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表　　題

1,3-ベンゼンジメタンアミンの藻類（*Selenastrum capricornutum*）に対する生長阻害試験

試験番号

９Ｂ４４９Ｇ

試験方法

本試験は，OECD 化学品テストガイドライン No.201「藻類生長阻害試験」（1984年）に準拠して実施した。

1) 被験物質:　1,3-ベンゼンジメタンアミン
2) 暴露方式：　止水式，振とう培養（100rpm）
3) 供試生物:　*Selenastrum capricornutum* (ATCC22662)
4) 暴露期間：　72時間
5) 試験濃度（設定値）：
　対照区，1.00，2.19，4.78，10.5，22.9，50.0 mg/L
　（公比：2.2）
6) 試験液量：　100 mL（ＯＥＣＤ培地）／容器
7) 連数：　３容器／濃度区
8) 初期細胞濃度：1×10^4 cells/mL
9) 試験温度：　23±2 ℃
10) 照明：　4000 lux （±20％の変動内，フラスコ液面付近）で連続照明
11) 分析法:　ＨＰＬＣ法

結　果

1) 試験液中の被験物質濃度

被験物質の測定濃度が開始時において設定値の±20％を超えたものがなかったため，下記の生長阻害濃度の算出には設定値を採用した。

2) 生長曲線下面積の比較による阻害濃度

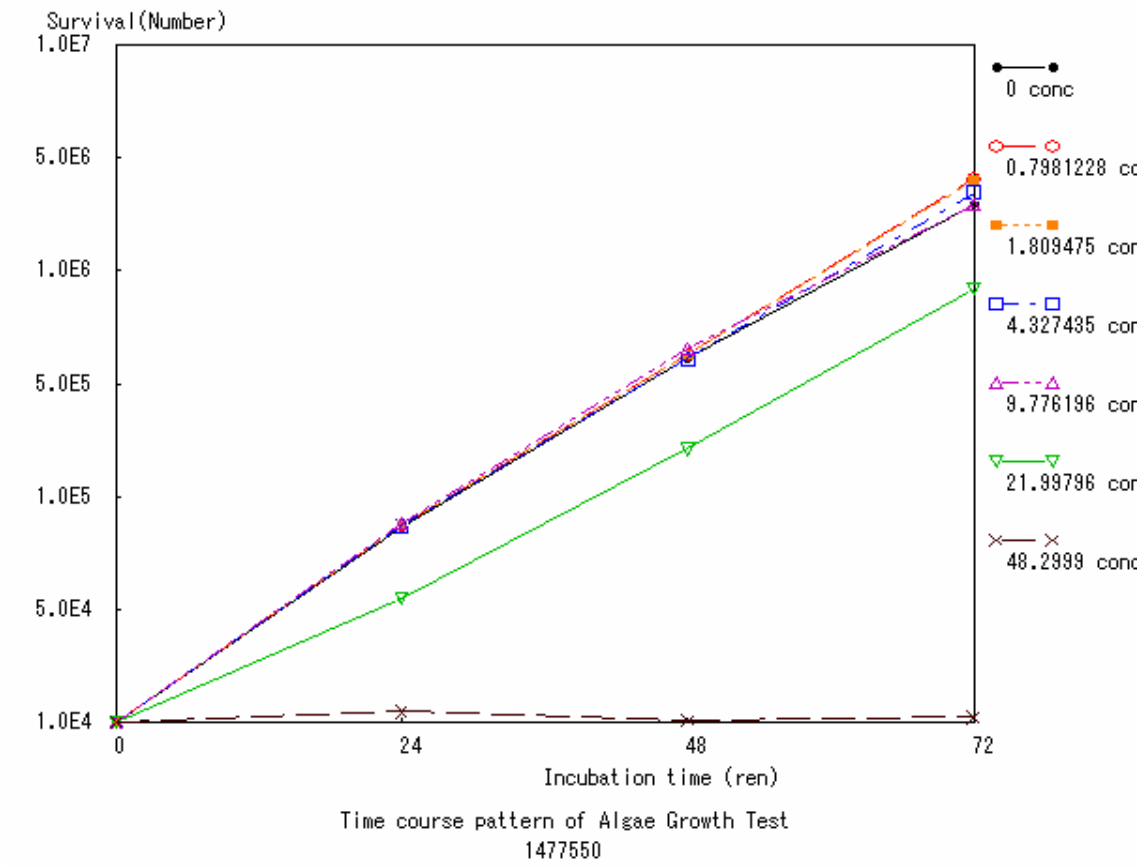
50％生長阻害濃度 EbC50(0-72)：	20.3	mg/L	(95％信頼区間：算出不可)
最大無作用濃度 NOECb(0-72)：	10.5	mg/L	

3) 生長速度の比較による阻害濃度

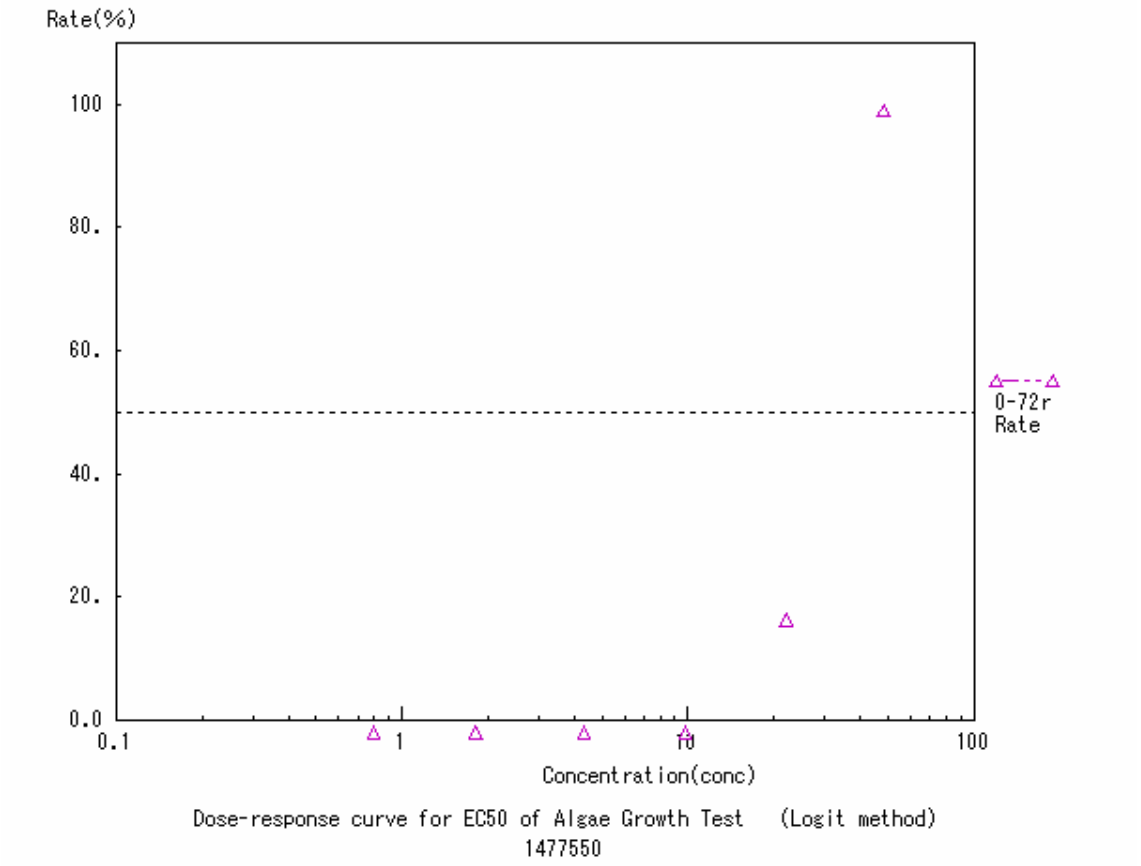
50％生長阻害濃度 ErC50(24-48)：	32.1	mg/L	(95％信頼区間：算出不可)
最大無作用濃度 NOECr(24-48)：	10.5	mg/L	
50％生長阻害濃度 ErC50(24-72)：	33.3	mg/L	(95％信頼区間：算出不可)
最大無作用濃度 NOECr(24-72)：	22.9	mg/L	

1,3-ビス（アミノメチル）ベンゼン（CAS.1477-55-0）

① 生長曲線



② 阻害率曲線



③ 毒性値

0-72hErC50（実測値に基づく）＝28 mg/L
0-72hNOECr（実測値に基づく）＝9.8 mg/L

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1,3-ベンゼンジメタンアミンのオオミジンコ（*Daphnia magna*）に対する急性遊泳阻害試験

試験番号

９Ｂ４７１Ｇ

試験方法

本試験は，OECD 化学品テストガイドライン No.202「ミジンコ類，急性遊泳阻害試験および繁殖試験」（1984年）に準拠して実施した。

1) 被験物質：　1,3-ベンゼンジメタンアミン
2) 暴露方式：　止水式，水面をテフロンシートで被覆
3) 供試生物：　オオミジンコ（*Daphnia magna*）
4) 暴露期間：　48時間
5) 試験濃度（設定値）：対照区，5.00，8.90，16.0，28.0，50.0 mg/L
　　公比：1.8
6) 試験液量：　100 mL／容器
7) 連数：　４容器／濃度区
8) 供試生物数：　20頭／濃度区（5頭／容器）
9) 試験温度：　20±1℃
10) 照明：　16時間明／8時間暗
11) 分析法：　ＨＰＬＣ法

結　果

1) 試験液中の被験物質濃度

被験物質の測定濃度がすべて設定値の±20％以内であったため，各影響濃度の算出には設定値を採用した。

2) 24 時間暴露後の結果

半数遊泳阻害濃度（EiC50）：　35.1 mg/L　（95％信頼限界 : 28.0～50.0 mg/L）

最大無作用濃度（NOECi）：　16.0 mg/L

100％阻害最低濃度：　50.0 mg/L

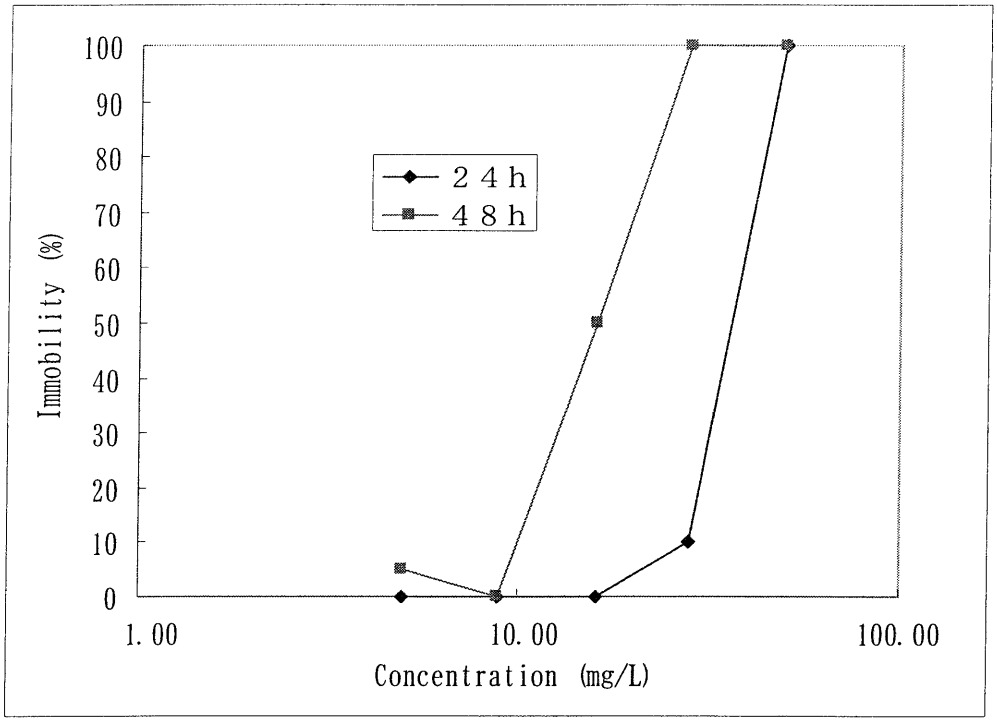
3) 48 時間暴露後の結果

半数遊泳阻害濃度（EiC50）：　15.2 mg/L　（95％信頼限界 : 12.3～18.7 mg/L）

最大無作用濃度（NOECi）：　8.90 mg/L

100％阻害最低濃度：　28.0 mg/L

Figure 1　Concentration-Response (Immobility) Curve



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1,3-ベンゼンジメタンアミンのオオミジンコ（*Daphnia magna*）に対する繁殖阻害試験

試験番号

９Ｂ４９３Ｇ

試験方法

本試験は，OECD 化学品テストガイドラインNo.211「オオミジンコ繁殖試験」（1998年）に準拠して実施した。

1) 被験物質：　1,3-ベンゼンジメタンアミン
2) 暴露方式：　半止水式（24時間毎に試験液の全量を交換）
　　水面をテフロンシートで被覆
3) 供試生物：　オオミジンコ（*Daphnia magna*）
4) 暴露期間：　21日間
5) 試験濃度(設定値）：
　　対照区，0.150，0.470，1.50，4.70，15.0 mg/L
　　公比：3.2
6) 試験液量：　80 mL／容器
7) 連数：　10容器／濃度区
8) 供試生物数：10頭／濃度区（1頭／容器）
9) 試験温度：　20±1℃
10) 照明：　16時間明／8時間暗
11) 分析法：　ＨＰＬＣ法

結　果

1) 試験液中の被験物質濃度

被験物質の測定濃度がすべて設定値の±20％以内であったため，各影響濃度の算出には設定値を採用した。

2) 21 日間暴露の各影響濃度結果を以下に示す。

親ミジンコの半数致死濃度（LC50）：　6.77 mg/L

(95％信頼限界 ： 1.50～15.0 mg/L)

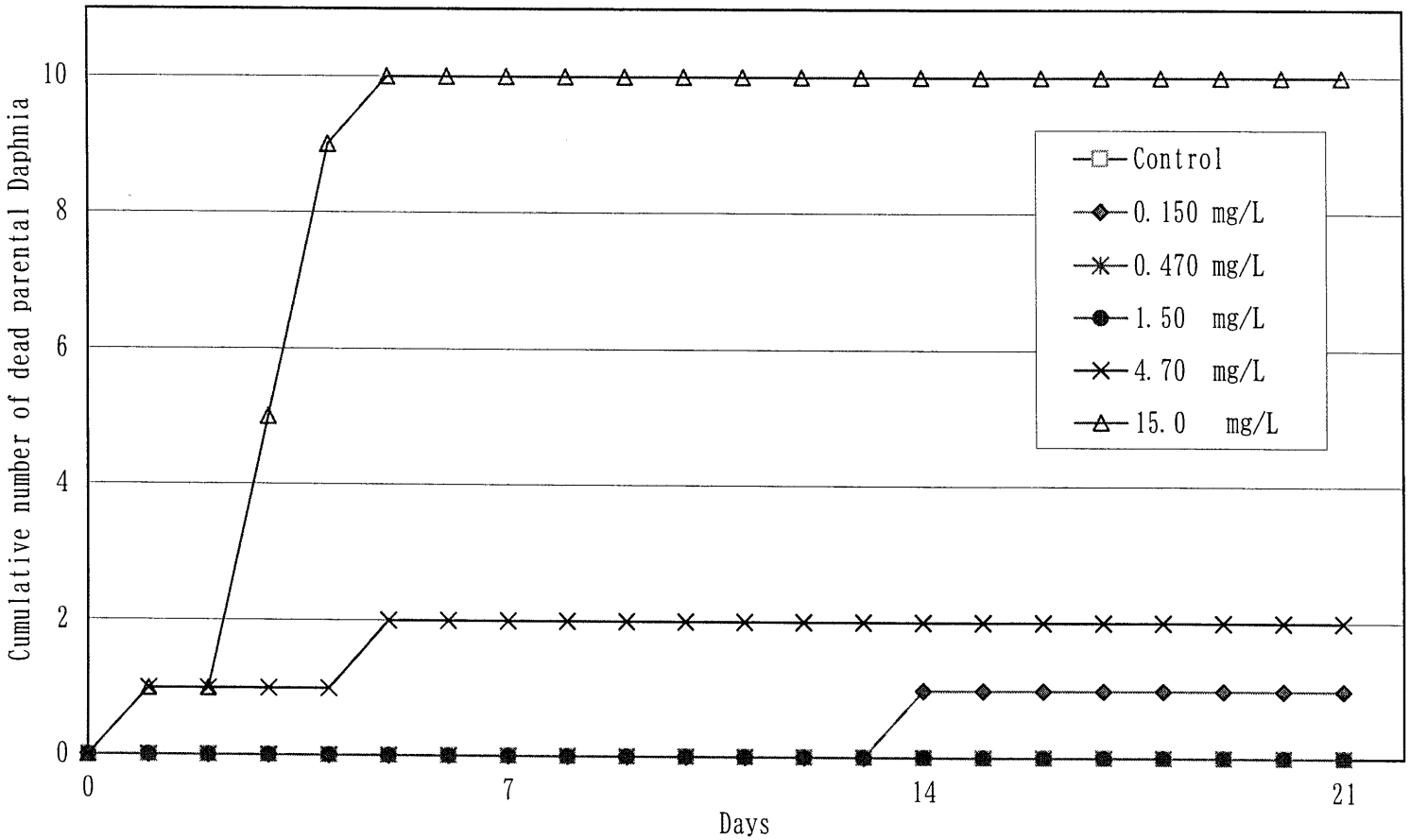
50％ 繁殖阻害濃度（EC50）：　8.40 mg/L

(95％信頼限界 ： 算出不可)

最大無作用濃度(NOEC) ：　4.70 mg/L

最小作用濃度(LOEC) ：　15.0 mg/L

Figure 1 Cumulative Numbers of Dead Parental *Daphnia*



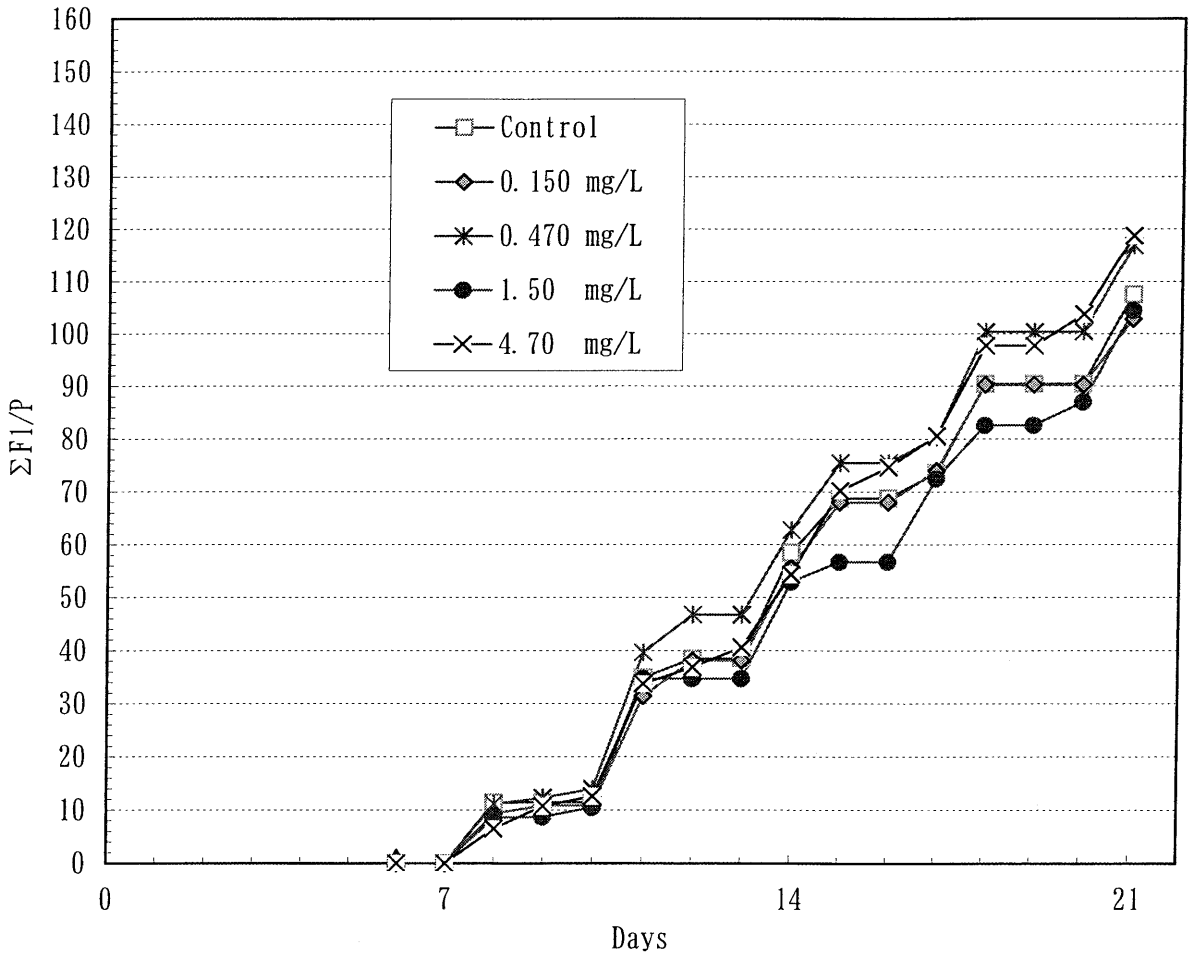
Values in legend are given in the nominal concentration.

Table 4 Mean Cumulative Numbers of Juveniles Produced per Adult Alive for 21 Days (ΣF1/P)

Nominal Conc.	Days															
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Control	0.0	0.0	11.4	11.5	11.5	34.9	38.5	38.5	58.5	68.8	68.8	73.6	90.5	90.5	90.5	107.5
0.150 mg/L	0.0	0.0	9.3	10.9	10.9	31.4	38.1	38.1	55.6	68.0	68.0	74.0	90.3	90.3	90.3	102.8
0.470 mg/L	0.0	0.0	11.2	12.3	14.0	39.7	46.8	46.8	62.8	75.5	75.5	80.4	100.4	100.4	100.4	116.9
1.50 mg/L	0.0	0.0	8.6	8.7	10.5	34.7	34.7	34.7	53.0	56.8	56.8	72.5	82.6	82.6	87.0	104.5
4.70 mg/L	0.0	0.0	6.5	10.8	12.6	33.8	36.9	40.6	54.4	70.3	74.6	80.6	97.8	97.8	103.8	118.8
15.0 mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

-: All parental *Daphnia* were dead during a 21-days testing period.

Figure 2 Time Course of ΣF1/P for Each Concentration Level



Values in legend are given in the nominal concentration.

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表　題

1,3-ベンゼンジメタンアミンのヒメダカ（*Oryzias latipes*）に対する急性毒性試験

試験番号

９Ｂ５１５Ｇ

試験方法

本試験は，OECD 化学品テストガイドライン No.203「魚類毒性試験」（1992年）に準拠して実施した。

1) 被験物質：　1,3-ベンゼンジメタンアミン

2) 暴露方式：　半止水式（24時間毎に試験液の全量を交換），水面をテフロンシートで被覆

3) 供試生物：　ヒメダカ（*Oryzias latipes*）

4) 暴露期間：　96時間

5) 試験濃度（設定値）：対照区，　10.0，18.0，32.0，56.0，100mg/L

公比；1.8

6) 試験液量：　5.0L／容器

7) 連数：　１容器／濃度区

8) 供試生物数：　10尾／濃度区

9) 試験温度：　24±1℃

10) 照明：　室内光，16時間明／8時間暗

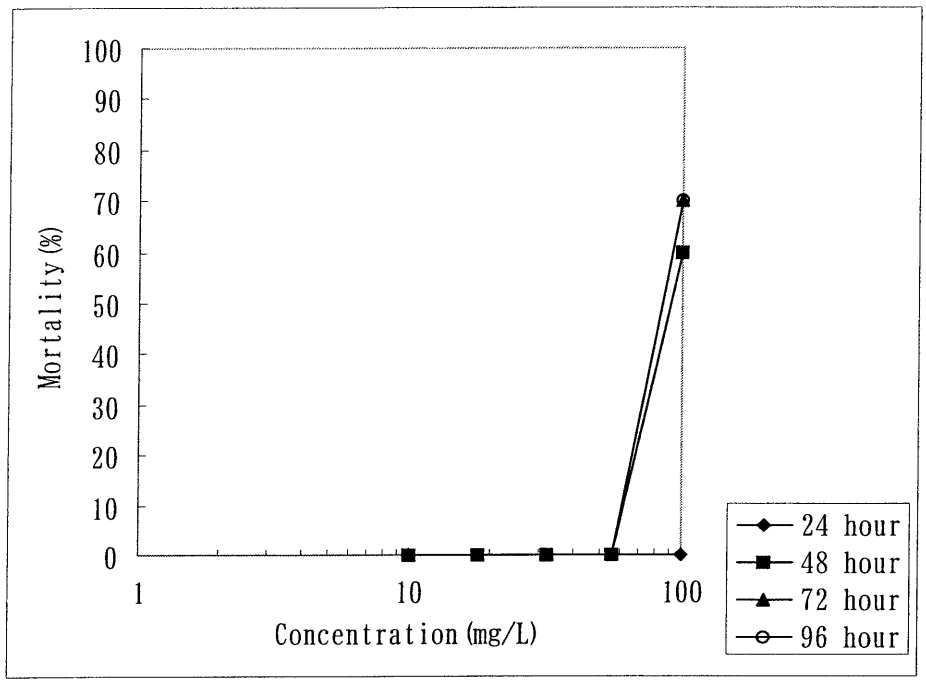
11) 分析法：　ＨＰＬＣ法

結　果

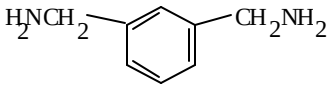
1) 試験液中の被験物質濃度：測定濃度はすべての濃度区において設定濃度に対して±20%以内であった。したがって，結果の算出は設定濃度に基づいて行った。

2) 96 時間の半数致死濃度（LC50）：87.6 mg/L（95％信頼区間：56.0mg/L～>100mg/L）

Figure 1 Concentration-Response (Mortality) Curve



SIDS INITIAL ASSESSMENT PROFILE

CAS No.	1477-55-0
Chemical Name	1,3-bis(aminomethyl)benzene
Structural Formula	

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

There is no information on toxicokinetics. The toxicity of this chemical is entirely consistent with its corrosiveness at the site of first contact.

Oral LD_{50} of rats was 1090 mg/kg for males and 980 mg/kg for females [OECD TG 401]. The oral LD_{50} of mice was 1180 mg/kg [OECD TG 401]. The inhalation LC_{50} (4h) of rats was 0.8 mg/L for females but it was presumed to be more than 1.42 mg/L for males. The toxicity via oral administration and inhalation was tissue damage in the digestive and respiratory organs, respectively, which are the first contact sites. The chemical is corrosive to rat and mouse skin and a sensitiser in the guinea pig maximisation test.

In the 28-day repeated dose toxicity study [OECD TG 407], the chemical was given to rats by gavage at doses of 0, 10, 40, 150 and 600 mg/kg b.w/day. One male and four females died, and salivation, low locomotor activity and piloerection were noted in the 600 mg/kg group. Furthermore, ulceration, acanthosis with hyperkeratosis and submucosal inflammation were observed in the forestomach. No adverse effects were observed in the 150 mg/kg and the lower dose groups.

A reproductive /developmental toxicity screening test [OECD TG 421] of rats by gavage at 50, 150 and 450 mg/kg b.w/day for at least 41 days resulted in death in one male in the 150 mg/kg group, and three males and one female in the 450 mg/kg group. In almost all 450 mg/kg animals, the same histopathological changes as the above 28-day study were observed in the forestomach. No adverse effects were found at 50 mg/kg b.w/day.

Based on this information, the NOAEL for repeated dose toxicity is considered to be 50 mg/kg b.w/day.

In the above reproductive/developmental toxicity screening test [OECD TG 421] the substance was administered from 14 days before mating to 20 days after mating in males and to day 3 of lactation in females. No adverse effects were observed in terms of copulation, fertility, delivery and nursing of parents, and the viability, body weight and morphology of offsprings. The NOAEL for reproductive/developmental toxicity (F1 offspring) was 450 mg/kg b.w/day.

The chemical was not mutagenic in bacteria [OECD TG 471 & 472]. It induced neither chromosomal aberrations in mammalian cells *in vitro* [OECD TG 473] nor micronuclei in mouse bone marrow *in vivo* [OECD TG 474].

In clinical observation of workers during the manufacturing process, the chemical appears to act as a gastrointestinal irritant. It has also been shown to cause contact sensitisation reactions in workers at concentrations equal to and below 0.1 mg/m^3 (the occupational threshold limit value in the US).

Environment

The chemical has a log Pow value of 0.18 at 25 °C, a vapour pressure of 0.04 hPa at 25 °C, and a water solubility of > 100 000 mg/L. Fugacity model Mackay level III calculations suggest that the majority of the chemical would distribute to soil if released to soil and/or air compartment(s), and water if released to aquatic compartment.

The chemical is not readily biodegradable (49% after 28 d) or inherently biodegradable (BOD = 22%, TOC = 6% and analysis in HPLC = 21%) and it does not hydrolyse (half-life >1 y at 25 ^{o}C). However, the chemical does not bioaccumulate (BCF < 2.7 at 0.2 mg/L). The chemical will react with carbon dioxide to form the carbamate acid, and will undergo indirect photo-oxidation with hydroxy radicals ($T_{½}$ 5.39 h), and will therefore not persist in the atmosphere.

Acute toxicity data were available for three kinds of fish (Medaka, 96h LC_{50} = 87.6 mg/L; Golden orfe, 96h LC_{50} = 75 mg/L and Rainbow trout, 96h LC_{50} >100 mg/L). In *Daphnia magna*, acute toxicity values of 48h EC_{50} = 15.2 mg/L and 48h EC_{50} = 16 mg/L were reported. The chronic toxicity data for *Daphnia magna* were 6.77 mg/L EC_{50} (21d, reproduction inhibition) and 4.7 mg/L NOEC (21d, reproduction inhibition). The parental toxicity for *Daphnia magna* was 8.4 mg/L 21d LC_{50}. The results in algae were E_bC_{50} = 12 mg/L and NOEC = 6.25 mg/L (*Scenedesumus subspicatus*) and E_bC_{50} = 20.3 mg/L and NOEC (0 to 72 h) = 10.5 mg/L (*Selenastrum capricornutum*).

The predicted no effect concentration (PNEC) of 0.047 mg/L is estimated from the lowest chronic value (NOEC of 4.7mg/L, *D. magna* reproduction), by applying an assessment factor of 100 because two chronic studies are available (that is, in algae and daphnia).

Exposure

Production of the chemical in Japan is ca. 13 000 t/y (1999 – 2000). The chemical is an intermediate in the production of epoxy curing agents, polyamides and polyurethanes. Due to the chemical binding processes that occur during curing, finished products do not contain the chemical. The substance is also not present in the industrial intermediates used in the production of polyamides and polyurethanes, but a few percent is present in the epoxy curing agent. The great majority of the epoxy curing agent is assumed to be used by industrial or professional users. Greater than 99.9% of the substance is used in three categories: polyamide (major), epoxy curing agent, and polyurethane production.

Based on the chemical nature, physico-chemical properties and the annual production amount, a Mackay level III fugacity model calculation shows that the chemical would distribute mainly into water. However, the use as an intermediate indicates that most of the chemical will be consumed in the reaction process. Environmental exposure from manufacture is considered to be negligible, because aqueous waste from plant cleaning is sent to a waste-water treatment plant before release and exhaust gases are sent for incineration.

The manufacture of epoxy resins and other compounds are conducted in closed systems. Occupational exposure limit values are set world-wide as 0.1 mg/m^3 15 min STEL. In a model workshop system, MXDA airborne concentrations varied from 0.064 to 0.229 mg/m^3 without ventilation and 0.018 to 0.051 mg/m^3 with ventilation. The EASE model gave a dermal exposure (non-dispersive use, indirect handling) of much less than 0.1 mg/cm^2/day. Personal protective equipment (vapour masks, goggles, overalls, gloves) is worn during operations such as drum filling. For inhalation exposure, the expected human exposure (inhalation) would be EHEinh =0.0073 mg/kg/day on the highest vapour concentration of 0.051 mg/m^3 in the model workshop system. If absorption occurred through hands and forearms, the calculated EHEder would be 0.03 mg/kg/day.

NATURE OF FURTHER WORK RECOMMENDED

The substance is not a priority for further work in relation to the use of the substance as an intermediate in a closed system.

4. HAZARDS TO THE ENVIRONMENT

4.1 AQUATIC EFFECTS

In the following table the results from acute and chronic tests with aquatic organisms are presented.

Table 5. Acute and chronic studies in aquatic organisms

Organism	Test duration	Result (mg/L)	Reference
fish			
Medaka (Oryzias latipes)	96 hours (ss)	LC_{50} (96 h) = 87.6 mg/L	(20)
Golden Orfe	96 hours (ss)	LC_{50} (96 h) = 75 mg/L	(20)
Rainbow trout	96 hours (s)	LC_{50} (96 h) > 100 mg/L	(20)
Invertebrates	48 hours (s)	EC_{50} (immobilisation) = 15.2 mg/L	(21)
Water Flea	48 hours (s)	EC_{50} (immobilisation) = 16 mg/L	(21)
(*Daphnia magna*)	21 days (ss)	EC_{50} (reproduction) = 6.77 mg/L LC_{50} (parent) = 8.4 mg/L NOEC (reproduction) = 4.7 mg/L	(22)
Green algae			
Selenastrum capricornutum	72 hours (s)	E_bC_{50} (biomass, 0 to 72 h) = 20.3 mg/L $NOEC_b$ (0 to 72 h) = 10.5 mg/L E_rC_{50} (growth rate, 24 to 72 h) = 33.3 mg/L $NOEC_r$ (24 to 72 h) = 22.9 mg/L	(23)
Scenedesmus subspicatus	72 hours (s)	E_bC_{50} (biomass, 72 h) = 12 mg/L E_rC_{50} (growth rate, 0 to 24 h) = 14 mg/L $NOEC_b$ (0 to 72 h) = 6.25 mg/L	(23)

(s): Static conditions
(ss): Semi-static conditions

4.1.1 TERRESTRIAL EFFECTS

There is no available information.

4.3 OTHER ENVIRONMENTAL EFFECTS

There is no available information.

4.4 INITIAL ASSESSMENT FOR THE ENVIRONMENT

The chemical is not readily biodegradable (49%, OECD 301B) or inherently biodegradable (MITI II, corresponding to OECD 302C: BOD = 22%, TOC = 6% and analysis in HPLC = 21%). It does not bioaccumulate (BCF < 0.3 and < 2.7 at 2 and 0.2 mg/L, respectively).

Acute toxicity data were available for three kinds of fish (Medaka, $96hLC_{50}$ = 87.6 mg/L; Golden orfe, $96hLC_{50}$ = 75 mg/L and Rainbow trout, $96hLC_{50}$ >100 mg/L). In *Daphnia magna*, acute toxicity values of $48hEC_{50}$ = 15.2 mg/L and $48hEC_{50}$ = 16 mg/L were reported. The chronic

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(22) MOE, Japan (2000) Ministry of Environment : unpublished report of A reproduction-inhibition study to *Daphnia magna* on 1,3-benzenedimethanamine.

(23) MOE, Japan (2000) Ministry of Environment : unpublished report of A growth–inhibition study to algae (*Selenastrum capricornutum*) on 1,3-benzenedimethanamine. C Mead, Algal inhibition test, SafePharm Laboratories, report 930/001 (1995) (unpublished).