2,2’-AZOBIS(2-METHYLPROPIONITRILE)

CAS N°: 78-67-1
SIDS Initial Assessment Report
for
9th SIAM
(France, June 29-July 1, 1999)

Chemical Name: 2,2'-Azobis(2-methylpropionitrile)
CAS No: 78-67-1
Sponsor Country: Japan

National SIDS Contact Point in Sponsor Country:
Mr. Kazuhide Ishikawa
Ministry of Foreign Affairs, Japan

HISTORY:
SIDS Testing Plan were reviewed in SIDS Review Process, where the following SIDS Testing Plan was agreed:
o. no testing
X. testing
Water solubility, Vapour pressure, Octanol/water partition coefficient, Stability in water, Biodegradation
Chronic toxicity to daphnia
Combined repeat dose and reproductive toxicity,
Gene mutation, Chromosomal aberration test in vitro

Deadline for circulation: March 31, 1999
Date of Circulation: March 30, 1999
(To all National SIDS Contact Points and the OECD Secretariat)
SIDS INITIAL ASSESSMENT PROFILE

<table>
<thead>
<tr>
<th>CAS NO.</th>
<th>78-67-1</th>
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</thead>
<tbody>
<tr>
<td>CHEMICAL NAME</td>
<td>2,2'-Azobis(2-methylpropionitrile)</td>
</tr>
<tr>
<td>Structural formula</td>
<td>(H₃C)₂C(CN) N—NC(CN)(CH₃)₂</td>
</tr>
</tbody>
</table>

RECOMMENDATIONS OF THE SPONSOR COUNTRY
The chemical is currently of low priority for further work.

SHORT SUMMARY WHICH SUPPORTS THE REASONS FOR THE RECOMMENDATIONS

2,2'-Azobis(2-methylpropionitrile) is not readily biodegradable (OECD 301C: 0% after 28-day), and it is stable in water (T₁/₂ = 304 days at pH 7).

72-h EC₅₀ of algae, *Selenastrum capricornutum* is more than 9.4 mg/l, and 72h NOEC is 4.2 mg/l. For the *Daphnia magna* test, 48-h EC₅₀ for immobilisation is more than 10 mg/l, and 21-day EC₅₀ and 21-day NOEC for reproduction are 7.5 mg/l and 2.2 mg/l, respectively. For testing in fish, Medaka (*Oryzias latipes*), 96-h and 14-day LC₅₀ values are both more than 10 mg/l. No data are available for effects on terrestrial organisms.

2,2'-Azobis(2-methylpropionitrile) is considered not to be irritating to skin and eyes, or a skin sensitizer. In an OECD combined repeat dose and reproductive/developmental toxicity study in rats at 2, 10 and 50 mg/kg/day, this chemical was toxic to the liver as well as the kidneys. Increases in eosinophilic bodies and basophilic changes of the renal tubular epithelial cells in the kidneys were observed only in treated male rats. This male rat specific renal toxicity might be caused by accumulation of α₂u-macroglobulin as one of the possible mechanisms. Centrilobular hypertrophy of hepatocytes with the related changes in hepatotoxic blood parameters was detected at the middle and high doses in both sexes. NOAEL for repeated dose toxicity was considered to be 2 mg/kg/day, based on hepatic toxicity. As there was only a reduction in viability and body weight of offsprings after birth at the high dose, most likely due to maternal toxicity, NOAEL for reproductive toxicity was considered to be 50 mg/kg/day. This chemical may not be genotoxic, based on negative results of bacterial mutation testing and chromosomal aberration in vitro testing.

The production volume of 2,2'-Azobis(2-methylpropionitrile) is 1,100 tons/year in 1993 in Japan. This chemical is used in closed systems as an initiator of polymerisation in polymer industry, and not included in consumer products, therefore no consumer exposure is expected.

This chemical is released into the environments from the production and process sites, and as an example its amount is reported to be 1 kg/year by a processor who treats 12 tonnes/year. A generic fugacity model (Mackey level III) shows that most (98.6%) of this chemical will distribute in water phase after it is discharged into water.

IF FURTHER WORK IS RECOMMENDED, SUMMARISE ITS NATURE
## FULL SIDS SUMMARY

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<th>CAS NO: 78-67-1</th>
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<th>PROTOCOL</th>
<th>RESULTS</th>
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<tr>
<td><strong>PHYSICAL-CHEMICAL</strong></td>
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<tr>
<td>2.1 Melting Point</td>
<td></td>
<td></td>
<td>100 - 103 °C</td>
</tr>
<tr>
<td>2.2 Boiling Point</td>
<td></td>
<td></td>
<td>Decomposed</td>
</tr>
<tr>
<td>2.3 Density</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4 Vapour Pressure</td>
<td>OECD TG 104</td>
<td>0.810 Pa at 25 °C</td>
<td></td>
</tr>
<tr>
<td>2.5 Partition Coefficient (Log Pow)</td>
<td>OECD TG 107</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>2.6 A. Water Solubility</td>
<td>OECD TG 105</td>
<td>350 mg/l at 25 °C</td>
<td></td>
</tr>
<tr>
<td>B. pH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.12 Oxidation: Reduction Potential</td>
<td></td>
<td></td>
<td></td>
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<td><strong>ENVIRONMENTAL FATE AND PATHWAY</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3.1.1 Photodegradation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.2 Stability in Water</td>
<td>OECD TG 111</td>
<td>T&lt;sub&gt;1/2&lt;/sub&gt; = 263 day at pH4 at 25 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;1/2&lt;/sub&gt; = 304 day at pH7 at 25 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T&lt;sub&gt;1/2&lt;/sub&gt; = 210 day at pH9 at 25 °C</td>
<td></td>
</tr>
<tr>
<td>3.2 Monitoring Data</td>
<td></td>
<td>In air = not detected</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In surface water = not detected</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In soil/sediment = not detected</td>
<td></td>
</tr>
<tr>
<td>3.3 Transport and Distribution</td>
<td>Calculated (Fugacity Level III type)</td>
<td>Release: 100% to Water</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Air 0.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Water 98.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Sediment 0.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In Soil 0.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(local exposure) 1.6 x 10&lt;sup&gt;-9&lt;/sup&gt; mg/L (Japan)</td>
<td></td>
</tr>
<tr>
<td>3.5 Biodegradation</td>
<td>OECD 301C</td>
<td>Not readily biodegradable 0% in 28 days</td>
<td></td>
</tr>
<tr>
<td><strong>ECOTOXICOLOGY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Acute/Prolonged Toxicity to Fish</td>
<td>Poecilia reticulata</td>
<td>OECD TG 203</td>
<td>LD&lt;sub&gt;50&lt;/sub&gt;(96h) = &gt; 10 mg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LD&lt;sub&gt;50&lt;/sub&gt;(14d) = &gt; 10 mg/l</td>
</tr>
<tr>
<td>4.2 Acute Toxicity to Aquatic Invertebrates Daphnia</td>
<td>Daphnia magna</td>
<td>OECD TG 202</td>
<td>EC&lt;sub&gt;50&lt;/sub&gt;(24hr) = &gt; 10 mg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EC&lt;sub&gt;50&lt;/sub&gt;(48hr) = &gt; 10 mg/l</td>
</tr>
<tr>
<td>4.3 Toxicity to Aquatic Plants e.g. Algae</td>
<td>Selenastrum capricornutum</td>
<td>ORCD TG 201</td>
<td>EC&lt;sub&gt;50&lt;/sub&gt;(72hr, Growth) = &gt; 9.4 mg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOEC = 4.2 mg/l</td>
</tr>
<tr>
<td>4.5.2 Chronic Toxicity to Aquatic Invertebrates (Daphnia)</td>
<td>Daphnia magna</td>
<td>OECD TG 202</td>
<td>EC&lt;sub&gt;50&lt;/sub&gt;(21d, Repro) = 7.5 mg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOEC = 2.2 mg/l</td>
</tr>
<tr>
<td>4.6.1 Toxicity to Soil Dwelling Organisms</td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td>4.6.2 Toxicity to Terrestrial Plants</td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td>4.6.3 Toxicity to Other Non-Mammalian Terrestrial Species (Including Birds)</td>
<td></td>
<td></td>
<td>No Data</td>
</tr>
<tr>
<td>TOXICOLOGY</td>
<td>Assay/Species</td>
<td>Toxicity Type</td>
<td>Test Method</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>5.1.1 Acute Oral Toxicity</td>
<td>Rat</td>
<td>Other (unknown)</td>
<td>LD_{50} = 100 mg/kg b.w.</td>
</tr>
<tr>
<td>5.1.2 Acute Inhalation Toxicity</td>
<td>Rat</td>
<td>Other (unknown)</td>
<td>LC_{50} = &gt; 12 g/m³/4 hr</td>
</tr>
<tr>
<td>5.1.3 Acute Dermal Toxicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.1 Skin irritation/corrosion</td>
<td>Rabbit</td>
<td>OECD TG 404 and EC TG</td>
<td>No irritating</td>
</tr>
<tr>
<td>5.2.2 Eye irritation/corrosion</td>
<td>Rabbit</td>
<td>OECD TG 405 and EC TG</td>
<td>No irritating</td>
</tr>
<tr>
<td>5.3 Skin sensitisation</td>
<td>Guinea pig</td>
<td>OECD TG 406 and EC TG</td>
<td>No sensitizing</td>
</tr>
<tr>
<td>5.4 Repeated Dose Toxicity</td>
<td>Rat</td>
<td>OECD Combined</td>
<td>NOAEL = 2 mg/kg/day</td>
</tr>
<tr>
<td>5.5 Genetic Toxicity In Vitro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Bacterial Test (Gene mutation)</td>
<td><em>S. typhimurium</em> and <em>E. coli</em> WP2</td>
<td>Japanese TG and OECD TG 471 &amp; 472</td>
<td>- (With metabolic activation)</td>
</tr>
<tr>
<td>B. Non-Bacterial In Vitro Test</td>
<td>Chinese hamster CHL cells</td>
<td>Japanese TG and OECD TG 473</td>
<td>- (Without metabolic activation)</td>
</tr>
<tr>
<td>5.6 Genetic Toxicity In Vivo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.8 Toxicity to Reproduction</td>
<td>Rat</td>
<td>OECD combined</td>
<td>NOAEL = 50 mg/kg/day</td>
</tr>
<tr>
<td>5.9 Developmental Toxicity/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teratogenicity</td>
<td></td>
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</tr>
<tr>
<td>5.11 Experience with Human</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure</td>
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</tr>
</tbody>
</table>

[Note] Data beyond SIDS requirements can be added if the items are relevant to the assessment of the chemical, e.g. corrosiveness/irritation, carcinogenicity.
1. IDENTITY

- OECD Name: 2,2’-Azobis(2-methylpropionitrile)
- Synonym: Azobisisobutyronitrile; Azodiisobutyronitrile; 2,2'-Azobis[2-methylpropanenitrile]; AIBN; alpha,alpha'-Azodiisobutyronitrile; 2,2'-Dicyano-2,2'-azopropane; Porofor-57; 2,2'-Azo-bis(isobutyronitrile); 2,2'-Dimethyl-2,2'-azodipropionitrile
- CAS Number: 78-67-1
- Empirical Formula: C₈H₁₂N₄
- Structural Formula:
  \[(H₃C)₂C(CN)N ===NC(N)(CH₃)₂\]
- Degree of Purity: 99.3%
- Major Impurity: None
- Essential Additives: None
- Physical-chemical properties
  - Melting Point: 100 – 103 °C
  - Vapour pressure: 0.81 Pa at 25 °C
  - Water solubility: 350 mg/L
  - Log Pow: 1.10

2. GENERAL INFORMATION ON EXPOSURE

2.1 Production and import

The production volume of 2,2’-azobis(2-methylpropionitrile) in Japan is 1,100 tonnes/year in 1995 and 12 tonnes are imported.

2.2 Use pattern

All of 2,2’-azobis(2-methylpropionitrile) produced and imported in Japan is used as a foaming agent for rubber and an initiator of polymerization, and no consumer uses are reported.

2.3 Other information

None

3. ENVIRONMENT

3.1 Environmental Exposure

3.1.1 General Discussion

2,2’-Azobis(2-methylpropionitrile) is not biodegradable (OECD 301C: 0% after 28d) and stable in water \(T_{1/2} = 263,304\) and 210 day at pH 4,7, and 9, respectively). Although direct photodegradation
is expected because 2,2’-azobis(2-methylpropionitrile) has absorption band in UV and VIS region, the data of half-lifetime is not available.

2,2’-Azobis(2-methylpropionitrile) is low bioaccumulative based on Log Pow (1.10 at 25 °C).

The potential environmental distribution of 2,2’-azobis(2-methylpropionitrile) obtain from a generic Mackay level III fugacity model is shown in Table 1. Parameters used for this model are shown as Annex to this report. The results show that, if 2,2’-azobis(2-methylpropionitrile) is released into water, it is unlikely to be distributed into other compartment. If 2,2’-azobis(2-methylpropionitrile) is released into air or soil, it is likely to be distributed in water and soil.

Table 1
Environmental distribution of 2,2’-azobis(2-methylpropionitrile)
Using a generic level III fugacity model

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Release 100% to air</th>
<th>Release 100% to water</th>
<th>Release 100% to soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>31.0 %</td>
<td>0.5 %</td>
<td>0.7 %</td>
</tr>
<tr>
<td>Water</td>
<td>40.9 %</td>
<td>98.6 %</td>
<td>28.6 %</td>
</tr>
<tr>
<td>Soil</td>
<td>27.9 %</td>
<td>0.5 %</td>
<td>70.6 %</td>
</tr>
<tr>
<td>Sediment</td>
<td>0.2 %</td>
<td>0.4 %</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>

As this chemical is used in closed system as an initiator of polymerization in polymer industry and is not included in consumer products, its release to the environment may occur only from the production site.

3.1.2 Predicted Environmental Concentration

As 2,2’-azobis(2-methylpropionitrile) is produced under the well controlled closed system, amount of release to air phase is negligibly small. The waste of 2,2’-azobis(2-methylpropionitrile) from the production system is released to water phase after treated its own wastewater treatment plant. Therefore, Predicted Environmental Concentration (PEC) will be calculated only for the water environment.

a) Regional exposure

According to report from a Japanese processor who import 12 t/y, 1kg/year (measured) of 2,2’-azobis(2-methylpropionitrile) are treated in its own wastewater treatment plant with 99.9% of removal rate (measured) and released with 6.24 x 10^8 L/year of effluent into sea. Local Predicted Environmental Concentration (PEC\_local) is calculated to be 1.6 x 10^-9 mg/L as a worst case scenario, employing the following calculation model and dilution factor of 1000(default).

\[
\text{Amount of release} \times (1 - \text{Removal rate (99.9%)}) \\
\text{Volume of effluent} \times \text{Dilution Factor (1000)}
\]

3.2 Effects on the Environments

3.2.1 Effects on aquatic organisms

Acute and chronic toxicity data of 2,2’-azobis(2-methylpropionitrile) to aquatic organisms are summarized below (Table 2). Predicted no effect concentration (PNEC) of this chemical was
determined mainly based on the toxicity data obtained by the Environmental Agency of Japan through a GLP-laboratory.

As the lowest data among test organisms belonging to three trophic levels, 21d NOEC (2.2 mg/l) of *Daphnia magna* is selected. The assessment factor of 100 was adopted to chronic toxicity data to determine PNEC according to the OECD Provisional Guidance for Initial Assessment of Aquatic Effects (EXCH/MANUAL /96-4-5.DOC/May 1996), because chronic toxicity data for fish was absent.

From chronic toxicity data (NOEC of 21 d *Daphnia*):
\[
PNEC = \frac{2.2}{100} = 0.022 \text{ mg/l}
\]

Thus, PNEC of 2,2’-azobis(2-methylpropionitrile) is 0.022 mg/l.

The toxicity of 2,2’-azobis (2-methylpropionitrile) to test organisms is low. Any symptoms were not observed in the *Orizias latipes* exposed to 9.6 mg/l (measured maximum concentration) in flow-through aquarium for 14-days.

Table 2
Toxicity data of 2,2’-azobis(2-methylpropionitrile) to aquatic organisms at different trophic levels. Relatively high toxicity data were selected from AQUIRE data base.

<table>
<thead>
<tr>
<th>Species</th>
<th>Endpoint</th>
<th>Conc. (mg/l)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selenastrum capricornutum (algae)</td>
<td>Bms</td>
<td>&gt; 9.4</td>
<td>a, 1), A</td>
</tr>
<tr>
<td></td>
<td>Bms</td>
<td>4.2</td>
<td>c, 1, C</td>
</tr>
<tr>
<td>Daphnia magna (Water flea)</td>
<td>Imm</td>
<td>&gt; 10</td>
<td>a, 1), A</td>
</tr>
<tr>
<td></td>
<td>Rep</td>
<td>7.5</td>
<td>c, 1)</td>
</tr>
<tr>
<td></td>
<td>Rep</td>
<td>2.2</td>
<td>c, 1), C</td>
</tr>
<tr>
<td>Oryzias latipes (fish, Medaka)</td>
<td>Mor</td>
<td>&gt; 10</td>
<td>a, 1), A</td>
</tr>
<tr>
<td></td>
<td>Mor</td>
<td>&gt; 10</td>
<td>a, 1)</td>
</tr>
</tbody>
</table>

Notes: Bms; biomass, Imm; immobilization, Mor; mortality, Rep; reproduction, A), C); selected as the lowest value respectively among the acute or chronic toxicity data of algae, cladocera (water flea) and fishes to determine PNEC of 2,2’-azobis(2-methylpropionitrile). 1) Toxicity data were obtained by the Environment Agency of Japan based on OECD Test Guidelines and GLP.

### 3.2.2 Terrestrial effects

No available data

### 3.2.3 Other effects

No available data

### 3.3 Initial Assessment for the Environment

Predicted no effect Concentration (PNEC) of 2,2’-azobis(2-methylpropionitrile) for aquatic organisms is calculated based on the lowest acute and/or chronic toxicity data among algae, cladocera (water flea) and fishes and assessment factor of 100.

\[
PNEC = \frac{2.2 \text{ (NOEC of } Daphnia)}{100} = 0.022 \text{ mg/l}
\]
The highest PEC from Japanese local exposure scenario is $1.6 \times 10^{-9}$ mg/l

$$\frac{\text{PEC}_{\text{local}}}{\text{PNEC}} = \frac{1.6 \times 10^{-9}}{0.022} = 7.3 \times 10^{-8} < 1$$

Thus, effects of this chemical on aquatic ecosystems are at low concern at present.

4. **HUMAN HEALTH**

4.1 **Human Exposure**

4.1.1 **Occupational exposure**

2,2'-Azobis(2-methylpropionitrile) is produced in closed systems and used as an initiator for polymer synthesis. The occupational exposure is expected through inhalation and dermal route is assumed negligible because this chemical is solid. As the atmospheric concentration in plant was not measured, the maximum exposure level is estimated according to working schedules as follows. If the worker (body weight: 70 kg, respiratory volume: 1.25 m³/hour) is assigned to implement this operation without protection, the highest daily intake (EHE) is calculated as 0.015 mg/kg/day as the worst case. Practically, the workers always wear protective gloves and respiratory protective equipment (mask) during the operation.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Duration</th>
<th>Working</th>
<th>Maximum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Times/day</td>
<td>hr</td>
<td>hr/day</td>
<td>Concentration</td>
<td>EHE</td>
</tr>
<tr>
<td>Charging to Reaction Vessel</td>
<td>1</td>
<td>0.17</td>
<td>0.17</td>
<td>5.00</td>
</tr>
</tbody>
</table>

EHE: Estimated Human Exposure

4.1.2 **Consumer exposure**

All of 2,2'-azobis(2-methylpropionitrile) produced in Japan is used as an initiator of polymerization, and no consumer uses are reported in Sponsor country.

4.1.3 **Indirect exposure via the environment**

As 2,2'-azobis(2-methylpropionitrile) is persistent in water and low bioaccumulative, the exposure to the general population via the environment would be possible through drinking water processed from surface water.

The concentration in drinking water should be estimated to be equal to PEC calculated in Section 3.1, i.e. $1.6 \times 10^{-9}$ mg/l. The daily intake through drinking water is calculated as $5.33 \times 10^{-11}$ mg/kg/day (2 l/day, 60 kg b.w.).

Using the bioconcentration factor of 1.0 estimated from logPow, the concentration of this chemical in fish can be calculated as follows:

$$\text{PEC}_{\text{fish}} = (1.6 \times 10^{-9} \text{ mg/l}) \times 1.0 = 1.60 \times 10^{-12} \text{ mg/g-wet}$$
As a daily intake of fish in Japan is estimated to be 90 g for 60 kg body weight person, a daily intake of this chemical will be $2.40 \times 10^{-12}$ mg/kg/day.

4.2 Effects on Human Health

a) Acute toxicity

[SIDS data] The oral LD$_{50}$ value for 2,2'-azobis(2-methylpropionitrile) was 100 mg/kg for rats. General anesthetic, somnolence, and ataxia were observed. In inhalation study, no mortality was observed at a concentration of 12 g/m$^3$ for 4 hours. Exciting behavior, conjunctive irritation, and weight loss or decreased weight gain were observed (National Technical Information Service$^1$).

In another oral study, the LD$_{50}$ value was 700 mg/kg for mice (Merck Index: 1989).

The intraperitoneal LD$_{50}$ value was 25 mg/kg for rats (National Technical Information Service$^1$) and mice (National Technical Information Service$^2$). General anesthetic, somnolence (general depressed activity), and ataxia were observed in rats.

The subcutaneous LD$_{L0}$ values were 30, 40, 50, and 50 mg/kg for rats, mice, rabbits, and guinea pigs, respectively. Convulsions, effect on seizure threshold, and other changes in lungs, thorax, or respiration were observed in all species (Archiv fuer Toxikologie: 1957).

b) Irritation

In rabbit dermal study, 2,2'-azobis(2-methylpropionitrile) did not induce skin irritation at a single dose of 500 mg (Elf Atochem: 1996a).

Test in human also showed that this chemical was not a skin irritant (Kanerva et al.: 1997). The test was performed with 2 days occlusion and 3 readings (usually on day 2, 3 and 4-6). This chemical (0.1 %) was applied to 173 patients, suspected occupational dermatoses. Skin irritative reaction was observed only in one patient.

There was an eye irritation study, in which application of this chemical at a single dose of 100 mg into the conjunctival sac, induced no irritation approximately 1, 24, 48 and 72 hr after administration (Elf Atochem: 1996b).

Therefore, 2,2'-azobis(2-methylpropanitrile) is considered not to be a skin and eye irritant.

c) Sensitisation

It was showed that 2,2'-azobis(2-methylpropanitrile) was not a skin sensitizer by guinea pig maximization test (Elf Atochem: 1996c). In this study, intradermal injection of this chemical at 0.1 % and topical application at 500 mg were performed as an induction, and topical application of this chemical undiluted at 500 mg as challenge did not induce any response.

Allergic patch test in human also showed that this chemical was not a skin sensitizer (Kanerva et al.: 1997). This test was performed with 2 days occlusion and 3 readings (usually on day 2, 3 and 4-6). This chemical was applied at 1.0 % to 173 patients, who were suspected occupational dermatoses. No allergic reaction was observed.
Therefore, 2,2'-azobis(2-methylpropanitrile) is considered not to be a skin sensitizer.

d) Repeated toxicity

[SIDS data] Oral toxicity study was performed in SD (Crj: CD) rats by an OECD combined repeat dose and reproductive/developmental toxicity screening test. 2,2'-Azobis(2-methylpropanitrile) was administered by gavage at doses of 2, 10, 50 mg/kg for 45 days in males and from 14 days before mating to day 3 of lactation in females. (MHW, Japan: 1997)

In males, temporary salivation was induced in 10 mg/kg or more groups. Decrease in body weight gain and food consumption was observed at 50 mg/kg. In kidneys, absolute and relative weight was increased in all treatment group and in 10 mg/kg or more groups, respectively. In addition, increases in eosinophilic bodies and basophilic changes of the renal tubular epithelial cells were observed in all treatment groups and granular casts in the lower nephrons were observed in 10 mg/kg and more groups. Liver weights significantly increased by 14 and 66 % for absolute weight (14 and 74 % for relative weight) in 10 and 50 mg/kg group, respectively. Centrilobular hypertrophy of hepatocyte was observed in 10 and 50 mg/kg groups (+: 4 in 13, +: 9 in 13 for 10 mg/kg, ++: 13 in 13 for 50 mg/kg, compared to no changes in 0 and 2 mg/kg groups). In blood analysis conducted only in males, several changes were observed only in 50 mg/kg group.

In females, one female died on postpartum day 3 at 50 mg/kg. Decrease in body weight gain and food consumption was observed at 50 mg/kg and more groups. In kidneys, absolute and relative weight was increased at 50 mg/kg. Liver weights significantly increased by 43 % for absolute weight (51 % for relative weight) in only 50 mg/kg group. However, centrilobular hypertrophy of hepatocytes was observed in 10 and 50 mg/kg groups (+: 6 in 13, +: 1 in 13 for 10 mg/kg, ±: 1 in 13, +: 11 in 13, ++: 1 in 13 for 50 mg/kg, compared to no changes in 0 and 2 mg/kg groups).

As renal pathological changes were observed only in males, accumulation of θ₂U-macroglobulin is suspected as a cause of male specific renal toxicity. Therefore, based on pathological changes in liver of both sexes, NOAEL was considered to be 2 mg/kg/day for both sexes.

e) Reproductive/developmental toxicity

Reproductive toxicity

[SIDS data] Oral toxicity study was performed in SD (Crj: CD) rats by an OECD combined repeat dose and reproductive/developmental toxicity screening test. 2,2'-Azobis(2-methylpropanitrile) was administered by gavage at doses of 2, 10, 50 mg/kg for 45 days in males and from 14 days before mating to day 3 of lactation in females. (MHW, Japan: 1997)

2,2'-Azobis(2-methylpropanitrile) showed no adverse effects on copulation, fertility, duration of pregnancy, gestation index and parturition at all treated groups. At 50 mg/kg (12 dams), three dams showed the difficulty of nursling and two of them let all their offsprings die within the first 4 days after birth. Although this chemical showed no adverse effects on viability, sex ratio and body weight of newborns at birth, viability and body weight of nurslings on postnatal day 4 at 50 mg/kg were lower than the control levels. These changes were considered to be caused by maternal toxicity. There were no morphological abnormalities in pups at all treated groups. Therefore, NOAEL for reproductive toxicity was considered to be 50 mg/kg/day.

f) Genetic toxicity
Bacterial test
[SIDS data] Gene reverse mutation was negative in *S. typhimurium* TA98, TA100, TA1535, TA1537, *E. coli* WP2 *uvr*A with and without metabolic activation, and TA97 without S9 mix. (MHW, Japan: 1997)

Non-bacterial test *in vitro*
[SIDS data] In chromosomal aberration test using cultured Chinese hamster lung (CHL/IU) cells, the negative result was obtained. (MHW, Japan: 1997)

In SOS chromotest, 2,2'-azobis(2-methylpropanitrile) showed borderline result in *E.coli* PQ37, but negative result in *E. coli* PM21 and GC4798. (Eder *et al.*: 1989)

Based on these results, 2,2'-azobis(2-methylpropanitrile) is considered not to be genotoxic.

4.3 Initial Assessment for Human Health

2,2'-Azobis(2-methylpropanitrile) is considered neither to be irritating to skin and eye nor a skin sensitizer. In an OECD combined repeat dose and reproductive/developmental toxicity study in rats at 2, 10 and 50 mg/kg/day, this chemical was toxic to the liver as well as the kidneys. Increases in eosinophilic bodies and basophilic changes of the renal tubular epithelial cells in the kidneys were observed only in treated male rats. This male rat specific renal toxicity might be caused by accumulation of α2u-macroglobulin as one of the possible mechanisms. Centrilobular hypertrophy of hepatocytes with the related changes in hepatotoxic blood parameters was detected at the middle and high doses in both sexes. NOAEL for repeated dose toxicity was considered to be 2 mg/kg/day, based on hepatic toxicity. As there was only a reduction in viability and body weight of offsprings after birth at the high dose, most likely due to maternal toxicity, NOAEL for reproductive toxicity was considered to be 50 mg/kg/day. This chemical may not be genotoxic, based on negative results of bacterial mutation testing and chromosomal aberration *in vitro* testing.

Occupational exposure

2,2'-Azobis(2-methylpropanitrile) is imported and used as an initiator for polymer synthesis and workers wear protective gloves and respiratory protective equipment during the operation. Although the occupational exposure route may be an inhalation in limited workers, there is no available data of the atmosphere concentration. Based on the estimated concentration and the possibility of exposure period, the daily intake is calculated as 0.015 mg/kg/day as the worst case. As there is no toxicokinetics data, it is assumed that 100% absorption occurs across the lungs. Occupational risk is presumably low because the margin of safety is 133.

Consumer exposure

No consumer exposure is expected because of use pattern.

Indirect exposure via environment

As for indirect exposure via environment, PEC\textsubscript{local} of $1.60 \times 10^{-9}$ mg/l from local exposure scenario was used for the estimation. The daily intakes through drinking water and fish are calculated as $5.33 \times 10^{-11}$ mg/kg/day and $2.40 \times 10^{-12}$ mg/kg/day, respectively. Since the margin of safety is very large, such as $3.75 \times 10^{10}$ for drinking water and $8.33 \times 10^{11}$ for fish, health risk via environment is presumably low.
5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

2,2’-Azobis(2-methylpropionitrile) is not biodegradable (OECD 301: 0% after 28d) and stable in water (T1/2 = 304 days at pH 7). PEC/PNEC ratio is much less than 1 based on the local exposure scenario in the Sponsor country and PNEC, 0.022 mg/l (NOEC of *Daphnia magna*). It is currently considered of low potential risk for environments and low priority for further work.

2,2'-Azobis(2-methylpropionitrile) is toxic in a repeated dose study (i.e. liver, kidney), such as 2 mg/kg/day of NOAEL. In reproductive/developmental toxicity screening study, this chemical shows only maternal toxicity with the result of fetal toxicity (decrease in mortality and body weight gain). This chemical is neither irritating to the skin and eyes, nor a skin sensitizer. This chemical is not genotoxic. Occupational risk is expected to be low because margin of safety is calculated as 133. The margin of safety via indirect exposure is $3.75 \times 10^{10}$ for drinking water and $8.33 \times 10^{11}$ for fish, respectively. Therefore, it is currently considered of low potential human risk and low priority for further work.

5.2 Recommendations

No recommendation

6. REFERENCES

- Elf Atochem, Laboratory study number 14350 TSG (1996a)
- Elf Atochem, Laboratory study number 14351 TSG (1996b)
- Elf Atochem, Laboratory study number 14352 TSG (1996c)
- Kanerva, L. *et al.*, Contact Dermatitis, 37, 301 (1997)
- National Technical Information Service¹. (Springfield, VA 22161) OTS0555369
- National Technical Information Service². (Springfield, VA 22161) AD691-490
Appendix 1. Method for Prediction of Environmental Concentration of Pollutant in Surface Water

1. Predicted environmental concentration in the local environment ($\text{PEC}_{\text{local}}$) with effluent release into river

When decomposition, precipitation and vaporization of pollutant can be ignored, it is used that simplified equation by complete mixing model shown with equation (1) to calculate predicted environmental concentration in the local environment ($\text{PEC}_{\text{local}}$) as for release effluent into river.

$$\text{PEC}_{\text{local}} \text{ (mg/L) } = \frac{\text{Co} \cdot Q + \text{Cs} \cdot Q_s}{Q + Q_s} \quad (1)$$

Where

Co: Concentration of pollutant in upper stream of release point (mg/L)
Cs: Concentration of pollutant in effluent (mg/L)
Q: Flow rate of river (m$^3$/day)
Qs: Flow rate of effluent released into river (m$^3$/day)

At the equation (1), when Co can be considered as 0, dilution factor of pollutant in the river (R) can be shown with following equation.

$$R = \frac{\text{Cs}}{\text{Co}} = \frac{(Q + Q_s)}{Q_s} \quad (2)$$

As the worst case, it is used to employ a flow rate at dry season as flow rate of river (Q). When flow rate at dry season is indistinct, it is estimated using the following equation in Japan.

$$\text{Flow rate at dry season} = \frac{\text{mean flow late}}{2.5} \quad (3)$$

2. Predicted environmental concentration in the local environment ($\text{PEC}_{\text{local}}$) with effluent release into sea

For prediction of concentration of pollutant in the sea water with effluent, it is employed generally Joseph-Sendnersymbol 146’s equation (4). This equation is one of analytic solution led under the following conditions from diffusion equation.

1. It is adopted large area of sea or lake.
2. The flow rate of effluent and concentration of pollutant in the effluent are constant, and distribution of concentration is able to regard as equilibrium state.
3. Effluent is distributed uniformly to vertical direction, and it spreads in a semicircle or segment to horizontal direction.
4. Diffusion coefficient of pollutant at the sea is in proportion to distance from release point of effluent.
5. There is not any effect of tidal current.
6. Decomposition of pollutant can be ignored.
\[
C(x) = \left( C_s - C(r) \right) \left( 1 - \exp \left( - \frac{Q_s}{dp \cdot x} \left( \frac{1}{r} - \frac{1}{x} \right) \right) \right) + C(r) \quad (4)
\]

Where

- \( C(x) \): Concentration of pollutant at distance \( x \) (m) from release point
- \( C_s \): Concentration of pollutant in effluent
- \( C(r) \): Concentration of pollutant at distance \( r \) (m) from release point
- \( Q_s \): Flow rate of effluent (m\(^3\)/day)
- \( \theta \): Opening angle of seacoast (rad.)
- \( d \): Thickness of diffusion layer (m)
- \( P \): Diffusion velocity (m/day) (1.0 \( \times \) 0.5 cm/sec)

When \( C(x) \) is 0 at \( r = \theta \) and density stratification is ignored for simplification, Joseph-Sendner's equation (4) is simplified to equation (5):

\[
C(x) = C_s \left( 1 - \exp \left( - \frac{Q_s}{dp \cdot x} \right) \right) \quad (5)
\]

Because of \( Q_s/dp \cdot x \ll 1 \) except vicinity of release point, dilution factor in distance \( x \) from release point \( R(x) \) can be shown with equation (6).

\[
R(x) = \frac{C_s}{C(x)} = \frac{dp \cdot x}{Q_s} \quad (6)
\]

When it is employed following parameters in equation (6) as default, dilution factor \( R \) can be shown with equation (7).

\[
P = 1 \text{ cm/sec (860 m/day)}
\]
\[
= 3.14
\]
\[
d = 10 \text{ m}
\]
\[
x = 1000 \text{ m}
\]

\[
R = 2.7 \times 10^7/Q_s \quad (7)
\]

\( Q_s \): volume of effluent (m\(^3\)/day)
REVISED OECD HPV FORM 1

SIDS DOSSIER
ON THE HPV PHASE 5 CHEMICAL
2,2'-Azobis(2-methylpropionitrile)

CAS No. 78-67-1

Sponsor Country: Japan

DATE: March 31, 1999
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Sids Profile

Sids Summary

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   * A. Cas-Number
   B. Name (Iupac-Name)
   * C. Name (Oecd Name)
   † D. Cas Descriptor
   E. Einecs-Number
   F. Molecular Formula
   * G. Structural Formula
   H. Substance Group
   I. Substance Remark
   J. Molecular Weight

1.02 Oecd Information
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   B. Lead Organisation
   C. Name Of Responder (Company)

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6. References

Appendix 1

Note: *; Data elements in the SIDS
†; Data elements specially required for inorganic chemicals
### SIDS Profile

<table>
<thead>
<tr>
<th>1.01 A.</th>
<th>CAS No.</th>
<th>78-67-1</th>
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<tbody>
<tr>
<td>1.01 C.</td>
<td>CHEMICAL NAME (OECD Name)</td>
<td>2,2'-Azobis(2-methylpropionitrile)</td>
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<tr>
<td>1.01 D.</td>
<td>CAS DESCRIPTOR</td>
<td></td>
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<td>1.01 G.</td>
<td>STRUCTURAL FORMULA</td>
<td>((\text{H}_3\text{C})_2\text{C(CN)N}—\text{NC(CN)(CH}<em>3)</em>{2})</td>
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### Other Chemical Identity Information

| 1.5 | QUANTITY | Production: 1,100 tonnes/year  
Import volume: 12 tonnes/year in Japan |
| 1.7 | USE PATTERN | Intermediate  
Intermediate in closed system.  
Initiator for polymerization. |
| 1.9 | SOURCES AND LEVELS OF EXPOSURE | 1 kg/year  
Release into river |

### Issues for Discussion (Identify, if any)

SIDS testing required:
- Water solubility, Vapour pressure, Octanol/water partition coefficient,  
Stability in water, Biodegradation  
Chronic toxicity to daphnia,  
Combined repeat dose and reproductive toxicity,  
Gene mutation, Chromosomal aberration test in vitro
## SIDS Summary

**CAS NO: 78-67-1**

<table>
<thead>
<tr>
<th>STUDY</th>
<th>Information</th>
<th>OECD Study</th>
<th>GLP</th>
<th>Other Study</th>
<th>Estimation Method</th>
<th>Acceptable</th>
<th>SIDS Testing Required</th>
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<tr>
<td>2.1</td>
<td>Melting Point</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<td>2.2</td>
<td>Boiling Point</td>
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<td>Y</td>
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<td>2.3</td>
<td>Density</td>
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<td>2.4</td>
<td>Vapour Pressure</td>
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<td>N</td>
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<td>2.5</td>
<td>Partition Coefficient</td>
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<td>2.6</td>
<td>Water Solubility</td>
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<td>N</td>
<td>N</td>
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<td>2.12</td>
<td>Oxidation: Reduction potential</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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</table>

### Other P/C Studies Received

#### Environmental Fate and Pathway

| 3.1.1 | Photodegradation | N | Y | N | Y | N | N | N |
| 3.1.2 | Stability in water | N | Y | Y | N | N | N | N |
| 3.2   | Monitoring data  | N | Y | Y | N | N | N | N |
| 3.3   | Transport and Distribution | N | Y | Y | N | N | N | N |
| 3.5   | Biodegradation   | N | Y | Y | N | N | N | N |

### Other Env Fate Studies Received

#### Ecotoxicity

| 4.1   | Acute toxicity to Fish | N | Y | Y | N | N | N | N |
| 4.2   | Acute toxicity to Daphnia | N | Y | Y | N | N | N | N |
| 4.3   | Toxicity to Algae      | N | Y | Y | N | N | N | N |
| 4.5.2 | Chronic toxicity to Daphnia | N | Y | Y | N | N | N | N |
| 4.6.1 | Toxicity to Soil dwelling organisms | N | Y | Y | N | N | N | N |
| 4.6.2 | Toxicity to Terrestrial plants | N | Y | Y | N | N | N | N |
| 4.6.3 | Toxicity to Birds      | N | Y | Y | N | N | N | N |

### Other Ecotoxicity Studies Received

#### Toxicity

| 5.1.1 | Acute Oral         | Y | N | N | Y | N | Y | N |
| 5.1.2 | Acute Inhalation   | Y | N | N | Y | N | Y | N |
| 5.1.3 | Acute Dermal       | N | Y | Y | N | N | N | N |
| 5.4   | Repeated Dose      | N | Y | Y | N | N | N | N |
| 5.5   | Genetic Toxicity *in vitro* | N | Y | Y | N | N | N | N |
|       | . Gene mutation     | N | Y | Y | N | N | N | N |
|       | . Chromosomal aberration | N | Y | Y | N | N | N | N |
| 5.6   | Genetic Toxicity *in vivo* | N | Y | Y | N | N | N | N |
| 5.8   | Reproduction Toxicity | N | Y | Y | N | N | N | N |
| 5.9   | Development / Teratogenicity | N | Y | Y | N | N | N | N |
| 5.11  | Human experience   | N | Y | Y | N | N | N | N |

### Other Toxicity Studies Received
1. GENERAL INFORMATION

1.01 SUBSTANCE INFORMATION

*A. CAS number 78-67-1

B. Name (IUPAC name)

C. Name (OECD name) 2,2’-Azobis(2-methylpropionitrile)

†D. CAS Descriptor

E. EINECS-Number 201-132-3

F. Molecular Formula C₈H₁₂N₄

*G. Structural Formula

   \((H₃C)₂C(CN)N\equiv\text{NC}(\text{CN})(\text{CH₃})₂\)

H. Substance Group

I. Substance Remark

J. Molecular Weight 164.21

1.02 OECD INFORMATION

A. Sponsor Country: Japan

B. Lead Organisation:

   Name of Lead Organisation: Ministry of Health and Welfare (MHW)
   Ministry of International Trade and Industry (MITI)
   Environmental Agency (EA)
   Ministry of Labour (MOL)

   Contact person: Mr. Kazuhide Ishikawa
   Economic International Bureau
   Second International Organization Division
   Ministry of Foreign Affairs

   2-2-1 Kasumigaseki, Chiyoda-ku, Tokyo 100 Japan
   Tel: 81-3-3581-0018
   Fax: 81-3-3503-3136

C. Name of responder

   Same as above contact person
1.1 GENERAL SUBSTANCE INFORMATION

A. Type of Substance  
- element [ ]
- inorganic [ ]
- natural substance [ ]
- organic [X]
- organometallic [ ]
- petroleum product [ ]

B. Physical State (at 20°C and 1.013 hPa)  
gaseous [ ]
liquid [ ]
solid [X]

C. Purity

1.2 SYNONYMS  
Azobisisobutyronitrile; Azodiisobutyrodinitrile; 2,2'-Azobis[2-methylpropanenitrile]; AIBN; alpha,alpha'-Azodiisobutyronitrile; 2,2'-Dicyano-2,2'-azopropane; Porofor-57; 2,2'-Azo-bis(isobutyronitrile); 2,2'-Dimethyl-2,2'-azodipropionitrile

1.3 IMPURITIES  
None

1.4 ADDITIVES  
None

*1.5 QUANTITY

Remarks: 1,100 tonnes/year
Reference: MITI, Japan

1.6 LABELLING AND CLASSIFICATION  
None

*1.7 USE PATTERN

A. General

Type of Use:  
- main
- industrial
- use

Category:  
- Intermediate
- Intermediate in closed system
- Initiator for polymerization

Remarks: None
Reference: MITI, Japan

1.8 OCCUPATIONAL EXPOSURE LIMIT  
None

*1.9 SOURCES OF EXPOSURE
In Japan, 2,2’-azobis(2-methylpropionitrile) is produced in 2 companies.

Source: Media of release: River
Quotities per media: 1 kg/year (one company)
Remarks:
Reference: MITI, Japan

2. PHYSICAL-CHEMICAL DATA

*2.1 MELTING POINT

Value: 100 - 103 °C
Decomposition: Yes [ ] No [X] Ambigious [ ]
Sublimation: Yes [ ] No [X] Ambigious [ ]
Method:
GLP:
Remarks:
Reference: MITI, Japan

*2.2 BOILING POINT

Value: decompose
Pressure:
Decomposition: Yes [X] No [ ] Ambigious [ ]
Method:
GLP:
Remarks:
Reference:

*2.4 VAPOUR PRESSURE

Value: 8.1 x 10^{-1} Pa
Temperature: 25 °C
Method: calculated [ ]; measured [X]
OECD TG 104
GLP:
Test substance: purity: 99.6 %
Remarks:
Reference: MITI, Japan

*2.5 PARTITION COEFFICIENT log_{10}P_{ow}

Log Pow: 1.10
Temperature: 25 °C
Method: calculated [ ]; measured [X]
OECD TG 107
GLP:
Test substance: purity: 98 %
Remarks:
Reference: MITI, Japan
*2.6 WATER SOLUBILITY

A. Solubility

Value: 350 mg/L
Temperature: 25 °C
Description: Miscible [ ]; Of very high solubility [ ]; Soluble [ ]; Slightly soluble [X]; Of low solubility [ ]; Of very low solubility [ ]; Not soluble [ ]
Method: OECD TG 105
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.6 %
Remarks: MITI, Japan

B. pH Value, pKa Value

No ionizable Functional Group

3. ENVIRONMENTAL FATE AND PATHWAYS

3.1 STABILITY

*3.1.2 STABILITY IN WATER

Type: Abiotic (hydrolysis) [X]; biotic (sediment)[ ]
Half life: 263 days at pH 4 at 25 °C
304 days at pH 7 at 25 °C
210 days at pH 9 at 25 °C
Method: OECD TG 111
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.6 %
Remarks: MITI, Japan

*3.2 MONITORING DATA (ENVIRONMENTAL)

(a) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Surface water (river)
Results: ND (Detection limits: 0.01 mg/l) in 1 area in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

(b) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Surface water (estuary)
Results: ND (Detection limits: 0.01 mg/l) in 1 area in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

(c) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Surface water (sea)
Results: ND (Detection limits: 0.01 mg/l) in 3 areas in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

(d) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Sediment (river)
Results: ND (Detection limits: 0.1 mg/kg-dry) in 1 area in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

(e) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Sediment (estuary)
Results: ND (Detection limits: 0.1 mg/kg-dry) in 1 area in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

(f) Type of Measurement: Background [ ]; At contaminated site [ ]; Other [X]
Media: Sediment (sea)
Results: ND (Detection limit: 0.1 mg/kg-dry) in 3 areas in Japan as of 1979
Remarks: ND: Not detected
Reference: Chemicals in the environment, EA, Japan (1980)

3.3 TRANSPORT AND DISTRIBUTION BETWEEN ENVIRONMENTAL COMPARTMENTS INCLUDING ESTIMATED ENVIRONMENTAL CONCENTRATIONS AND DISTRIBUTION

*3.3.2 THEORETICAL DISTRIBUTION (FUGACITY CALCULATION)

Media: Air-biota [ ]; Air-biota-sediment-soil-water [X]; Soil-biota [ ]; Water-air [ ]; Water-biota [ ]; Water-soil [ ]; Other [ ]
Method: Fugacity level I [ ]; Fugacity level II [ ]; Fugacity level III [X]; Fugacity level IV [ ]; Other (calculation) [ ]; Other (measurement)[ ]
Results:

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Release 100% to air</th>
<th>Release 100% to water</th>
<th>Release 100% to soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>31.0 %</td>
<td>0.5 %</td>
<td>0.7 %</td>
</tr>
<tr>
<td>Water</td>
<td>40.9 %</td>
<td>98.6 %</td>
<td>28.6 %</td>
</tr>
<tr>
<td>Soil</td>
<td>27.9 %</td>
<td>0.5 %</td>
<td>70.6 %</td>
</tr>
<tr>
<td>Sediment</td>
<td>0.2 %</td>
<td>0.4 %</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>

Remarks: Appendix 1
Reference: MITI, Japan

*3.5 BIODEGRADATION
Type: aerobic [X]; anaerobic [ ]
Inoculum: adapted [ ]; non-adapted [X];
Concentration of the chemical: related to COD [ ]; DOC [ ]; test substance [X]
Medium: water [X]; water-sediment [ ]; soil [ ]; sewage treatment [ ]
Degradation: 0 % by BOD after 28 days
3 % by TOC after 28 days
7 % by HPLC after 28 days
Results: readily biodeg. [ ]; inherently biodeg. [ ]; under test condition no biodegradation observed [X], other [ ]
Method: OECD TG 301C
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99 %
Reference: MITI, Japan

4. ECOTOXICITY

4.1 ACUTE/PROLONGED TOXICITY TO FISH

(a) Type of test: static [ ]; semi-static [X]; flow-through [ ]; other (e.g. field test) [ ]
Species: Oryzias latipes (Himedaka)
Exposure period: 96 h
Results: LC50 (96 h) > 10 mg/l
Analytical monitoring: Yes [X] No [ ] ? [ ]
Method: OECD TG 203 (1992)
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4, purity: 99.3 %
Remarks: Groups of ten Himedaka were exposed to the nominal concentrations of 1.0, 1.8, 3.2, 5.6 and 10* mg/l, a solubilizer control (100 mg/l of DMF) and laboratory water control. The LC50 (96h) was determined to be over 10 mg/l. 10* mg/l; the highest concentration dispersed completely by the maximum concentration of solubilizer (100 mg/l). Measured concentration was almost same as nominal concentration.

(b) Type of test: static [ ]; semi-static [ ]; flow-through [X]; other (e.g. field test) [ ]
Species: Poecilia reticulata (Guppy)
Exposure period: 14 d
Results: LC50 (14d) > 10 mg/l
Analytical monitoring: Yes [X] No [ ] ? [ ]
Method: OECD TG 203 (1992)
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4, purity: 99.3 %
Remarks: Groups of ten Himedaka were exposed to the nominal concentrations of 1.0, 1.8, 3.2, 5.6 and 10* mg/l, a solubilizer control (100 mg/l of DMF) and laboratory water control. The LC50 (14 d) was determined to be over 10 mg/l.
10* mg/l; the highest concentration dispersed completely by the maximum concentration of solubilizer (100 mg/l). Measured concentrations were almost same as nominal concentrations throughout the test period.


4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

*A. Daphnia

Type of test: static [ ]; semi-static [X]; flow-through [ ]; other (e.g. field test) [ ]; open-system [ ]; closed-system [X]

Species: Daphnia Magna.

Exposure period: 48 h.

Results: EC50 (48 h) > 10 mg/l

Analytical monitoring: Yes [X] No [ ] ? [ ]

Method: OECD TG 202

GLP: Yes [X] No [ ] ? [ ]

Test substance: As prescribed by 1.1 - 1.4, purity: 99.3 %

Remarks: 20 daphnids (4 replicates by 5 organisms) were exposed to the nominal concentrations of 10* mg/l, solubilizer control (DMF of 100 mg/l) and laboratory water control.


Type of test: static [X]; semi-static [ ]; flow-through [ ]; other (e.g. field test) [ ]; open-system [ ]; closed-system [X]

Species: Daphnia Magna.

Exposure period: 48 h.

Results: EC50 (48 h) > 367 mg/l

Analytical monitoring: Yes [X] No [ ] ? [ ]

Method: C2 of the European Directive 92/69/CEE

GLP: Yes [X] No [ ] ? [ ]

Test substance: As prescribed by 1.1 - 1.4, purity: Unknown

Remarks: Since AZDN is sparingly soluble, the test was carried out with concentrations up to the water solubility. Daphnia were exposed in a static test to a concentration range of 160 to 367 mg/l, forming a geometric progression with a factor of 1.15. The test was performed with 20 daphnia per concentration. The test was performed using closed flasks as test glassware. The flasks were entirely filled with test solution and closed with butyl rubber caps covered with PTFE.

Reference: Service Analyse Environment (France)

*4.3 TOXICITY TO AQUATIC PLANTS, e.g. algae

Species: Selenastrum capricornutum ATCC 22662

Endpoint: Biomass [X]; Growth rate [ ]; Other [ ]

Exposure period: 72 h

Results: Biomass EC50 (72h) > 9.4 mg/l
(Endpoint) NOEC = 4.2 mg/l

Analytical monitoring: Yes [X] No [ ] ? [ ]
Method: OECD TG 201 (1984) open-system [X]; closed-system [ ]
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4, purity: 99.3 %
Remarks: Static test. The EC50 value for growth rate (% inhibition) was calculated based on 5 measured concentrations (0.46, 0.71, 2.1, 4.2 and 9.4 mg/l). DMF of 100 mg/l was used as a solubilizer.

Species: *Pseudokirchneriella subcapitata (Selenastrum capricornutum)*
Endpoint: Biomass [X]; Growth rate [ ]; Other [ ]
Exposure period: 72 h
Results: Biomass EC50 (72h) 2.9 mg/l
NOEC = 2.2 mg/l
Growth rate EC50 (72h) 6.1 mg/l
NOEC = 2.2 mg/l

Analytical monitoring: Yes [X] No [ ] ? [ ]
Method: OECD TG 201 (1984) open-system [X]; closed-system [ ]
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4, purity: Unknown
Remarks:
Reference: Service Analyse Environment (France)

4.4 TOXICITY TO BACTERIA

No data

4.5 CHRONIC TOXICITY TO AQUATIC ORGANISMS

4.5.1 CHRONIC TOXICITY TO FISH

No data

(*) 4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Type of test: static [ ]; semi-static [X]; flow-through [ ]; other (e.g. field test) [ ]; open-system [ ]; closed-system [X]
Species: *Daphnia Magna.*
Endpoint: Mortality [ ]; Reproduction rate [X]; Other [X]
Exposure period: 21 d
Results: Reproduction rate: EC50 (21 d) = 7.5 mg/l
(Endpoint) NOEC = 2.2 mg/l
LOEC = 4.6 mg/l

Analytical monitoring: Yes [X] No [ ] ? [ ]
GLP: Yes [X] No [ ] ? [ ]
Test substance: As prescribed by 1.1 - 1.4, purity: 99.3 %
Remarks: 40 daphnids (4 replicate of 10 daphnids) were exposed to 5 nominal concentrations (0.46, 1.0, 2.2, 4.6, and 10 mg/l), solvent control (100 mg/l of acetone) control and laboratory water control (dechlorinated tap water, pH: 7.4 to 8.0; DO: 7.5 to 8.0 mg/l). Measured concentrations were within 88 to 98 % of the nominal concentrations throughout the 21-d test period.


4.6 TOXICITY TO TERRESTRIAL ORGANISMS

4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

No data

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

No data

4.6.3 TOXICITY TO OTHER NON MAMMALIAN TERRESTRIAL SPECIES (INCLUDING AVIAN)

No data

4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)

No data

4.8 BIOTRANSFORMATION AND KINETICS

No data

4.9 ADDITIONAL REMARKS

None

5. TOXICITY

*5.1 ACUTE TOXICITY

5.1.1 ACUTE ORAL TOXICITY

Type: LD₀ [ ]; LD₁₀₀ [ ]; LD₅₀ [X]; LDL₀ [ ]; Other [ ]
Species/strain: Rats
Value: 100 mg/kg b.w.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: General anesthetic, somnolence, and ataxia
Reference: National Technical Information Service¹
Type: LD0 [ ]; LD100 [ ]; LD50 [X]; LDL0 [ ]; Other [ ]
Species/strain: Mice
Value: 700 mg/kg b.w.
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: Merck Index: 1989

5.1.2 ACUTE INHALATION TOXICITY

Type: LC0 [ ]; LC100 [ ]; LC50 [ ]; LCL0 [X]; Other [ ]
Species/strain: Rats
Exposure time: 4 hr
Value: > 12 g/m³
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: Exciting behavior, conjunctive irritation, weight loss or decreased weight gain
Reference: National Technical Information Service¹

5.1.3 ACUTE DERMAL TOXICITY

No data

5.1.4 ACUTE TOXICITY, OTHER ROUTES OF ADMINISTRATION

(a) Type: LD0 [ ]; LD100 [ ]; LD50 [X]; LDL0 [ ]; Other [ ]
Species/strain: Rats
Route of Administration: i.m. [ ]; i.p. [X]; i.v. [ ]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: Value: 25 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: General anesthetic, somnolence (general depressed activity), and ataxia
Reference: National Technical Information Service¹

(b) Type: LD0 [ ]; LD100 [ ]; LD50 [X]; LDL0 [ ]; Other [ ]
Species/strain: Mice
Route of Administration: i.m. [ ]; i.p. [X]; i.v. [ ]; infusion [ ]; s.c. [ ]; other [ ]
Exposure time: Value: 25 mg/kg
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: 
Reference: National Technical Information Service²
5.2 CORROSIVENESS/IRRITATION

5.2.1 SKIN IRRITATION/CORROSION
Species/strain: New Zealand White rabbits
Results: Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [ ]; Not irritating [X]
Classification: Highly corrosive (causes severe burns)[ ]; Corrosive (causes burns)[ ]; Irritating [ ]; Not irritating [ ]
Method: OECD TG 404 and EC TG 92/69/E.E.C., B4
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.2 %
Remarks: A single dose of 500 mg in original form of 2,2'-azobis(2-methylpropanitrile) was applied to the closely-clipped skin of the flank for 4 hours, with semi-occlusives dressing. Cutaneous reaction was evaluated approximately one hour, 24, 48 and 72 hours after removal of the dressing.
Reference: Elf Atochem: 1996a

Species/strain: Human
Results: Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [ ]; Not irritating [X]
Classification: Highly corrosive (causes severe burns)[ ]; Corrosive (causes burns)[ ]; Irritating [ ]; Not irritating [ ]
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: unknown
Remarks: Test was performed with 2 days occlusion and 3 readings (usually on irritant day 2, 3 and 4-6). 1.0 % in petroleum ether was applied to 173 patients, who were suspected occupational dermatoses.
Reference: Kanerva et al.: 1997

5.2.2 EYE IRRITATION/CORROSION

Species/strain: New Zealand White rabbits
Results: Highly corrosive [ ]; Corrosive [ ]; Highly irritating [ ]; Irritating [ ]; Moderate irritating [ ]; Slightly irritating [ ]; Not irritating [X]
Classification: Irritating [ ]; Not irritating [ ]; Risk of serious damage to eyes [ ]
Method: OECD TG 405 and EC TG 92/69/E.E.C., B5
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.2 %
Remarks: After gently pulling the lower lid away from the eyeball, a single dose of 100 mg in original form of 2,2'-azobis(2-methylpropanitrile) was administered into the conjunctival sac of the left eye. The lower and upper eyelids were held together for about one second to avoid any loss of test substance. The right eye, which remained untreated, served as a control. The eyes were not rinsed and examined approximately one hour, 24, 48 and 72 hours after administration.
Reference: Elf Atochem: 1996b
5.3 SKIN SENSITISATION

Type: Maximization test  
Species/strain: Dunkin-Hartley guinea pigs  
Results: Sensitizing [ ]; Not sensitizing [X]; Ambiguous [ ]  
Classification: Sensitizing [ ]; Not sensitizing [ ]  
GLP: Yes [X] No [ ] ? [ ]  
Test substance: purity: 99.2 %  
Remarks: On day 1, 0.1 % in paraffin oil or the vehicle was injected intradermally in the dorsal region between the shoulders. On day 7, the same region received a topical application of sodium lauryl sulfate in vaseline in order to induce local irritation. On day 8, topical application of undiluted substance (500 mg) or the vehicle to this same site was performed with an occlusive dressing for 48 hours. After rest period of 12 days, all animals were challenged by a topical application of undiluted substance (500 mg) and the vehicle to the right and the left flank, respectively. This application was held for 24 hours with an occlusive, hypoallergenic dressing. Skin reaction was evaluated approximately 24 and 48 hours after challenge application.  
Reference: Elf Atochem: 1996c

Type: Allergic and irritant patch test  
Species/strain: Human  
Results: Sensitizing [ ]; Not sensitizing [X]; Ambiguous [ ]  
Classification: Sensitizing [ ]; Not sensitizing [ ]  
Method: Other  
GLP: Yes [ ] No [X] ? [ ]  
Test substance: purity: unknown  
Remarks: This test was performed with 2 days occlusion and 3 readings (usually on day 2, 3 and 4-6). 1.0 % in petroleum ether was applied to 173 patients, who were suspected occupational dermatoses.  
Reference: Kanerva et al.: 1997

*5.4 REPEATED DOSE TOXICITY

Species/strain: Rats/Crj: CD (SD)  
Sex: Female [ ]; Male [ ]; Male/Female [X]; No data [ ]  
Route of Administration: Oral (by gavage)  
Exposure period: Male: 42 days  
Female: From 14 days before mating to day 3 of lactation  
Frequency of treatment: Daily  
Post exposure observation period:  
Dose: 0, 2, 10, 50 mg/kg/day  
Control group: Yes [X]; No [ ]; No data [ ]; Corn oil  
Concurrent no treatment[ ]; Concurrent vehicle[X]; Historical [ ]  
NOAEL: Male: 2 mg/kg/day, Female: 2 mg/kg/day  
LOAEL: Male: 10 mg/kg/day, Female: 10 mg/kg/day
Results: Male: Temporary salivation was induced at 10 mg/kg or more groups. Decrease in body weight gain and food consumption was observed at 50 mg/kg. In kidneys, absolute and relative weight was increased in all treatment group and in 10 mg/kg or more groups, respectively. In addition, increases in eosinophilic bodies and basophilic changes of the renal tubular epithelial cells were observed in all treatment groups and granular casts in the lower nephrons were observed in 10 mg/kg and more groups. As these pathological changes were observed only in males, accumulation of $\alpha_{2u}$-macroglobulin is suspected as a cause of male specific renal toxicity. Liver weights significantly increased by 14 and 66 % for absolute weight (14 and 74 % for relative weight) in 10 and 50 mg/kg group, respectively. Centrilobular hypertrophy of hepatocyte was observed in 10 and 50 mg/kg groups ($\pm$: 4 in 13, $+$: 9 in 13 for 10 mg/kg, $++$: 13 in 13 for 50 mg/kg, compared to no changes in 0 and 2 mg/kg groups). In blood analysis, there were several changes in 50 mg/kg group, such as an elevation of platelet and white blood cell counts, increases in total protein, albumin, total cholesterol, Ca and inorganic phosphorus, and decreases in the A/G ratio and Cl concentration.

Female: One animal died on postpartum day 3 at 50 mg/kg. Decrease in body weight gain and food consumption was observed in 10 mg/kg and more groups. In kidneys, absolute and relative weights were increased at 50 mg/kg. Liver weights significantly increased by 43 % for absolute weight (51 % for relative weight) in only 50 mg/kg group. However, centrilobular hypertrophy of hepatocytes was observed in 10 and 50 mg/kg groups ($\pm$: 6 in 13, $+$: 1 in 13 for 10 mg/kg, $\pm$: 1 in 13, $+$: 11 in 13, $++$: 1 in 13 for 50 mg/kg, compared to no changes in 0 and 2 mg/kg groups).

Method:
OECD Combined Repeat Dose and eproductive/Developmental Toxicity Screening Test

GLP:
Yes [X] No [ ]

Test substance:
purity: 99.9 %

Reference:
MHW, Japan (1997)

*5.5 GENETIC TOXICITY IN VITRO

A. BACTERIAL TEST

Type:
Gene mutation test

System of testing:
Salmonella typhimurium TA98, TA100, TA1535, TA1537, TA97 (without S9 mix), Escherichia coli WP2 uvrA

Concentration:
+S9 mix; 0, 313, 625, 1250, 2500, 5000 µg/plate (TA98, TA100, TA1535, TA1537, and WP2 uvrA)
-S9 mix; 0, 313, 625, 1250, 2500, 5000 µg/plate (all strains)

Metabolic activation:
With [ ]; Without [ ]; With and Without [X]; No data [ ]

S9:
Rat liver, induced with phenobarbital and 5,6-benzoflavone

Results:
Cytotoxicity conc: With metabolic activation: Not observed
OECD SIDS  2,2'-AZOBIS(2-METHYLPROPIONITRILE)

Without metabolic activation: Not observed
Precipitation conc: With metabolic activation: 1250 µg/plate
Without metabolic activation: 2500 µg/plate
Genotoxic effects: + ? -
With metabolic activation: [ ] [ ] [X]
Without metabolic activation: [ ] [ ] [X]
Method: Guidelines for Screening Mutagenicity Testing of Chemicals (Japan) and OECD Guideline No. 471 and 472
GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.9 %
Remarks: Positive control:
With metabolic activation: 2-Aminoanthracene (five strains)
Without metabolic activation:

Sodium azide (TA 1535)
9-Aminoacridine (TA1537, TA 97)
2-(2-Furyl)-3-(5-nitro-2-furyl) acrylamide (TA100, TA98, WP2)
Reference: MHW, Japan (1997)

Type: SOS chromotest
System of testing: Escherichia coli PQ37, PM21, GC4798
Concentration: Not indicated
Metabolic activation: With [ ]; Without [X]; With and Without [ ]; No data [ ]
Results: 2,2'-Azobis(2-methylpropanitrile) showed borderline result in PQ37, but negative result in PM21, GC4798.
Cytotoxicity conc: With metabolic activation:
Without metabolic activation:
Precipitation conc: + ? -
Genotoxic effects: With metabolic activation: [ ] [ ] [ ]
Without metabolic activation: [ ] [X] [ ]
Method: Other
GLP: Yes [ ] No [X] ? [ ]
Test substance: purity: 98 %

B. NON-BACTERIAL IN VITRO TEST

Type: Chromosomal aberration test
System of testing: Chinese hamster lung (CHL/IU) cells
Concentration: +S9 mix (short-term treatment): 0, 0.40, 0.80, 1.6 mg/ml
-S9 mix (short-term treatment): 0, 0.40, 0.80, 1.6 mg/ml
-S9 mix (continuous treatment): 0, 0.40, 0.80, 1.6 mg/ml
Metabolic activation: With [ ]; Without [ ]; With and Without [X]; No data [ ]
S9: Rat liver, induced with phenobarbital and 5,6-benzoflavone.
Results: Cytotoxicity conc: Not observed
Precipitation conc:
OECD SIDS  2,2'-AZOBIS(2-METHYLPROPIONITRILE)

Genotoxic effects:      clastogenicity  polyploidy
                        +    ?    -    +    ?    -
With metabolic activation: [ ]  [ ]  [X]  [ ]  [ ]  [X]
Without metabolic activation: [ ]  [ ]  [X]  [ ]  [ ]  [X]

Method:  Guide for Screening Mutagenicity Testing of Chemicals (Japan),
and OECD TG No. 473

GLP:  Yes [X]  No [ ]  ? [ ]

Test substance:  purity: 99.9%

Remarks:  Exposure period: short-term treatment: 6 hr
continuous treatment: 24, or 48 hr
Positive control: -S9: Mitomycin, +S9: Cyclophosphamide

Reference:  MHW, Japan (1997)

* 5.6  GENETIC TOXICITY IN VIVO

No data

5.7  CARCINOGENICITY

No data

*5.8  TOXICITY TO REPRODUCTION

Type:  Fertility [ ]; One-generation study [ ]; Two-generation study [ ]; Other [X]

Species/strain:  Rats/Crj: CD (SD)

Sex:  Female [ ]; Male [ ]; Male/Female [X]; No data [ ]

Route of Administration:  Oral (by gavage)

Exposure period:  Male: From 14 days before mating to 14 days after mating
Female: From 14 days before mating to day 3 of lactation

Frequency of treatment:  Daily

Post exposure observation period:

Premating exposure period: 14 days

Duration of the test:

Dose:  0, 2, 10, 50 mg/kg/day

Control group:  Yes [X]; No [ ]; No data [ ]; Corn oil

Concurrent no treatment[ ]; Concurrent vehicle[X]; Historical [ ]

NOAEL Parental:  10 mg/kg/day

NOAEL F1 Offspring:  50 mg/kg/day

NOAEL F2 Offspring:

Results:

General parental toxicity:
There were no adverse effects of 2,2'-azobis(2-methylpropanitrile) on copulation and fertility, duration of pregnancy, gestation index and parturition at all treated group. Three of 12 dams at 50 mg/kg showed the difficulty of nursling and two of them let all their offsprings die within the first 4 days after birth.

Toxicity to offspring:
This compound showed no adverse effects on viability, sex ratio and body weight gain of pups. However, viability of newborns
at birth and body weight of nurslings on postnatal day 4 was lower than the control levels at 50 mg/kg/day. These changes were considered to be caused by maternal toxicity. There were no morphological abnormalities in pups at all treated groups.

Method: OECD Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test

GLP: Yes [X] No [ ] ? [ ]
Test substance: purity: 99.9 %
Remarks: MHW, Japan (1997)

*5.9 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

No data

5.10 OTHER RELEVANT INFORMATION

A. Specific toxicities

No data

B. Toxicodynamics, toxicokinetics

No data

* 5.11 EXPERIENCE WITH HUMAN EXPOSURE

No data

6. REFERENCES

- Elf Atochem, Laboratory study number 14350 TSG (1996a)
- Elf Atochem, Laboratory study number 14351 TSG (1996b)
- Elf Atochem, Laboratory study number 14352 TSG (1996c)
- Kanerva, L., et al., Contact Dermatitis, 37, 301 (1997)
- National Technical Information Service1. (Springfield, VA 22161) OTS0555369
- National Technical Information Service2. (Springfield, VA 22161) AD691-490
### Appendix 1.

#### Scenario 1

<table>
<thead>
<tr>
<th>Emission Rate</th>
<th>Conc.</th>
<th>Amount</th>
<th>Percent</th>
<th>Transformation Rate [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[kg/h]</td>
<td>[g/m³]</td>
<td>[kg]</td>
<td>[%]</td>
<td>Reaction</td>
</tr>
<tr>
<td><strong>Air</strong></td>
<td>1,000</td>
<td>7.1.E-06</td>
<td>7.1.E+04</td>
<td>31.0</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>0</td>
<td>4.7.E-03</td>
<td>9.4.E+04</td>
<td>40.9</td>
</tr>
<tr>
<td><strong>Soil</strong></td>
<td>0</td>
<td>4.0.E-02</td>
<td>6.4.E+04</td>
<td>27.9</td>
</tr>
<tr>
<td><strong>Sediment</strong></td>
<td>4.3.E-03</td>
<td>4.3.E+02</td>
<td>0.2</td>
<td>3.4E-02</td>
</tr>
</tbody>
</table>

**Total amount**: 2.3.E+05

#### Scenario 2

<table>
<thead>
<tr>
<th>Emission Rate</th>
<th>Conc.</th>
<th>Amount</th>
<th>Percent</th>
<th>Transformation Rate [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[kg/h]</td>
<td>[g/m³]</td>
<td>[kg]</td>
<td>[%]</td>
<td>Reaction</td>
</tr>
<tr>
<td><strong>Air</strong></td>
<td>0</td>
<td>4.6.E-07</td>
<td>4.6.E+03</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>1000</td>
<td>4.4.E-02</td>
<td>8.7.E+05</td>
<td>98.6</td>
</tr>
<tr>
<td><strong>Soil</strong></td>
<td>0</td>
<td>2.6.E-03</td>
<td>4.2.E+03</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Sediment</strong></td>
<td>3.9.E-02</td>
<td>3.9.E+03</td>
<td>0.4</td>
<td>3.2.E-01</td>
</tr>
</tbody>
</table>

**Total amount**: 8.8.E+05

#### Scenario 3

<table>
<thead>
<tr>
<th>Emission Rate</th>
<th>Conc.</th>
<th>Amount</th>
<th>Percent</th>
<th>Transformation Rate [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[kg/h]</td>
<td>[g/m³]</td>
<td>[kg]</td>
<td>[%]</td>
<td>Reaction</td>
</tr>
<tr>
<td><strong>Air</strong></td>
<td>0</td>
<td>1.6.E-06</td>
<td>1.6.E+04</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>0</td>
<td>3.1.E-02</td>
<td>6.2.E+05</td>
<td>28.6</td>
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<tr>
<td><strong>Soil</strong></td>
<td>1000</td>
<td>9.6.E-01</td>
<td>1.5.E+06</td>
<td>70.6</td>
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<tr>
<td><strong>Sediment</strong></td>
<td>2.8.E-02</td>
<td>2.8.E+03</td>
<td>0.1</td>
<td>2.3.E-01</td>
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**Total amount**: 2.2.E+06

#### Scenario 4

<table>
<thead>
<tr>
<th>Emission Rate</th>
<th>Conc.</th>
<th>Amount</th>
<th>Percent</th>
<th>Transformation Rate [kg/h]</th>
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</thead>
<tbody>
<tr>
<td>[kg/h]</td>
<td>[g/m³]</td>
<td>[kg]</td>
<td>[%]</td>
<td>Reaction</td>
</tr>
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<td><strong>Air</strong></td>
<td>600</td>
<td>4.6.E-06</td>
<td>4.6.E+04</td>
<td>7.4</td>
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<tr>
<td><strong>Water</strong></td>
<td>300</td>
<td>1.9.E-02</td>
<td>3.8.E+05</td>
<td>61.2</td>
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<tr>
<td><strong>Soil</strong></td>
<td>100</td>
<td>1.2.E-01</td>
<td>1.9.E+05</td>
<td>31.2</td>
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<tr>
<td><strong>Sediment</strong></td>
<td>1.7.E-02</td>
<td>1.7.E+03</td>
<td>0.3</td>
<td>1.4.E-01</td>
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**Total amount**: 6.2.E+05
### Physico-chemical parameter

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<tr>
<th>Parameter</th>
<th>Value</th>
<th>Method</th>
<th>Temp.</th>
<th>Unit</th>
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<tr>
<td>Molecular weight</td>
<td>164.21</td>
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<tr>
<td>Melting point</td>
<td>101.5</td>
<td>Measured</td>
<td></td>
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<tr>
<td>Vapor pressure [Pa]</td>
<td>8.1E+01</td>
<td>Measured</td>
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<td></td>
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<tr>
<td>Water solubility [g/m³]</td>
<td>350</td>
<td>Measured</td>
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<td></td>
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<tr>
<td>Log Kow</td>
<td>1.1</td>
<td>Measured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half life [h]</td>
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<td></td>
</tr>
<tr>
<td>In air</td>
<td>272</td>
<td>Estimated</td>
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<tr>
<td>In water</td>
<td>8640</td>
<td>Estimated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In soil</td>
<td>8640</td>
<td>Estimated</td>
<td></td>
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</tr>
<tr>
<td>In sediment</td>
<td>8640</td>
<td>Estimated</td>
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### Environmental parameter

<table>
<thead>
<tr>
<th>Environment</th>
<th>Volume</th>
<th>Depth</th>
<th>Area</th>
<th>Organic content</th>
<th>Lipid content</th>
<th>Density [kg/m³]</th>
<th>Residence [h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk air</td>
<td>1.0E+13</td>
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<td></td>
<td>1.2</td>
<td></td>
<td>100</td>
<td></td>
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<tr>
<td>Particles</td>
<td>2.0E+03</td>
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<td></td>
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</tr>
<tr>
<td>Total</td>
<td>1.0E+13</td>
<td>1000</td>
<td>1E+10</td>
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</tr>
<tr>
<td>Bulk water</td>
<td>2.0E+10</td>
<td></td>
<td></td>
<td></td>
<td>1000</td>
<td>1000</td>
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<tr>
<td>Particles</td>
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<td>Fish</td>
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<td>0.05</td>
<td>1000</td>
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<tr>
<td>Total</td>
<td>2.0E+10</td>
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<td>2E+09</td>
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<td>Bulk soil</td>
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<tr>
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<td>1.0E+13</td>
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<tr>
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<td>4.8E+08</td>
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</tr>
<tr>
<td>Solid</td>
<td>8.0E+08</td>
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<td>2400</td>
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<tr>
<td>Total</td>
<td>1.6E+09</td>
<td>0.2</td>
<td>8E+09</td>
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<td>Bulk sediment</td>
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<tr>
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### Intermedia Transport Parameters

<table>
<thead>
<tr>
<th>Transport</th>
<th>MTC [m/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air side - Water MTC</td>
<td>5</td>
</tr>
<tr>
<td>Water side - Air MTC</td>
<td>0.05</td>
</tr>
<tr>
<td>Rain Rate</td>
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</tr>
<tr>
<td>Aerosol Deposition</td>
<td>6E-10</td>
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<tr>
<td>Soil Air Phase Diffusion MTC</td>
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</tr>
<tr>
<td>Soil Water Phase Diffusion MTC</td>
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EXTRACT FROM IRPTC LEGAL FILES
OECD SIDS

2,2'-AZOBIS(2-METHYLPROPIONITRILE)

File: 17.01 LEGAL
rn : 1645478

systematic name: Propanenitrile, 2,2'-azobis%2-methyl-
common name : Azodiisobutyronitrile
reported name : AZODIISOBUTYRONITRILE
cas no : 78-67-1
area : IMO
type : REC

<table>
<thead>
<tr>
<th>subject</th>
<th>specification</th>
<th>descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRNSP</td>
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<td>CLASS</td>
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<td>LABEL</td>
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<tr>
<td>PACK</td>
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</tr>
</tbody>
</table>

HAZARD CLASS: 4.1 = INFLAMMABLE SOLID. PACKING GROUP: II = MEDIUM DANGER (I=GREAT DANGER - III=MINOR DANGER). SUBSIDIARY RISK LABEL: EXPLOSIVE UN NO. 2952
entry date: JAN 1991

******

File: 17.01 LEGAL
rn : 1745186

systematic name: Propanenitrile, 2,2'-azobis%2-methyl-
common name : Azodiisobutyronitrile
reported name : AZODIISOBUTYRONITRILE
cas no : 78-67-1
area : UN
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<td>CLASS</td>
</tr>
<tr>
<td>LABEL</td>
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<tr>
<td>PACK</td>
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</tbody>
</table>

HAZARD CLASS: 4.1 = INFLAMMABLE SOLID. PACKING GROUP: II = MEDIUM DANGER (I=GREAT DANGER - III=MINOR DANGER). UN NO. 2952
entry date: AUG 1990