quantity in fiscal 2004 as dialkyl (C =1–5) aniline was 1,000 to <10,000 t.

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2. Exposure assessment

Because this substance was not classified as a Class 1 Designated Chemical Substance prior to revision of substances regulated by the PRTR Law, release and transfer quantities could not be obtained. Predictions of distribution by medium using a Mackay-type level III fugacity model indicated that if equal quantities were released to the atmosphere, water bodies, and soil, the proportion distributed to soil would be higher.

Data for setting the predicted maximum exposure to humans via inhalation could not be obtained, but there is a report of less than 0.00087 μg/m^3 when data from a limited area (Kawasaki City) was used. The predicted maximum oral exposure was estimated to be less than around 0.00032 μg/kg/day based on calculations from data for groundwater. The risk of exposure to this substance by intake from an environmental medium via food is considered slight.

The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was less than around 0.008 μg/L for both public freshwater bodies and seawater.

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3. Initial assessment of health risk

This substance is irritating to the eyes and is slightly irritating to they skin. Diminished consciousness is caused as a result of exposure to high levels of this substance and MetHb may possibly be generated. Inhalation exposure causes dizziness, lethargy, headache and nausea while oral exposure causes cyanosis on the lips, nail beds and skin, dizziness, lethargy, headache, nausea and loss of consciousness.

Sufficient information could not be obtained on its carcinogenicity, and its initial assessment was conducted on the

basis of data on its non-carcinogenic effects.

Its lowest-observed-adverse-effect-level (LOAEL) of 20 mg/kg/day for liver weight increases was obtained for oral exposure from its mid-term and long-term toxicity tests for rats. This LOAEL was divided by 10 as is always the case with LOAEL, and divided again by 10 due to their short test periods to produce 0.2 mg/kg/day as its 'non-toxic level.*' Its NOAEL of 30 mg/m^3 for liver weight increases and diffuse hepatocyte swelling was obtained for inhalation exposure from its mid-term and long-term toxicity tests for rats. It was then adjusted for exposure conditions to provide 5.4 mg/m^3. This was divided by 10 due to their short test periods to produce 0.54 mg/m^3 as its 'non-toxic level*'.

As for its oral exposure, it's the predicted maximum exposure was estimated to be less than around 0.00032 µg/kg/day, when intakes of groundwater were assumed. Its margin of exposure (MOE) would be more than 63,000 when calculated from its 'non-toxic level*' of 0.2 mg/kg/day and its predicted maximum exposure, and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments. Since risk associated with exposure to this substance through food intakes from the environment is presumed to be minimal, this exposure will not increase MOE significantly, and no further action will be required at the moment to assess health risk from oral exposure to this substance.

As for its inhalation exposure, data at national-level were not available, and its health risk could not be assessed. Reports of its concentrations in the ambient air for some locations suggest that its predicted maximum exposure would be less than 0.00087 µg/m^3. For reference, when this is combined with its 'non-toxic level*' of 0.54 mg/m^3 and then divided by 10 due to the fact that 'non-toxic level*' was obtained from animal experiments, MOE would be calculated to be more than 62,000. Its half-life in the atmosphere is 0.4 to 4.0 hrs. When released to the atmosphere, most of it is expected to go to media other than the ambient air, and collection of information on its inhalation exposure to assess health risk associated with its inhalation exposure in the ambient air would not be required.

Information of toxicity				Exposure assessment		Result of risk assessment			Judgment
Exposure Path	Criteria for risk assessment	Animal	Criteria for diagnoses (endpoint)	Exposure medium	Predicted maximum exposure quantity and concentration				
Oral	'Non-toxic level*' 0.2 mg/kg/day	Rats	Increase in liver weight	Drinking water	– µg/kg/day	MOE	–	×	○
				Groundwater	< 0.00032 µg/kg/day	MOE	> 63,000	○	
Inhalation	'Non-toxic level*' 0.54 mg/m^3	Rats	Increase in liver weight and diffuse hepatocyte swelling	Ambient air	– 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 level equivalent to NOAEL.
- When an adverse effect level is available for the short-term exposure, it is divided by 10 to obtain a level equivalent to an adverse effect level for the long-term exposure.

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4. Initial assessment of ecological risk

With regard to acute toxicity, reliable data of a 48-h median effective concentration (EC_{50}) of 9,900 µg/L was obtained for swimming inhibition in the crustacean *Daphnia magna*. Accordingly, based on this acute toxicity value and an assessment factor of 1,000, a predicted no effect concentration (PNEC) of 9.9 µg/L was obtained. No data is available regarding chronic toxicity and on this account, 9.9 µg/L was adopted as the PNEC for this substance.

The PEC/PNEC ratio for both freshwater bodies and seawater was less than 0.0008. 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)		
Crustacean (water flea)	Acute	EC_{50} Swimming inhibition	1000	9.9	Freshwater	<0.008	<0.0008	○
					Seawater	<0.008	<0.0008	

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5. Conclusions

	Conclusions		Judgment
Health risk	Oral exposure	No need for further work.	○
	Inhalation exposure	Though a risk characterization cannot be determined, there would be little necessity of collecting information.	(○)
Ecological risk	No need for further work.		○

［Risk judgments］ ○: No need for further work ▲: Requiring information collection

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

(○) : Though a risk characterization cannot be determined, there would be little necessity of collecting information.

(▲) : Further information collection would be required for risk characterization.