FOREWORD INTRODUCTION

DOCOSANOIC ACID

CAS N°: 112-85-6

SIDS Initial Assessment Report for 13th SIAM

(Bern, Switzerland, November 6 - 9, 2001)

Chemical Name: Docosanoic acid

CAS No: 112-85-6

Sponsor Country: Japan

National SIDS Contact Point in Sponsor Country:

Mr. Koji Tomita,
Ministry of Foreign Affairs,
Japan

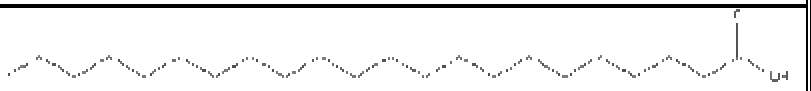
History:

As a high priority chemical for initialassessment, docosanoic acid was selected in the framework of the ICCA Initiative.
Ministry of Health, Labour and Welfare, Ministry of Economy, Trade and Industry and Ministry of Environment were involved in the peer review process for the preparation of all SIDS initial assessment documents.

Comments:

ICCA Initiative work was lead by NOF CORPORATION, Japan.
SIDS initial assessment documents were prepared by Chemicals Evaluation and Research Institute (CERI), Japan.

SIDS INITIAL ASSESSMENT PROFILE

CAS No.	112-85-6
Chemical Name	Docosanoic acid
Structural Formula	 $CH_3(CH_2)_{20}COOH$

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

Oral LD_{50} value of docosanoic acid for rats is greater than 2,000 mg/kg. There are no available data for irritation and sensitization. In an oral study using the OECD combined repeated dose and reproductive/developmental toxicity test [OECD TG 422], docosanoic acid was administered to rats at doses of 0, 100, 300, 1,000 mg/kg/day for at least 42 days. No deaths occurred and also no substance related toxic effects were observed in any parameters. Therefore, the NOAEL is considered to be 1,000 mg/kg/day for both repeated dose toxicity and reproductive/developmental toxicity. The chemical was negative in both a bacterial mutation test [OECD TG 471, 472] and a chromosomal aberration test *in vitro* [OECD TG 473].

Environment

Docosanoic acid is stable in water but inherently biodegradable (OECD TG 301C: 48-56 % (BOD) after 28-day and OECD TG 302C: 79-96% (BOD) after 28 days). It is likely to be easily degraded in air by the reaction with photochemically produced OH radical (half-life time is estimated as 13.7 hours). Fugacity level III calculation shows that the majority of docosanoic acid is likely to be distributed into water and sediment when it is released into water environment.

Acute toxicity values of docosanoic acid on alga (*Selenastrum capricornutum*), aquatic invertebrate (*Daphnia magna*) or fish (*Oryzias latipes*) are greater than its water solubility (0.016 mg/L). The NOEC in a 21-day reproduction test with *Daphnia magna* is also greater than its water solubility. No significant effects are observed in any tests conducted at extremely high concentrations by using dispersant under OECD test guidelines [TG201, 202, 203, 204, or 211]. There is information that some fatty acids with shorter carbon chain caused no mortality at saturated concentration in certain aquatic organisms (gammarus in freshwater; Medaka in seawater condition). Considering from these data and additional information, it is reasonable to assume that docosanoic acid is not toxic to aquatic organisms at the concentration less than its water solubility (0.016 mg/L). A PNEC is not calculated since NOEC values obtained are above the water solubility of the substance.

Exposure

The production volume of docosanoic acid is estimated at 6,440 tonnes (Production; 5,960 tonnes, import; 480 tonnes) in Japan in 1999. Docosanoic acid is produced in two companies in Japan, and used

as an intermediate for the production of its metal salts, docosylamine or higher alkyl esters in the chemical industry. The chemical is approved for use as a cosmetic ingredient in Japan. Docosanoic acid naturally occurs as triglyceride in most seed fats, animal milk fats, marine animal oils and so on.

The chemical seems to be released mainly into water from production and use sites after biological treatment.

Occupational exposures through inhalation as its vapor or dermal absorption are assumed to be negligible because of the low vapor pressure and low water solubility. While this chemical is produced in a closed system in Japan, workers might be exposed by dust during packing process when the chemical is treated as powder. EHE_{inh} is calculated as 0.71 mg/kg/day (8h operation without protection, body weight; 70 kg, respiratory volume; 1.25 m^3/h). Workers are recommended to wear protective equipment (dust mask) during the work to avoid the exposure by dust. General population is indirectly exposed to this chemical through food consumption, since docosanoic acid exists naturally in various foods.

Docosanoic acid may be permitted for use in cosmetics in some region (e.g. Japan), however, no information is available on whether cosmetic products are available which contain docosaonic acid. Further information in this regard was not requested due to the low hazard profile identified for this substance.

NATURE OF FURTHER WORK RECOMMENDED

No recommendation.

FULL SIDS SUMMARY

CAS NO: 112-85-6		SPECIES	PROTOCOL	RESULTS
PHYSICAL-CHEMICAL				
2.1	Melting Point		Unknown	79.95 °C
2.2	Boiling Point		Unknown	306 °C (at 60 mmHg)
2.3	Density		Unknown	0.8221 (at 100 °C) (relative density)
2.4	Vapour Pressure		OECD TG 104	< 6.6×10^{-3} Pa at 100 °C
			Calculated (MPBP v1.40)	6.5 x 10^{-5} Pa at 25 °C
2.5	Partition Coefficient		OECD TG 107	> 5.11 at 25 °C
	(Log Pow)		Calculated	9.91
2.6 A.	Water Solubility		OECD TG 105	0.016 mg/L at 25 °C
B.	pH			No data available.
	pKa		OECD TG 112	Not determined
2.12	Oxidation: Reduction Potential			No data available.
ENVIRONMENTAL FATE AND PATHWAY				
3.1.1	Photodegradation		AOP Win v 1.86	$T_{1/2}$ = 13.7 h (sensitizer: OH radical)
3.1.2	Stability in Water		OECD TG 111	Stable (pH 4.0, 7.0, 9.0)
3.2	Monitoring Data			No data available.
3.3	Transport and Distribution			(Release: 100% to Water)
			Calculated (Fugacity Model, Level III)	In Air 0.4%
				In Water 61.7%
				In Soil 1.6 %
				In Sediment 36.3%
3.5	Biodegradation			Inherently biodegradable
			OECD TG 301C	48-56 % (BOD) in 28 days,
			OECD TG 302C	79-96% (BOD) in 28 days
3.6	Bioaccumulation			No data available.
ECOTOXICOLOGY				
4.1	Acute/Prolonged Toxicity to Fish	*Oryzias latipes*	OECD TG 203	LC_{50} (96hr): > 5.00 mg/L
				LC_0 (96hr): > 5.00 mg/L
			OECD TG 204	LC_{50} (14d): > 4.99 mg/L
				NOEC (14d, Grt, Beh): >4.99 mg/L
4.2	Acute Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 202	EC_{50} (48hr): > 5.00 mg/L
4.3	Toxicity to Aquatic Plants e.g. Algae	*Selenastrum capricornutum*	OECD TG 201	EC_{50} (72hr): > 5.00 mg/L
				NOEC (72h): > 5.00 mg/L
4.5.2	Chronic Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 211	EC_{50} (21d, Repro): > 0.84 mg/L
				NOEC(21d, Repro): > 0.84 mg/L
4.6.1	Toxicity to Soil Dwelling Organisms			No data available.
4.6.2	Toxicity to Terrestrial			No data available.

CAS NO: 112-85-6		SPECIES	PROTOCOL	RESULTS
	Plants			
(4.6.3)	Toxicity to Other Non-Mammalian Terrestrial Species (Including Birds)			No data available
TOXICOLOGY				
5.1.1	Acute Oral Toxicity	Rat	OECD TG 401	LD_{50} > 2,000 mg/kg
5.1.2	Acute Inhalation Toxicity			No data available.
5.1.3	Acute Dermal Toxicity			No data available.
5.4	Repeated Dose Toxicity	Rat	OECD Combined 422 Test	NOAEL = 1,000 mg/kg/day
5.5	Genetic Toxicity *In Vitro*			
A.	Bacterial Test (Gene mutation)	*S.typhimurium* *E.coli*	OECD Guidelines No.471 and 472 and Guidelines for Screening Mutagenicity Testing of Chemicals (Japan)	Negative (With metabolic activation) Negative (Without metabolic activation)
B.	Non-Bacterial *In Vitro* Test (Chromosomal aberrations)	CHL cells	OECD Guideline No.473 and Guidelines for Screening Mutagenicity Testing of Chemicals (Japan)	Negative (With metabolic activation) Negative (Without metabolic activation)
5.6	Genetic Toxicity *In Vivo*			No data available.
5.8	Toxicity to Reproduction	Rat	OECD Combined 422 Test	NOAEL Parental = 1,000 mg/kg/day NOAEL F1 offspring = 1,000 mg/kg/day
5.9	Developmental Toxicity/ Teratogenicity	Rat	OECD Combined 422 Test	NOAEL Maternal toxicity = 1,000 mg/kg/day NOAEL Teratogenicity = 1,000 mg/kg/day
5.11	Experience with Human Exposure	Woman		Recurrent pulpable purpura (probably due to silver docosanoate, not docosanoic acid itself)

SIDS INITIAL ASSESSMENT REPORT (SIAR)

1. IDENTITY

- OECD Name: Docosanoic acid
- Synonym: Behenic acid;
- 1-Docosanoic acid
- CAS Number: 112-85-6
- Empirical Formula: $C_{22}H_{44}O_2$
- Structural Formula:

$CH_3(CH_2)_{20}COOH$

- Degree of Purity: 86 %
- Major Impurity: (C_{14}-C_{20}) fatty acids ca. 11 %
- C_{24} fatty acid ca. 3 %
- Essential Additives: None
- Physical-chemical properties

	Protocol	Results
Melting point:	Unknown	79.95°C
Boiling point:	Unknown	306 °C at 60 mmHg
Density:	Unknown	0.8221 at 100 °C (as relative density)
Vapor pressure:	OECD TG 104	< 6.6×10^{-3} Pa at 100°C
	Calculated (MPBP v1.40)	6.5×10^{-5} Pa at 25°C
Water solubility:	OECD TG 105	0.016 mg/L at 25°C
pKa:	OECD TG 112	Not determined
Log Pow:	OECD TG 107	> 5.11 at 25 °C
	Calculated (KOWWIN v1.66)	9.91
Koc:	Calculated (PCKOCWIN v1.66)	135,000
Henry's law constant:	Calculated (bond estimation method by HENRYWIN v3.10)	1.58×10^{-4} atm-m^3/mole at 25°C
	Calculated (group estimation method by HENRYWIN v3.10)	2.94×10^{-4} atm-m^3/mole at 25°C

2. GENERAL INFORMATION ON EXPOSURE

The production volume of docosanoic acid is estimated at 2,800 tonnes in the EU in 2000, at 6,440 tonnes (Production; 5,960 tonnes, import; 480 tonnes) in Japan (METI, Japan. Unpublished data), and at 454 tonnes in United States in 1977 (HSDB, 2001). Docosanoic acid is produced in a closed system at two companies in Japan and used as an intermediate for the production of its metal salts, docosylamine and higher alkyl esters in chemical industry. Also, this chemical is approved for the use as a cosmetic ingredient in Japan. However, no information is available whether such products containing docosanoic acid are available or not.

Docosanoic acid naturally occurs as triglyceride in most seed fats, animal milk fats, marine animal oils and so on. Thus, docosanoic acid exists everywhere.

2.1 Environmental Fate

Docosanoic acid seems to be released mainly into the water compartment from its production and use sites after biological treatment. The use of products containing docosanoic acid as well as its occurrence in nature would be a source of release into the environment. The chemical has been found in air as particulate matter.

The potential environmental distribution of docosanoic acid obtained from a generic Fugacity model, Mackay level III, under different emission scenarios is shown in Table 1. The results show that when docosanoic acid is released into water, the majority of the chemical is likely to be distributed into water and sediment. Also, if released into soil, 100% of the chemical remains in soil. If released into air, the majority of the chemical is distributed into soil and air.

Table 1. Environmental distribution of docosanoic acid using a generic Fugacity model, Mackay level III.

Compartment	Release 100 % to air	Release 100 % to water	Release 100 % to soil
Air	19.7 %	0.4 %	0.0 %
Water	6.8 %	61.7 %	0.0 %
Soil	69.6 %	1.6 %	100.0 %
Sediment	4.0 %	36.3 %	0.0 %

Docosanoic acid is stable in water (METI, 1998) and a half-life time of 13.7 hours is calculated for the degradation of docosanoic acid in air by the reaction with photochemically produced OH radical (CERI, Japan, 2001). No information on the reaction products is available.

Docosanoic acid is biodegraded up to 48-56 % (BOD) after 28-day according to OECD TG 301C, and up to 79-96% (BOD) after 28-day according to OECD TG 302C. These results suggest that this chemical is inherently biodegradable under aerobic conditions (METI, Japan, 1997, 1998). The slow rate of biodegradation of this chemical may be due to the low water solubility of the chemical. No data were available on the anaerobic degradation of docosanoic acid.
The anaerobic biodegradation properties of the related C16 fatty acid (palmitic acid) has been reported. 10 mg/L C(14)-labeled palmitic acid in the presence of raw sludge after

28 days yielded 66.1 percent C(14)-labeled carbon dioxide and 25.6 percent C(14)-labeled methane (Sterber J, 1987). This report suggests that docosanoic acid could be biodegraded under anaerobic conditions.

On the basis of its low vapor pressure (<6.6 x 10^{-3} Pa at 25 ℃ (measured), 6.5 x 10^{-5} Pa at 25℃ (calculated)), volatilization of docosanoic acid is not expected. If released into air, docosanoic acid is expected to exist solely as particulate matter and the chemical in vapor phase is expected to degrade by reaction with photochemically produced hydroxyl radicals. The extrapolated Koc value of 135,000 indicates that docosanoic acid is immobile in soil, and is absorbed to sediment or suspended solid in water. Docosanoic distributed into water phase or soil is expected to undergo biodegradation under aerobic condition. No data are available on anaerobic degradation. However, since the related C16 fatty acid (palmitic acid) is anaerobically biodegradable, the chemical distributed into sediment may undergo biodegradation but at a slow rate. Although the high value of Log Pow indicates accumulative properties, docosanoic acid is biodegradable and photodegradable in the environment.

2.2 Human exposure

2.2.1 Occupational exposure

Workers might be exposed by dust through handling of docosanoic acid, especially during the packing process when this chemical is treated as powder.

The dust level of occupational environment, estimated with the EASE model, is 2-5 mg/m^3 when this non-fibrous dust is produced by a dry method and controlled under local exhaust ventilation. EHE_{inh} is 0.71 mg/kg, which is calculated under the conditions of 8 hours operation without protection (human body weight; 70 kg, respiratory volume; 1.25 m^3/h). Workers are recommended to wear protective equipment (such as mask) during the work to avoid the exposure by dust.

The maximum vapor concentration in air of this chemical is calculated as 6.4 x 10^{-4} ppm, using the value of 6.5 x 10^{-5} Pa at 25 °C (calculated), and the level of the exposure via vapor inhalation is considerably low. As this chemical is a solid with low water solubility (0.016 mg/L), it is expected that the absorption rate of the chemical is very low. Workers practically wear personal protective equipments such as safety gloves and glasses during working period (at most 8 hours), and the chemical is produced in a closed system at production site. Thus, exposure to this chemical by the dermal route is considered to be negligible.

Thus, the occupational exposure to docosanoic acid via inhalation or dermal route is not expected. In Japan, there are no reports regarding the effects on the health of workers at the factory producing the chemical.

2.2.2 Consumer exposure

In Japan, docosanoic acid is approved to be used as a cosmetic ingredient without limitation of content in the Japanese Standards of Cosmetic Ingredients (MHLW, 1994). Thus consumer might be directly exposed to docosanoic acid via the cosmetics containing this chemical. However, no information is available whether such products containing docosanoic acid are available.

2.2.3 Indirect exposure via the environment

Docosanoic acid occurs in nature in natural products such as seeds, animal milk, marine animal oils etc. The surface water may contain the chemical released via the use of products containing the chemical or from production and user sites. Thus, indirect exposure may be caused by the intake of food or surface water.

3. EFFECTS ON THE ENVIRONMENT

3.1 Effects on aquatic organisms

Docosanoic acid has been tested using three aquatic species (*Selenastrum capricornutum*, *Daphnia magna* and *Oryzias latipes*) at concentrations considerably higher than its water solubility, as limit tests conducted with control and vehicle control (HCO-40 and/or DMF) under OECD test guidelines [OECD TG 201, 202, 203, 204 and 211].

Acute and chronic toxicity results to test organisms for docosanoic acid are summarized in Table 2.

Table 2. Summary of toxicity test results of docosanoic acid to aquatic organisms from different trophic levels.

Species	Endpoint	Conc. (mg/L)	Reference
Selenastrum capricornutum (alga)	Grt: EC_{50} (72h) Grt: NOEC(72h)	>5.00 mg/L (nc) >5.00 mg/L (nc)	MOE, Japan. (1998)
Daphnia magna (water flea)	Imm: EC_{50}(48h) Rep: EC_{50}(21d) Rep: NOEC(21d)	>5.00 mg/L (nc) >0.84 mg/L (ac) >0.84 mg/L (ac)	
Oryzias latipes (fish, Medaka)	Mor: LC_{50}(96h) Mor: LC_0(96h) Mor: LC_{50}(14d) Grt, Beh: NOEC (14d)	>5.00 mg/L (nc) >5.00 mg/L (nc) >4.99 mg/L (nc) >4.99 mg/L (nc)	

Notes: Mor; mortality, Imm; immobilization, Rep; reproduction,
Grt; growth rate, Beh; behavior,
nc; nominalconcentration,
ac; analytical concentration (mean time-weighted)

In a chronic toxicity test with *Daphnia magna*, conducted at 0.30, 0.55 and 1.00 mg/L under semi-static conditions (water renewal: 3 times a week), the measured concentrations in groups tested at 21 day were different over 20% from their corresponding nominal concentration. Thus, the concentrations were expressed using time-weighted averages: 0.24, 0.49 and 0.84 mg/L, respectively. The parental mortalities observed in controls and treated groups were within the range of 20% and no effects by dispersant were observed. EC_{50} and NOEC values in this chronic toxicity test to *Daphnia magna* on reproduction were greater than 0.84 mg/L. In other tests on *Selenastrum capricornutum* or *Oryzias latipes*, the toxicity values in any tests are greater than 4.99 mg/L, at least. Thus, no significant effects were recognized in any tests conducted at extremely high concentration by using a dispersant agent.

There are further results available in the literature on acute toxicity (48h) to gammarus (*Hyale plumulosa*) and medaka (*Oryzias latipes*) after acclimatization in seawater using a saturated solution of fatty acids (C_{12}-C_{14}) or mixture of fatty acids (more than C_{16}) (Onitsuka, et al.,1989). It was not stated whether docosanoic acid was included in the mixture of fatty acid or not. Although, in this report, no mortality was observed on both *Hyale plumulosa* and *Oryzias latipes* in the saturated solution of any fatty acids tested. It could be expected that docosanoic acid is not toxic to both *Hyale plumulosa* and

Oryzias latipes at the saturated concentration since the water solubility is decreased depending on the increase of the chain length.
As a conclusion, it is reasonable to assume that docosanoic acid is not toxic to aquatic organisms at concentrations less than its water solubility (0.016 mg/L). A PNEC is not calculated since NOEC values obtained are above the water solubility of the substance.

3.2 Terrestrial effects

No data available

3.3 Other effects

No data available

3.4 Initial Assessment for the Environment

No data are available on terrestrial effects.

Toxicity studies of docosanoic acid have been conducted using dispersant in a limited number of representative aquatic organisms: algae (*Selenastrum capricornutum*), aquatic invertebrates (*Daphnia magna*), and fish (*Oryzias latipes*). The lowest value among acute and chronic toxicity data of three species is greater than 0.84 mg/L (NOEC (21d) on reproduction to *Daphnia magna*). In all tests, no significant effect was observed at considerably higher concentration than its water solubility (0.016 mg/L).
Docosanoic acid is considered of low potential risk to the environment based on the low toxicity profile to aquatic organisms, and its properties of low water solubility and inherent biodegradability in the environment.

4. HUMAN HEALTH HAZARD

4.1 Effects on Human Health

a) Toxicokinetics and metabolism and mechanism of action.

No data are available on toxicokinetics and metabolism and mechanism of action.

b) Acute toxicity

Only one acute toxicity result is available for rats using a limit test according to OECD Test Guideline 401. The data is shown in Table 3. Rats were administered orally (gavage) at 0 or 2,000 mg/kg of docosanoic acid. No deaths occurred for either males or females in the treated groups. No treatment-related effects were found on clinical signs, body weight changes or autopsy findings (MHW, Japan, 1998).

Table 3. Acute toxicity data of docosanoic acid

Routes	Species	Strain	Type	Values
Oral	Rats	Crj:CD(SD)	LD_{50}	> 2,000 mg/kg

c) rritation and sensitization

No data are available on irritation and sensitisation of docosanoic acid. Related fatty acids, palmitic acid (C_{16}) and stearic acid (C_{18}), were neither irritating nor sensitizing (Mary, A.L., 1987).

d) Repeated dose toxicity

There is only one key study on repeated dose toxicity with docosanoic acid. This chemical was studied for oral toxicity in rats according to the OECD combined repeated dose and reproductive/developmental toxicity test [OECD TG 422]. As the study was well controlled and conducted under GLP, it was considered to be appropriate to select this as a key study.

Male and female SD rats were orally administered (gavage) at doses of 0, 100, 300 and 1,000 mg/kg/day. In male rats, the administration period was two weeks prior to mating, 2 weeks of mating and 2 weeks after the completion of the mating period. In females, in addition to maximum four weeks pre-mating and mating period, they were exposed through pregnancy until day 3 of post delivery.

No deaths or abnormalities in clinical signs were observed in any male and female animals. Also, there were no adverse effects related to the substance in body weights and food consumption. No treatment-related effects were found for hematological, biochemical, gross findings, organ weights and histopathological examinations (MHW, Japan, 1998). The NOAEL for repeated dose toxicity in rats is considered to be 1,000 mg/kg/day in both sexes.

e) Reproductive/developmental toxicity

Docosanoic acid was studied for oral toxicity in rats according to the OECD combined repeated dose and reproductive/developmental toxicity test [OECD TG 422] at doses of 0, 100, 300 and 1,000 mg/kg/day, as described above (section d). Although this combined study was designed to investigate reproductive capability in the parental generation as well as development in F_1 offspring, parameters to evaluate developmental toxicity were limited to only body weights at day 0 and day 4 after birth, and autopsy findings at day 4.

This chemical showed no adverse effects on copulation or fertility indexes. No changes related to the dosing of substance were observed in gestation length and any parameters during gestation, delivery and lactation periods. The chemical also did not show any adverse effects on the sex ratio, body weight or viability of pups. And also, no morphological abnormalities in external and visceral observation in pups were observed in any of the treated groups (MHW, 1998). The NOAEL values for both parental and F_1 offspring in reproductive toxicity are considered to be 1,000 mg/kg/day. As for developmental toxicity, the NOAEL for F_1 offspring is estimated to be 1,000 mg/kg/day.

f) Genetic toxicity

Bacterial test

A reverse gene mutation assay was conducted in line with Guidelines for Screening Mutagenicity Testing of Chemicals (Japan) and OECD Test Guidelines 471 and 472, using a pre-incubation method. This study was well controlled and considered to be appropriate as a key study.

Docosanoic acid showed negative results in *Salmonella typhimurium* TA100, TA1535, TA98, TA1537 and *Escherichia coli* WP2 *uvr*A at concentrations up to 5 mg/plate with or without metabolic activation system (MHW, 1998).

Non-bacterial test in vitro

A chromosomal aberration test in line with Guidelines for Screening Mutagenicity Testing of Chemicals (Japan) and OECD Test Guideline 473 was conducted using cultured Chinese hamster lung (CHL/IU) cells. This study was well controlled and considered to be appropriate as a key study. The highest concentration of the chemical used was set to the maximum one showing no apparent cytotoxic effect during continuous treatment. For short term treatment, it was set to 3.5 mg/ml because the concentration was equivalent to ca. 10 mM as required in the test guidelines.

As a result, neither structural chromosomal aberrations nor polyproidy were observed up to a maximum concentration of 3.5 mg/ml under conditions of both continuous treatment and short-term treatment with or without an exogenous metabolic activation system (MHW, 1998).

in vivo test

No data are available on *in vivo* genotoxic effects.

g) Carcinogenicity

No data are available on carcinogenicity.

h) Other human health related information

With regard to human health related information, there are one oral repeated dose toxicity study including this chemical in rat and one human case report.

Other information

A 13 week oral repeated dose toxicity study was performed with rats, but the test substance used in this study was a mixture of three fatty acids containing docosanoic acid (named as caprenin: mixtures with caprylic, capric and 45% of docosanoic acid). Caprenin was added to the feed in a ratio ranging from 5.23 to 15%. The dose of docosanoic acid was calculated by multiplying the caprenin consumption with 0.45. As a result of this 13-week caprenin feeding study, no abnormalities were observed at doses up to 5,940 and 6,570 mg/kg/day (as docosanoic acid) for males and females, respectively (Webb D.R., et al., 1993).

Human case

There is only one ambiguous report that volatised docosanoic acid released from silver docosanoate from heat-activated photocopy paper induced a recurrent palpable purpura on her legs in a woman. (Tencati, JR., 1983). In response to this report, there is critical opinion noting the lack of convincing evidences such as the clinical description and the characterization of exposure (Guidotti, T. L., 1983). Considering that there is no other similar case report, it is thought to be quite suspicious that the cause of this unusual case was related to this chemical.

4.2 Initial Assessment for Human Health

The oral LD_{50} value of docosanoic acid for rats is more than 2,000 mg/kg. There are no available data for irritation and sensitization. The related fatty acids, palmitic acid (C_{16}) and stearic acid (C_{18}), were neither irritating nor sensitizing. In the combined repeated dose and reproductive/developmental toxicity study, no toxic effects were observed. Therefore, the NOAEL was considered to be 1,000 mg/kg/day for both repeated dose and reproductive/development toxicity. The chemical was negative in an *in vitro* bacterial mutation test and a chromosomal aberration test. Thus, toxicity in mammals seems to be very weak.

There is one ambiguous human case report that indicates a possibility that docosanoic acid vapor derived from heat activated photocopy paper might cause recurrent palpable purpura. Except for this suspicious case report, no other adverse effects on human health have been reported so far.

Based on these data, docosanoic acid is considered of low potential risk for human health.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Exposure

The production volume of the chemical is estimated at 2,800 tonnes in the EU in 2000, at 6,440 tonnes (Production; 5,960 tonnes, import; 480 tonnes) in Japan, and at 454 tonnes in United States in 1977. Docosanoic acid is produced in a closed system and used as an intermediate in chemical industry and polymer industry. Also, this chemical is approved for the use as a cosmetic ingredient in Japan. However, no information is available whether such products containing docosanoic acid are available or not.

Docosanoic acid seems to be released mainly into water via wastewater from production and use sites after biological treatment. The use of products containing docosanoic acid as well as its occurrence in nature would be a source of release into the environment.

Calculations according to a fugacity model, level III, shows that the majority of docosanoic acid is likely to be distributed into water and sediment when it is released into water. The estimated Koc value of 135,000 suggests that docosanoic acid is immobile in soil. In the water compartment and/or soil, docosanoic acid is expected to biodegrade under aerobic condition based on its inherently biodegradable property. The anaerobic degradation is expected based on the anaerobic degradation property of a related fatty acid. The chemical released in air is expected to exist as particulate and to be easily degraded in air by the reaction with photochemically produced OH radicals (half-life time is calculated as 13.7 hours). Although the high value of Log Pow indicates accumulative properties, docosanoic acid is biodegradable and photodegradable in the environment.

Occupational exposures through vapor inhalation or dermal route are assumed to be negligible because this chemical has a low vapor pressure and a low water solubility. Workers might be exposed by dust during packing process when this chemical is treated as powder. EHE_{inh} (8h) is 0.71 mg/kg, which is calculated under 8h operation without protection (human body weight; 70 kg, respiratory volume; 1.25 m^3/h). Workers are recommended to wear protective equipment (mask) during the work in order to avoid the exposure by dust.

Consumer might be directly exposed to this chemical from cosmetic use. In Japan, the use of docosanoic acid is approved for the use as a cosmetic ingredient without limitation of content in cosmetic products. However, no information is available whether such products containing docosanoic acid are available. Docosanoic acid exists naturally as triglyceride in most seed fats, animal milk fats, marine animal oils and so on. Therefore indirect exposure via environment may occur by the intake of food or surface water.

Hazards to the Environment

Acute toxicity results with algae (*Selenastrum capricornutum*), aquatic invertebrates (*Daphnia magna*) or fish (*Oryzias latipes*) are greater than 4.99 mg/L.
The chronic toxicity result with *Daphnia magna* is greater than 0.84 mg/L (NOEC, 21-day reproduction test). In all tests using dispersant, no significant effects were observed

at concentrations extremely higher than its water solubility. A PNEC is not calculated since NOEC values obtained are above the water solubility of the substance.

No data are available on the terrestrial effects.

Docosanoic acid is considered of low potential risk to the environment based on the low toxicity profile to aquatic organisms, its properties of low water solubility and inherent biodegradability in the environment.

Human Health Hazards

The oral LD_{50} value of docosanoic acid for rats is more than 2,000 mg/kg. Although there are no available data for irritation and sensitization of this chemical, related fatty acids, such as palmitic acid (C_{16}) and stearic acid (C_{18}), were neither irritating nor sensitizing. In an oral study according to the OECD combined repeat dose and reproductive/developmental toxicity test [OECD TG 422], at doses of 0, 100, 300, 1,000 mg/kg/day for at least 42 days, no toxic effects were observed. Therefore, the NOAEL is considered to be 1,000 mg/kg/day for both repeated dose toxicity and reproductive/developmental toxicity. The chemical showed negative results in a bacterial mutation test [OECD TG 471, 472] and a chromosomal aberration test *in vitro* [OECD TG 473].

Based on these data, docosanoic acid is considered of low potential risk for human health.

5.2 Recommendations

The chemical is currently of low priority for further work.

6. REFERENCES

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SIDS DOSSIER

Docosanoic acid CAS No. 112-85-6

Sponsor Country: Japan
Data of Submission to OECD: 2002.02.08

S I D S P R O F I L E

1.01 A. 1.01 C.	**CAS No.** **CHEMICAL NAME (OECD Name)**	112-85-6 Docosanoic acid (Docosanoic acid)
1.01 D.	**CAS DESCRIPTOR**	
1.01 G.	**STRUCTURAL FORMULA**	 $CH_3(CH_2)_{20}COOH$
OTHER CHEMICAL IDENTITY INFORMATION		
1.5	**QUANTITY**	2,800 tonnes in EU in 2000 6,440 tonnes (Production; 5,960 tonnes, import; 480 tonnes) in Japan.
1.7	**USE PATTERN**	Approved to use as cosmetic ingredient in some region. Intermediates for lithium docosanoate, silver docosanoate, other metal salt, docosylamine, and higher alkyl esters; cosmetics ingredient; waxes; plasticizers; stabilizers.
1.9	**SOURCES AND LEVELS OF EXPOSURE**	Docosanoic acid naturally occurs in nature product as triglyceride. Docosanoic acid is produced in a closed system. The waste containing docosanoic acid seems to be released from the production and use sites into water after biological treatment. No information is available on whether cosmetic products are available which contain docosanoic acid. However, this use would be the source of release into the environment.
ISSUES FOR DISCUSSION (IDENTIFY, IF ANY) SIDS testing required: None		

1. GENERAL INFORMATION

1.01 SUBSTANCE INFORMATION

A. CAS Number 112-85-6

B. Name *(OECD name)* Docosanoic acid

C. Name *(IUPAC name)* 1-Docosanoic acid

D. CAS Descriptor

E. EINECS-Number 204-010-8

F. Molecular Formula $C_{22}H_{44}O_2$

G. Structural Formula

$CH_3(CH_2)_{20}COOH$

H. Substance Group Not applicable

I. Substance Remark None

J. Molecular Weight 340.58

1.02 OECD INFORMATION

A. Sponsor Country: Japan

B. Lead Organisation:

Name of Lead Organisation:	NOF CORPORATION
Contact person:	Mr. Koji Tomita
	Ministry of Foreign Affairs
	Economic Affairs Bureau
	Second International Organisations Division
Address:	2-2-1 Kasumigaseki, Chiyoda-ku
Town:	Tokyo
Postal code:	100
Country:	Japan
Tel:	+81-3-3581-0018
Fax:	+81-3-3581-9470

C. Name of responder Same as above contact person

1.1 GENERAL SUBSTANCE INFORMATION

A. Type of Substance

element **[ ]**; inorganic **[ ]**; natural substance **[X]**; organic **[ ]**; organometallic **[ ]**; petroleum product **[ ]**

B. Physical State

gaseous **[ ]**; liquid **[ ]**; solid **[X]**

C. Purity

86 %

1.2 SYNONYMS

1-Docosanoic acid;
Behenic acid
n- Docosanoic acid
Docosoic acid

1.3 IMPURITIES

(C_{14}-C_{20}) fatty acids	ca. 11 %
C_{24} fatty acid	ca. 2 %

1.4 ADDITIVES

No additives

1.5 QUANTITY

(a)
Remarks: 2,800 tonnes in EU in 2000
Reference: NOF Corporation (2001) unpublished data

(b)
Remarks: 6,440 tonnes in Japan
(Production; 5,960 tonnes, import; 480 tonnes)
Reference: METI (former MITI), Japan. Unpublished data

(c)
Remarks: At least 454 tonnes in United States in 1977
Reference: HSDB (2001)

1.6 USE PATTERN

A. General

Type of Use:	Category:
(a)	
main	Use in a closed system
industrial	Chemical industry: used in intermediates for lithium docosanoate, silver docosanoate, other metal salt, docosylamine and higher alkyl esters.
(b)	
main	Use resulting in inclusion into or on matrix
industrial	Polymer industry
use	Waxes, plasticizers and stabilizers
(c)	
main	Wide dispersive use
industrial	Personal and domestic use
use	Cosmetics
Reference:	HSDB (2001)

B. Uses in Consumer Products

(a)	
Remarks:	In Japan, docosanoic acid is approved as a cosmetic ingredient, and it is also specified in the Japanese Standards of Cosmetic Ingredients, second edition. It can be used in all kinds of cosmetics without limitation of content.
Reference:	MHLW (former MHW), Japan (1994)
(b)	
Remarks:	In the Swedish Products Register (2001), docosanoic acid is registered as a raw material for cosmetics in 3 Products/Consumer Products.
Reference: Sweden	Swedish Products Register (2001) provided on EDG from

1.7 SOURCES OF EXPOSURE

(a)	
Source:	Media of release: Water from a production site Quantities per media:
Remarks:	At one factory in Japan, docosanoic acid is produced in a closed continuous line, but some of it may be lost, for example, during the packing process and the wastewater containing docosanoic acid may be discharged into water after biological treatment.

(b)

Source: Media of release: Water from a use site
Quantities per media:

Remarks: Docosanoic acid is used as intermediates in chemical industry and plasticizer etc. in polymer industry. Docosanoic acid may be released into water from these users' factories.

(c)

Source: Media of release: From consumer products
Quantities per media:

Remarks: The exposure from the migration of docosanoic acid used in polymer as plasticizer etc. is negligible. No information is available on whether cosmetic products are available which contain docosanoic acid. However, this use would be the source of release into the environment.

(d)

Source: Media of release: From natural occurrence
Quantities per media:

Remarks: Docosanoic acid is the minor constituent of most seed fats, animal milk fats and marine animal oils, as a triglyceride. Larger amounts of docosanoic acid are found in jamba oil, mustard seed oil and rape oil, as well.

References: The Merck Index (2001)

1.8 ADDITIONAL REMARKS

A. Labelling and Classification

Labelling: Not assigned according to the EC Directive 67/548/EEC

Classification: Not classified

B. Occupational Exposure Limit Value

Exposure limit value: Not established.

Short term exposure limit value: Not established.

C. Options for disposal

(a)

Remarks: Dissolved or mixed the material with a combustible solvent and burned in a chemical incinerator equipped with an afterburner and scrubber.

Reference: Sigma-Aldrich (1998)

(b)

Remarks: For the incineration of the materials, related laws and regulations must be kept. In case of disposal, the waste materials must be properly treated according to the law (Waste Disposal and Public Cleansing Law) and its related

regulations by contracting with waste-shipping or disposal services trader who received the approval of the business from municipal governors in Japan.

Reference: NOF Corporation (2001) Material Safety Data Sheet (MSDS) of Docosanoic acid.

D. Other remarks

None

2. PHYSICAL-CHEMICAL DATA

2.1 MELTING POINT

Value:	79.95 °C
Decomposition:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Sublimation:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	
Reference:	The Merck Index (2001)

2.2 BOILING POINT

Value:	306 °C
Pressure:	at 60 mmHg
Decomposition:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	
Reference:	The Merck Index (2001)

2.3 DENSITY (relative density)

(a)

Type:	Bulk density **[ ]**; Density **[ ]**; Relative Density **[X]**
Value:	0.8221
Temperature:	100 °C
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Density is relative value when that of the water at 4°C is 1.0.
Reference:	The Merck Index (2001)

(b)

Type:	Bulk density **[ ]**; Density **[ ]**; Relative Density **[X]**
Value:	0.82
Temperature:	100 °C
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Density is relative value when that of the water at 4°C is 1.0.
Reference:	NOF Corporation (2001) Material Safety Data Sheet (MSDS) of Docosanoic acid.

2.4 VAPOUR PRESSURE

(a)

Value:	$< 6.6 \times 10^{-3}$ Pa
Temperature:	100 °C

Method:	calculated **[ ]**; measured **[X]** OECD Test Guideline 104
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	This test was conducted under the national program.
Reference:	METI (former MITI), Japan (1998)

(b)

Value:	6.5×10^{-5} Pa
Temperature:	25 °C
Method:	calculated **[X]**; measured **[ ]**
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	Calculated by MPBP v1.40 (Syracuse Research Corporation)
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

2.5 PARTITION COEFFICIENT $log_{10}Pow$

Log Pow:	> 5.11
Temperature:	25 °C
Method:	calculated **[ ]**; measured **[X]** OECD Test Guideline 107
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Remarks:	
Reference:	METI (former MITI), Japan (1998), unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

Log Pow:	9.91
Temperature:	
Method:	calculated **[X]**; measured **[X]**
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	Calculated by KOWWIN v 1.66
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

2.6 WATER SOLUBILITY

A. Solubility

Value:	0.016 mg/L
Temperature:	25 °C
Description:	Miscible **[ ]**; Of very high solubility **[ ]**; Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**; Of low solubility **[ ]**; Of very low solubility **[X]**; Not soluble **[ ]**
Method:	OECD Test Guideline 105
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	This test was conducted under the national program.

Reference:	METI (former MITI), Japan (1998), unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

B. pH Value, pKa Value

pH Value:	No data available
Temperature:	25 °C
pKa value	Not determined
Method:	OECD Test Guideline 112
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	pKa could not be determined by conductometric method because of low water solubility (OECD TG 112). This test was conducted under the national program.
Reference:	METI (former MITI), Japan (1998), unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

2.7 FLASH POINT

No data available

2.8 AUTO FLAMMABILITY

No data available

2.9 FLAMMABILITY

No data available

2.10 EXPLOSIVE PROPERTIES

No data available

2.11 OXIDISING PROPERTIES

No data available

2.12 OXIDATION: REDUCTION POTENTIAL

No data available

2.13 ADDITIONAL DATA

A. Partition co-efficient between soil/sediment and water (Kd)

No data available

B. Other data

Type:	Koc value
Result:	1.35 x 10^5
Method:	calculated **[X]**; measured **[ ]**
Remarks:	Calculated by PCKOCWIN v1.66
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

Type:	Henry's law constant
Temperature:	25°C
Results:	1.58 x 10^{-4} atm-m^3/mole by bond estimation method 2.94 x 10^{-4} atm-m^3/mole by group estimation method
Method:	calculated **[X]**; measured **[ ]**
Remarks:	Calculated by HENRYWIN v3.10
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

3. ENVIRONMENTAL FATE AND PATHWAYS

3.1 STABILITY

3.1.1 PHOTODEGRADATION

Type:	Air **[X]**; Water **[ ]**; Soil **[ ]**; Other **[ ]**
Temperature:	25 °C
Indirect Photolysis:	
Type of sensitizer:	OH radical
Concentration of sensitizer:	5×10^5 molecule/cm^3
Rate constant (radical):	2.81×10^{-11} cm^3 /molecule-sec
Method:	calculated **[X]**; measured **[ ]**
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	The rate constant for gas-phase reaction between OH radical and the test substance was calculated by AOP Win v1.86 and the half-life time of 13.7 hours was calculated with the daily average concentration of OH radical of 5×10^5 molecule/cm^3 in atmosphere.
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001) unpublished data.

3.1.2 STABILITY IN WATER

Stability:	Stable (Hydrolysis was not observed in water)
Temperature:	50 °C
Concentration:	2 mg/L
pH Value:	pH 4, 7 and 9
Method:	modified OECD Test Guideline 111 (Hydrolysis as a function of pH)
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	Each buffer solution contained 1 % Tetrahydrofuran. Stability of the substance in water was tested under the preliminary condition similar to OECD Test Guideline 111.
Reference:	METI (former MITI), Japan (1998) Unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

3.1.3 STABILITY IN SOIL

No data available

3.2 MONITORING DATA (ENVIRONMENTAL)

(a)

Type of Measurement:	Background **[ ]**; At contaminated site **[ ]**; Other **[X]**
Media:	Air
Results:	At residential area in Wilrijk (Belgium): 10.3 $ng.m^3$ in 59.6 ug/m^3 of TSP on October in 1976 15.8 ng/m^3 in 116.8 ug/m^3 of TSP on December in 1976.

At rural area in Botrange (Belgium):
3.2 ng/m^3 in 34.5 ug/m^3 of TSP on June in 1977
3.8 ng/m^3 in 44.2 ug/m^3 of TSP on July in 1977

Remarks: The sample was collected as particulate matter.
Reference: Van Vaeck L. et al. (1979)

(b)
Type of Measurement: Background **[ ]**; At contaminated site **[ ]**; Other **[X]**
Media: Air
Results: At residential city area:
3.2-8.4 ng/m^3 in 40.6-59.9 ug/m^3 of TSP
In Bolivia at 5,200m altitude:
0.29-0.69 ng/m^3 in 13.3-20.2 ug/m^3 of TSP
Remarks:
Reference: Cautreels W. et al. (1977)

(c)
Type of Measurement: Background **[ ]**; At contaminated site **[X]**; Other **[ ]**
Media: Air
Results: On freeway-interchange on October-November, 1963 (sampled in Detroit, Mich.): 61.6 ng/m3 air
At high traffic city location on February 1964 (sampled in New York): 119.2 ng/m3 air
Remarks: Determined in the particulate matter of air pollutant samples.
Reference: Hoffman, D. and Wynder, E.L. (1968)

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

3.3.1 TRANSPORT

No data available

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:

Compartment	Release : 100 % to air	Release : 100 % to water	Release : 100 % to soil
Air	19.7 %	0.4 %	0.0 %
Water	6.8 %	61.7 %	0.0 %
Soil	69.6 %	1.6 %	100.0 %
Sediment	4.0 %	36.3 %	0.0 %

Remarks:	The detailed results and the input parameters used in the calculation are shown in Appendix 1, in which the calculated value by MPBP v1.40 (Syracuse Research Corporation) was used for vapour pressure instead of the measured lower limit value.
Reference:	Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

3.4 IDENTIFICATION OF MAIN MODE OF DEGRADABILITY IN ACTUAL USE

No data available

3.5 BIODEGRADATION

(a)

Type:	aerobic **[X]**; anaerobic **[ ]**
Inoculum:	adapted **[ ]**; non-adapted **[X]**;
Concentration of the chemical:	100 mg/L related to COD **[ ]**; DOC **[ ]**; test substance **[X]**
Medium:	water **[X];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation:	48-56 % (by BOD) after 28 days 67-80 % (by GC) after 28 days
Results:	readily biodeg. **[ ];** inherently biodeg. **[ ]**; under test condition no biodegradation observed **[ ]**, other **[X]**
Method:	OECD Test Guideline 301C
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 96.5 %
Remarks:	The results suggest that the chemical is not readily biodegradable. Concentrations of activated sludge and the chemical substance were 30 mg/L and 100 mg/L, respectively, as shown in the Test Guideline. The biodegradation was in progress at the termination of the test.
Reference:	METI (former MITI), Japan (1997), unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

(b)

Type:	aerobic **[X]**; anaerobic **[ ]**
Inoculum:	adapted **[ ]**; non-adapted **[X]**;
Concentration of the chemical:	30 mg/L related to COD **[ ]**; DOC **[ ]**; test substance **[X]**
Medium:	water **[X];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation:	79-96 % (by BOD) after 28 days 94-95% (by GC) after 28 days
Results:	readily biodeg. **[ ];** inherently biodeg. **[X]**; under test condition no biodegradation observed **[ ]**, other **[ ]**
Method:	OECD Test Guideline 302C
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 96.5 %

Remarks:	The results indicate that the chemical is inherently biodegradable.
Reference:	METI (former MITI), Japan (1997), unpublished data, conducted by Chemicals Evaluation & Research Institute (CERI), Japan.

3.6 BOD_5, COD OR RATIO BOD_5/COD

No data available

3.7 BIOACCUMULATION

No data available

3.8 ADDITIONAL REMARKS

A. Sewage treatment

No data available

B. Other information

No data available

4. ECOTOXICITY

4.1 ACUTE/PROLONGED TOXICITY TO FISH

(a)

Type of test:	static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other **[ ]** open-system **[ ]**; closed-system **[ ]**
Species:	*Oryzias latipes* (Medaka)
Exposure period:	96 hour
Results:	LC_{50} (96h) : > 5.00 mg/L LC_0 (96h) : > 5.00 mg/L
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	docosanoic acid, Purity: 96.5 %
Remarks:	HCO-40 was used in this test to prepare the test solution due to low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). LC_{50} (96h) was greater than the concentration used in the limit test because there was no mortality during the exposure.
Reference:	MOE, Japan (1998).

(b)

Type of test:	static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other **[ ]** open-system **[ ]**; closed-system **[ ]**
Species:	*Oryzias latipes* (Medaka)
Exposure period:	14 day
Results:	LC_{50} (14d) : > 4.99 mg/L LC_0 (14d) : > 4.99 mg/L NOEC(14d, Grt, Beh) : > 4.99 mg/L
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	docosanoic acid, Purity: 96.5 %
Remarks:	HCO-40 was used in this test to prepare the test solution due to low water solubility and the limit test at 4.99 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). LC_{50} (14d) was greater than the concentration used in the limit test because there was no mortality. NOEC (14d, Grt, Beh) was greater than 4.99 mg/L since there was no abnormal response during the exposure and no statistically significant difference in body weight and body length at the end of the test between the test concentration and the controls.
Reference:	MOE, Japan (1998).

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

(a)

Type of test:	static **[X]**; semi-static **[ ]**; flow-through **[ ]**; other **[ ]**; open-system **[ ]**; closed-system **[ ]**

Species:	*Daphnia magna*
Exposure period:	48 hour
Results:	EC_{50} (48h): > 5.00 mg/L
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	docosanoic acid, Purity: 96.5 %
Remarks:	HCO-40 was used in this test to prepare the test solution due to low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). EC_{50} (48h) was greater than the concentration used in the limit test because there was only 10 % immobility during the exposure.
Reference:	MOE, Japan (1998).

4.3 TOXICITY TO AQUATIC PLANTS, e.g. algae

Species:	*Selenastrum capricornutum*
Endpoint:	Biomass **[ ]**; Growth rate **[X]**; Other **[ ]**
Exposure period:	72 hour
Results:	EC_{50} (72 h) > 5.00 mg/L NOEC (72h): > 5.00 mg/L
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
Method:	open-system **[ ]**; closed-system **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	docosanoic acid, Purity: 96.5 %
Remarks:	HCO-40 was used in this test to prepare the test solution due to low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). EC_{50} (72h) and NOEC (72h) were greater than the concentration used in the limit test because there was no growth inhibition during the exposure.
Reference:	MOE, Japan (1998).

4.4 TOXICITY TO BACTERIA

No data available

4.5 CHRONIC TOXICITY TO AQUATIC ORGANISMS

4.5.1 CHRONIC TOXICITY TO FISH

No data available

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Type of test:	static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other **[ ]**; open-system **[ ]**; closed-system **[ ]**
Species:	*Daphnia magna*

Endpoint:	Mortality **[ ]**; Reproduction rate **[X]**; Other **[ ]**
Exposure period:	21 day
Results:	EC_{50} (21d) > 0.84 mg/L (measured) NOEC (21d): > 0.84 mg/L (measured)
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, Purity: 96.5 %
Remarks:	Three test concentrations were prepared at 0.30, 0.55 and 1.00 mg/L as nominal concentration. However, Since the measured concentrations in groups tested at 21 day were different over 20% from their corresponding nominal concentration, the concentrations were expressed by time-weighted as 0.24, 0.49 and 0.84 mg/L, respectively. DMF and HCO-40 were used in this test to prepare the test solution due to low water solubility and the concentration of vehicles used was 40 mg/L in the final test solution which has no significant effect on reproduction as revealed by a vehicle-only control and is less than the recommended concentration of vehicle, i.e. 100 mg/L). No significant difference on cumulative number of dead parental was observed among control, vehicle control and treated groups. NOEC (21d) and EC_{50} (21d) were greater than the highest concentration used in the test because there was no statistical difference on cumulative number of juveniles produced per adult alive for 21 days.
Reference:	MOE, Japan (1998).

4.6 TOXICITY TO TERRESTRIAL ORGANISMS

4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

No data available

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

No data available

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

No data available

4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)

No data available

4.8 BIOTRANSFORMATION AND KINETICS

No data available

4.9 ADDITIONAL REMARKS

No data available

5. TOXICITY

5.1 ACUTE TOXICITY

5.1.1 ACUTE ORAL TOXICITY

Type:	LD_0 **[ ]**; LD_{100} **[ ]**; LD_{50} **[X]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain:	Rat/Crj:CD(SD)
Value:	> 2,000 mg/kg b.w.
Method:	OECD Test Guideline 401 (Limit test)
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)
Remarks:	Maximum dose (2,000 mg/kg) was used according to TG 401.
Reference:	MHLW (former MHW), Japan (1998)

5.1.2 ACUTE INHALATION TOXICITY

No data available

5.1.3 ACUTE DERMAL TOXICITY

No data available

5.1.4 ACUTE TOXICITY, OTHER ROUTES OF ADMINISTRATION

No data available

5.2 CORROSIVENESS/IRRITATION

5.2.1 SKIN IRRITATION/CORROSION

No data available

5.2.2 EYE IRRITATION/CORROSION

No data available

5.3 SKIN SENSITISATION

No data available

5.4 REPEATED DOSE TOXICITY

(a)
Species/strain: Rat/Crj:CD(SD)

Sex:	Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration:	Oral (Gavage).
Exposure period:	Males, 42 days; Females, from 14 days prior to mating to day 3 of lactation.
Frequency of treatment:	daily.
Dose:	0(vehicle), 100, 300, 1,000 mg/kg/day.
Control group:	Yes **[X]**; No **[ ]**; No data **[ ]**; Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL:	1,000 mg/kg/day.
Results:	Male: No deaths or abnormalities in clinical signs were observed in any of the treated groups. Also, there were no changes related to the dosing of compound in body weight gain and food consumption. No adverse effects were found for haematological, biochemical, gross findings, organ weights and histopathological examinations. Female: No deaths were observed in any of the treated groups. Also, there were no changes related to the dosing of compound in clinical signs, body weight gain and food consumption. No abnormal gross findings, changes of organ weights and histopathology were recognized at autopsy performed on postpartum day 4.
Method:	OECD Test Guideline 422 (Combined Repeat Dose and Reproductive/ Developmental Toxicity Screening Test)
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)
Reference:	MHLW (former MHW), Japan (1998)

(b)

Species/strain:	Rat/Crl:CdB R(SD).
Sex:	Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration:	Oral (Feeding)
Exposure period:	13 weeks.
Frequency of treatment:	Daily.
Post exposure observation period:	
Dose:	0 (Corn oil control), 0 (Medium-chain triglyceride oil control), 5.23, 10.23, 15.00 % in diet (w/w) Caprenin consumption: Male: 0, 0, 4,400, 8,700, 13,200 mg/kg/day Female: 0, 0, 4,900, 9,700, 14,600 mg/kg/day Docosanoic acid consumption: Male: 0, 0, 1,980, 3,915, 5,940 mg/kg/day Female: 0, 0, 2,205, 4,365, 6,570 mg/kg/day
Control group:	Yes **[X]**; No **[ ]**; No data **[ ]**; Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL:	Fifteen % (5,940 mg/kg/day and 6,570 mg/kg/day as docosanoic acid for male and female rats, respectively).

Results:	There were no treatment-related effects in growth, mortality, haematology and serum biochemistry values, or in anatomical or microscopical pathology.
Method:	Other
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substance:	Caprenin (Mixture of caprylic, capric, and docosanoic acid: 23.2 %, 26.6 %, and 45.0 %, respectively)
Remarks:	
Reference:	Webb D.R., et al. (1993)

5.5 GENETIC TOXICITY IN VITRO

A. BACTERIAL TEST

Type:	Bacterial reverse mutation assay
System of testing:	*Salmonella typhimurium* TA100, TA1535, TA98, TA1537 *Escherichia coli* WP2 *uvr* A
Concentration:	156-5,000 ug/plate
Metabolic activation:	With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results:	
Cytotoxicity conc.:	With metabolic activation: None Without metabolic activation: None
Precipitation conc.:	All treatment groups
Genotoxic effects:	+ ? -
	With metabolic activation: **[ ] [ ] [X]**
	Without metabolic activation: **[ ] [ ] [X]**
Method:	OECD Test Guidelines 471 and 472, and Japanese Guidelines for Screening Mutagenicity Testing of Chemicals
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)
Remarks:	S9; rat, induced with phenobarbital and 5,6-benzoflavone Procedure; pre-incubation assay
Reference:	MHLW(former MHW), Japan (1998)

B. NON-BACTERIAL IN VITRO TEST

Type:	Chromosomal aberration test
System of testing:	CHL/IU cells
Concentration:	350-2,800 ug/mL (-S9, 24 hr continuous treatment) 288-2,300 ug/mL (-S9, 48 hr continuous treatment) 875-3,500 ug/mL (+/- S9, short term treatment)
Metabolic activation:	With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results:	
Cytotoxicity conc.:	With metabolic activation: None Without metabolic activation: >= 2,703 ug/mL (24 hr), 2,242 ug/mL (48 hr) Precipitation conc.: All treatment groups

Genotoxic effects:

		+	?	-
	With metabolic activation:	[ ]	[ ]	[X]
	Without metabolic activation:	[ ]	[ ]	[X]
Method:	OECD Test Guideline 473 and Japanese Guidelines for Screening Mutagenicity Testing of Chemicals			
GLP:	Yes [X] No [ ] ? [ ]			
Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)			
Remarks:	S9; rat, induced with phenobarbital and 5,6-benzoflavone			
Reference:	MHLW(former MHW), Japan (1998)			

5.6 GENETIC TOXICITY IN VIVO

No data available

5.7 CARCINOGENICITY

No data available

5.8 TOXICITY TO REPRODUCTION

Type:	Fertility [ ]; One-generation study [ ]; Two-generation study [ ]; Other [X]
Species/strain:	Rat/Crj:CD(SD)
Sex:	Female [ ]; Male [ ]; Male/Female [X]; No data [ ]
Route of Administration:	Oral (Gavage)
Exposure period:	Males, 42 days; Females, from 14 days prior to mating to day 3 of lactation.
Frequency of treatment:	Daily
Post exposure observation period:	
Premating exposure period:	Male: 14 days, Female: 14 days
Doses:	0(vehicle), 100, 300, 1,000 mg/kg/day.
Control group:	Yes [X]; No [ ]; No data [ ]; Concurrent no treatment [ ]; Concurrent vehicle [X]; Historical [ ]
NOAEL Parental:	1,000 mg/kg/day.
NOAEL F1 Offspring:	1,000 mg/kg/day.
Results:	No compound related changes were observed in length of gestation period and any parameters during gestation, delivery and lactation. The compound showed no adverse effects on copulation or fertility. Also, no compound related changes were observed on the sex ratio, body weights or viability of pups.
Method:	OECD Test Guideline 422 (Combined Repeat Dose and Reproductive/ Developmental Toxicity Screening Test)
GLP:	Yes [X] No [ ] ? [ ]

Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)
Reference:	MHLW (former MHW), Japan (1998)

5.9 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

Species/strain:	Rat/Crj:CD(SD).
Sex:	Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration:	Oral (Gavage).
Exposure period:	Males, 42 days; Females, from 14 days prior to mating to day 3 of lactation.
Frequency of treatment:	Daily.
Doses:	0(vehicle), 100, 300, 1,000 mg/kg/day
Control group:	Yes **[X]**; No **[ ]**; No data **[ ]**; Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL Maternal Toxicity:	1,000 mg/kg/day.
NOAEL teratogenicity:	1,000 mg/kg/day
Results:	No morphological abnormalities in external and visceral observation in pups were observed in any of the treated groups.
Method:	OECD Test Guideline 422 (Combined Repeat Dose and Reproductive/ Developmental Toxicity Screening Test)
GLP:	Yes **[** X **]** No **[ ]** ? **[ ]**
Test substance:	Docosanoic acid, purity: 85.9 % Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) C_{24} fatty acid (2.3 %)
Reference:	MHLW(former MHW), Japan (1998)

5.10 OTHER RELEVANT INFORMATION

A. Specific toxicities

No data available

B. Toxicodynamics, toxicokinetics

No data available

5.11 EXPERIENCE WITH HUMAN EXPOSURE

Remarks:	A 53-year-old librarian had recurrent palpable purpura on her ankles and legs that was found to be caused by the fumes released from heat-activated photocopy paper at her place of employment. Docosanoic acid was identified as the responsible chemical component through a series of challenge studies that simulated her work exposure. Silver docosanoate was used in the manufacture of heat-activated photocopy

paper and docosanoic acid was volatilized when heat-activated photocopy paper was developed. Absorption through the upper respiratory mucosa was the likely route of entry of this agent. The mechanism of this reaction is unclear. Skin biopsies, complement studies, and immune complex assays failed to confirm a type III immune response. The author concluded that physicians should be aware that chemical fumes released from microfilm copying machines or other devices that use heat-activated photocopy paper may cause palpable purpura (Tencati, J. R., 1983). However, in this case, the suspected substance was silver docosanoate and was not docosanoic acid itself. Also, lack of convincing evidences such as the clinical description and characterization of exposure was noted (Guidotti, T. L., 1983).

Reference: Tencati, J. R. (1983) and Guidotti, T. L. (1983)

No other human exposure data are reported.

6. REFERENCES

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APPENDIX 1 : RESULTS OF THE CALCULATION OF THE THEORETICAL DISTRIBUTION

Docosanoic acid

Scenario 1

	Emission rate	Conc.	Amount	Percent	Transformation rate [kg/h]	
	[kg/h]	[g/m^3]	[kg]	[%]	Reaction	Advection
Air	1,000	3.3.E-06	3.3.E+04	19.7	5.8E+02	3.3.E+02
Water	0	5.8.E-04	1.2.E+04	6.8	6.6E+00	1.2.E+01
Soil	0	7.4.E-02	1.2.E+05	69.6	6.8E+01	
Sediment		6.8.E-02	6.8.E+03	4.0	1.3E+00	1.4.E-01
		Total amount	1.7.E+05			

Scenario 2

	Emission rate	Conc.	Amount	Percent	Transformation rate [kg/h]	
	[kg/h]	[g/m^3]	[kg]	[%]	Reaction	Advection
Air	0	3.8.E-07	3.8.E+03	0.4	6.5.E+01	3.8.E+01
Water	1,000	2.6.E-02	5.2.E+05	61.7	3.0.E+02	5.2.E+02
Soil	0	8.3.E-03	1.3.E+04	1.6	7.7.E+00	
Sediment		3.1.E+00	3.1.E+05	36.3	5.9.E+01	6.2.E+00
		Total amount	8.5.E+05			

Scenario 3

	Emission rate	Conc.	Amount	Percent	Transformation rate [kg/h]	
	[kg/h]	[g/m^3]	[kg]	[%]	Reaction	Advection
Air	0	3.7.E-10	3.7.E+00	0.0	6.4.E-02	3.7.E-02
Water	0	9.0.E-06	1.8.E+02	0.0	1.0.E-01	1.8.E-01
Soil	1000	1.1.E+00	1.7.E+06	100.0	1.0.E+03	
Sediment		1.1.E-03	1.1.E+02	0.0	2.0.E-02	2.1.E-03
		Total amount	1.7.E+06			

Scenario 4

	Emission rate	Conc.	Amount	Percent	Transformation rate [kg/h]	
	[kg/h]	[g/m^3]	[kg]	[%]	Reaction	Advection
Air	600	2.1.E-06	2.1.E+04	4.0	3.7.E+02	2.1.E+02
Water	300	8.2.E-03	1.6.E+05	30.9	9.5.E+01	1.6.E+02
Soil	100	1.5.E-01	2.5.E+05	46.9	1.4.E+02	
Sediment		9.6.E-01	9.6.E+04	18.2	1.9.E+01	1.9.E+00
		Total amount	5.3.E+05			

APPENDIX 1 (continued)
Physico-chemical parameters used

Molecular weight		340.58	Calculated
Melting point [°C]		79.95	Measured
Vapour pressure [Pa]		6.50E-05	Calculated
Water solubility [g/m^3]		0.016	Measured
Log Pow		5.11	Measured
Half life [h]	In air	40	Estimated
	In water	1200	Estimated
	In soil	1200	Estimated
	In sediment	3600	Estimated

Temp. [°C]	25

Environmental parameters used

		Volume	Depth	Area	Organic	Lipid content	Density	Residence
		[m^3]	[m]	[m^2]	Carbon [-]	[-]	[kg/m^3]	Time [h]
Bulk air	Air	1.0E+13					1.2	100
	Particles	2.0E+03						
	Total	1.0E+13	1000	1E+10				
Bulk water	Water	2.0E+10					1000	1000
	Particles	1.0E+06			0.04		1500	
	Fish	2.0E+05				0.05	1000	
	Total	2.0E+10	10	2E+09				
Bulk soil	Air	3.2E+08					1.2	
	Water	4.8E+08					1000	
	Solid	8.0E+08			0.04		2400	
	Total	1.6E+09	0.2	8E+09				
Bulk sediment	Water	8.0E+07					1000	
	Solid	2.0E+07			0.06		2400	50000
	Total	1.0E+08	0.05	2E+09				

Intermedia Transport Parameters

			[m/h]
Air side air-water MTC	5	Soil air boundary layer MTC	5
Water side air water MTC	0.05	Sediment-water MTC	1E-04
Rain rate	1E-04	Sediment deposition	5E-07
Aerosol deposition	6E-10	Sediment resuspension	2E-07
Soil air phase diffusion MTC	0.02	Soil water runoff	5E-05
Soil water phase diffusion MTC	1E-05	Soil solid runoff	1E-08

ROBUST STUDY SUMMARIES

For Docosanoic acid

CAS No. 112 - 85 - 6

Sponsor country: Japan
DATA of Submission to OECD: 2002.02.08

OECD SIDS PHYSICAL/CHEMICAL ENDPOINTS

Melting Point

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: not available

METHOD

- **Method:** Not specified
- **GLP:** Not stated
- **Year:** Not stated
- **Remarks:** Not stated

RESULTS

- **Melting point value :** 79.95 °C
- **Decomposition**: Not stated
- **Sublimation:** Not stated
- **Remarks:** Not stated

CONCLUSIONS

Melting point is 79.95 °C.

DATA QUALITY

- **Reliabilities:** Reliable with restriction
- **Remarks:**

REFERENCES The Merck Index (2001), S. Budavari (ed.), 13th ed., Merck & Co., Inc., Whitehouse Station, NJ

OTHER

- **Last changed**
- **Order number for sorting**
- **Remarks:**

Boiling Point

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: not available

METHOD

- **Method:** Not specified
- **GLP:** No
- **Year:**
- **Remarks:**

RESULTS

- **Boiling point value:** 306 °C
- **Pressure:** 60
- **Pressure unit:** mmHg
- **Decomposition:** No
- **Remarks:**

CONCLUSIONS

Boiling point is 306 °C at 60 mmHg.

DATA QUALITY

- **Reliabilities:** Reliable with restriction
- **Remarks:**

REFERENCES The Merck Index (2001), S. Budavari (ed.), 13th ed., Merck & Co., Inc., Whitehouse Station, NJ

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

Vapour Pressure

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., - Purity: 96.5 %, kept at 5 °C until use. The structure was identified by infrared red spectroscopy.

METHOD

- **Method:** OECD TG104 (Gas saturation method)
- **GLP:** No
- **Year:** 1998
- **Remarks:** Vapour pressure was measured at 100 °C. The vapour pressure at 100 °C was below the detection limit of gas saturation method (6.6×10^{-3} Pa). This test was conducted under the national program.

RESULTS

- **Vapour Pressure value:** $< 6.6 \times 10^{-3}$ Pa (at 100°C)
- **Decomposition:** No
- **Remarks:**

CONCLUSIONS

The vapour pressure at 100 °C is below 6.6×10^{-3} Pa.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks:** Well conducted study

REFERENCES Ministry of Economy, Trade and Industry (METI, former MITI), Japan (1998) unpublished data, conducted by Chemicals Evaluation and Research Institute (CERI), Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

Partition Coefficient

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., - Purity: 96.5 %, kept at 5 °C until use. The structure was identified by infrared red spectroscopy.

METHOD

- **Method:** OECD TG 107 (Flask shake method)
- **GLP:** Yes
- **Year:** 1998
- **Remarks:** After partition equilibrium of the test substance was established between n-octanol and water at three volume ratios, the concentrations of the test substance of both phases were determined with GC.

RESULTS

- **Log P_{ow}:** > 5.11
- **Temperature:** 25 °C
- **Remarks:**

Concentration in n-octanol and water phases under three conditions (mg/L):

Condition	Run 1		Run 2	
	Water phase	Octanol phase	Water phase	Octanol phase
1	<0.0237	3,040	<0.0237	3,070
2	<0.0237	1,520	<0.0237	1,550
3	<0.0237	739	<0.0237	803

The concentration of the test substance in water phase was below the detection limit (< 0.0237 mg/L).

CONCLUSIONS

Log P_{ow} is > 5.11.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks:** Well conducted study

REFERENCES Ministry of Economy, Trade and Industry (METI, former MITI), Japan (1998) unpublished data, conducted by Chemicals Evaluation and Research Institute (CERI), Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

Water Solubility

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., - Purity: 96.5 %, kept at 5 °C until use. The structure was identified by infrared red spectroscopy.

METHOD

- **Method:** OECD TG 105 (Flask method)
- **GLP:** No
- **Year:** 1998
- **Remarks:** 50 mg of the test substance was added in duplicate to 500 mL of water in glass vessel. The vessel was tightly stopped and then shaken at 30 °C for 24, 48 and 72 hours and then equilibrated for 24 hours at 25 °C with occasional shaking. After the aqueous phase was extracted with chloroform, the test substance was methylated with diazomethane. The concentration of the test substance was determined with GC. This test was conducted under the national program.

RESULTS

- **Value :** 0.016 mg/L at 25 °C
- **Description of solubility:** Of very low solubility
- **pH value:**
- **pKa value :** Not determined at 25 °C
- **Remarks:** No dissociation was observed by conductometric method (OECD TG 112)

CONCLUSIONS

Water solubility is 0.016 mg/L.

DATA QUALITY

- **Reliabilities:** Reliable with restrictions
- **Remarks:** Well conducted study

REFERENCES Ministry of Economy, Trade and Industry (METI, former MITI), Japan (1998) unpublished data, conducted by Chemicals Evaluation and Research Institute (CERI), Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

OECD SIDS Environmental Fate Endpoints

Photodegradation

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: not applicable.

METHOD

- **Method:** Calculation by AOP Win v1.86 (Syracuse ResearchCorporation)
- **Type:** Indirect photodegradation
- **GLP:** No
- **Year:** 2001
- **Type of Sensitizer:** OH radical
- **Concentration of Sensitizer:** 5 x 10^5 molecule/cm^3
- **Remarks:** The rate constant for gas-phase reaction between photochemically produced hydroxyl radicals and the test substance in atmosphere was calculated by AOP Win v1.86, which is based on the structure activity relationship methods developed by Dr. Roger Atkinson and co-workers. The half-life time of the substance was calculated with the daily average concentration of OH radical of 5 x 10^5 molecule/cm^3 in atmosphere.

RESULTS

- **Rate Constant:** 2.81 x 10^{-11} cm^3 /molecule-sec
- **Degradation:** 50 % after 13.7 hours
- **Remarks:**

CONCLUSIONS

The half-life time of the substance by the reaction with photochemically produced OH radicals in air is 13.7 hours.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks:**

REFERENCES Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

OTHER

- **Last changed**
- **Order number for sorting**
- **Remarks:**

Stability in water

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., - Purity: 96.5 %, kept at 5 °C until use. The structure was identified by infrared red spectroscopy.

METHOD

- **Method/guideline:** Modified OECD TG 111
- **Type:** Hydrolysis as a function of pH
- **GLP:** No
- **Year:** 1998
- **Remarks:** Stability of the substance in water was tested under the preliminary condition similar to OECD Test Guideline 111. The preliminary test was performed at 2 mg/L and at 50 °C for 5 days in each buffer of pH 4.0, 7.0 and 9.0. Each buffer solution contained 1 % of tetrahydrofulan. All tests were performed in duplicate. The concentration was determined with GC. The test substance was stable in the preliminary test at all pH's. This test was conducted under the national program.

RESULTS

- **Nominal concentration:** 2 mg/L
- **Measured value:** Not stated
- **Degradation %:**

Residue % after 5 days at 50°C		
pH 4.0	104	102
pH 7.0	104	97.0
pH 9.0	94.4	96.1

- **Breakdown products:** Not studied
- **Remarks:**

CONCLUSIONS

Docosanoic acid is stable (half-life time > 1 year) at pH 4.0, 7.0 and 9.0.

DATA QUALITY

- **Reliabilities:** Reliable with restrictions
- **Remarks:** Well conducted study

REFERENCES Ministry of Economy, Trade and Industry (METI, former MITI), Japan (1998), unpublished data, conducted by Chemicals Evaluation and Research Institute (CERI), Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

Transport between Environmental Compartments (Fugacity)

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: not applicable

METHOD

- **Test (test type)** Calculation
- **Method:** Fugacity level III
- **Year:** 2001
- **Remarks:**

RESULTS

- **Media:** Air, water, soil and sediment
- **Estimated Distribution and Media Concentration under three emission scenarios:**

Compartment	Release 100 % to air	Release 100 % to water	Release 100 % to soil
Air	19.7 %	0.4 %	0.0 %
Water	6.8 %	61.7 %	0.0 %
Soil	69.6 %	1.6 %	100.0 %
Sediment	4.0 %	36.3 %	0.0 %

- **Remarks:** The parameters used in the fugacity calculation are shown in Appendix 1, in which the calculated value by MPBP v1.40 (Syracuse Research Corporation) was used for vapour pressure instead of the measured lower limit value.

CONCLUSIONS

If docosanoic acid is released to water, it is likely to be distributed into water and sediment.
But, if it is released to air or soil, the majority of it is likely to be distributed in soil.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks:**

REFERENCES Chemicals Evaluation and Research Institute (CERI), Japan (2001), unpublished data.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

Appendix 1 The parameters used in the fugacity calculation

Physico-chemical parameters used

Molecular weight		340.58	Calculated
Melting point [°C]		79.95	Measured
Vapour pressure [Pa]		6.50E-05	Calculated
Water solubility [g/m^3]		0.016	Measured
Log Pow		5.11	Measured
Half life [h]	In air	40	Estimated
	In water	1200	Estimated
	In soil	1200	Estimated
	In sediment	3600	Estimated

Temp. [°C]	25

Environmental parameters used

		Volume [m^3]	Depth [m]	Area [m^2]	Organic Carbon [-]	Lipid content [-]	Density [kg/m^3]	Residence time [h]
Bulk air	Air	1.0E+13					1.2	100
	Particles	2.0E+03						
	Total	1.0E+13	1000	1E+10				
Bulk water	Water	2.0E+10					1000	1000
	Particles	1.0E+06			0.04		1500	
	Fish	2.0E+05				0.05	1000	
	Total	2.0E+10	10	2E+09				
Bulk soil	Air	3.2E+08					1.2	
	Water	4.8E+08					1000	
	Solid	8.0E+08			0.04		2400	
	Total	1.6E+09	0.2	8E+09				
Bulk sediment	Water	8.0E+07					1000	
	Solid	2.0E+07			0.06		2400	50000
	Total	1.0E+08	0.05	2E+09				

Intermedia Transport Parameters

			[m/h]
Air side air-water MTC	5	Soil air boundary layer MTC	5
Water side air water MTC	0.05	Sediment-water MTC	1E-04
Rain rate	1E-04	Sediment deposition	5E-07
Aerosol deposition	6E-10	Sediment resuspension	2E-07
Soil air phase diffusion MTC	0.02	Soil water runoff	5E-05
Soil water phase diffusion MTC	1E-05	Soil solid runoff	1E-08

Biodegradation

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS: 112-85-6)
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., - Purity: 96.5 %, kept at 5 °C until use. The structure was identified by infrared red spectroscopy.

METHOD

- **Method/guideline:** OECD TG 301C and 302C
- **Test Type :** Aerobic
- **GLP:** Yes (302C: No)
- **Year:** 1997
- **Contact time :** 28 days
- **Inoculum:** Activated sludge cultivated for OECD TG 301C or 302C
- **Remarks:** 30 mg of the test substance or aniline (as reference substance) and 9 mg as MLSS of activated sludge were added to 300 mL of test medium (OECD TG 301C). The test and reference solutions were cultivated in BOD meter together with the inoculum blank and abiotic control ones at 25°C for 28 days, during which the oxygen consumption was continuously measured. After termination of the test, the residual amount of the test substance was determined with GC. The biodegradability was calculated from the oxygen consumption and the residual amount.

  The additional test was conducted under OECD TG 302C conditions (9 mg of test substance and 30mg of activated sludge to 300 mL of test medium at 25°C), in which the biodegradability of the test substance was estimated only from the residual amount of the test substance determined with GC after 28 days. Also, BOD was continuously measured during the test.

RESULTS

- **Degradation after 28 days:** 48, 56 and 52 % by BOD and
  67, 80 and 73 % by GC under OECD TG 301C conditions
  96, 79 and 93 % by BOD and
  94, 95 and 95 % by GC under OECD TG 302C conditions
- **Results :** inherently biodegradable
- **Kinetic:** Percent biodegradability of reference substance by BOD

Test duration	7 days	14 days	21 days	28 days
% Biodegradability	65 %	74 %	74 %	74 %

- **Breakdown products:** No
- **Remarks**

CONCLUSIONS

This chemical is inherently biodegradable.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks:** Well conducted study

REFERENCES Ministry of Economy, Trade and Industry (METI, former MITI), Japan (1998), unpublished data, conducted by Chemicals Evaluation and Research Institute (CERI), Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks:**

ECOTOXICITY ELEMENTS

ACUTE TOXICITY TO FISH

TEST SUBSTANCE

- **Identity:** Docosanoic acid
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., Lot No. FBW01, purity; 96.5 %, melting point; 79.5 °C

METHOD

- **Method/guideline followed:** OECD TG 203
- **Type:** 96-hr mortality
- **GLP:** Yes
- **Year:** 1998
- **Species/Strain/Supplier:** *Oryzias latipes* (Medaka); obtained from commercial hatcheries
- **Analytical monitoring:** Measured by gas chromatography at the preparation and the renewal of the test solution (after 24 hr).
- **Exposure period:** 96 hr
- **Statistical methods:**
- **Remarks field for Test Conditions:**
  - **Test fish:** Acclimated for 7 d before testing; any groups showing > 5 % mortality during this period were not used for testing; fish with 22-32 mm in body length were selected at random.
  - **Test conditions:**
    - · Details of test: Semi-static
    - · Dilution water source: Dechlorinated tap water
    - · Dilution water chemistry: Hardness: 63 mg/L as $CaCO_3$; pH 7.8
    - · Stock and test solutions: The test substance (100 mg) and HCO-40 (2,000 mg) was dissolved in pure water to produce the stock solution of 1,000 mg/L and the appropriate amount of the stock solution was added into the test water.
    - · Concentrations dosing rate, flow-through rate, in what medium: One concentration of 5.00 mg/L, vehicle control and control were tested.
    - · Vehicle/solvent and concentrations: HCO-40 (100 mg/L)
    - · Stability of the test chemical solutions: Not described.
    - · Exposure vessel type: 5-L glass beaker
    - · Number of replicates, fish per replicate: 10 fishes per replicate
    - · Water chemistry in test: DO 5.2-8.3 mg/L; pH 7.2-7.8
  - **Test temperature range:** 23.5-24.2°C (Containers used for testing were placed in an incubator)

RESULTS

- **Nominal concentrations (as mg/L):** 5.00
- **Measured concentrations (as mg/L):** 4.78(Day 0)-5.08(Day 1)
- **Unit [results expressed in what unit]:** % survival after 24, 48, 72, 96 h
- **Element value** LC_{50} at 96 hours is greater than 5.00 mg/L based on nominal concentration
- **Statistical results:** Not described.
- **Remarks field for Results:**

- **Biological observations:** No mortality and abnormal response at the test concentration during the exposure

– **Table showing cumulative mortality:**

Nominal concentration (mg/L)	Measured concentration (mg/L)	Cumulative mortality (%)			
		24 hours	48 hours	72 hours	96 hours
Control	-	0	0	0	0
S.control[a]	-	0	0	0	0
5.00	4.93[b]	0	0	0	0

a : Solvent control
b : geometric mean

– **Lowest test substance concentration causing 100 % mortality:** > 5.00 mg/L
– **Mortality of controls:** No mortality at the controls
– **Abnormal responses:** No abnormal responses at the test concentration and controls
– **Reference substances (if used) – results:** LC_{50} of copper sulfate pentahydrate at 96 hours = 0.73 mg/L
– **Any observations, such as precipitation that might cause a difference between measured and nominal values:** Not described

CONCLUSIONS

HCO-40 was used in this test to prepare the test solution due to the substance with low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). LC_{50} (96h) and LC_0 (96h) were greater than the concentration used in the limit test because there was no mortality during the exposure.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks field for Data Reliability:**

REFERENCES

Ministry of the Environment (MOE), Japan (1998), conducted by Mitsubishi Chemical Safety Institute Ltd., Japan

OTHER

- **Last changed**
- **Order number for sorting**
- **Remarks field for General Remarks**

ACUTE TOXICITY TO FISH

TEST SUBSTANCE

- **Identity:** Docosanoic acid
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., purity ; 96.5 %, melting point ; 79.5°C

METHOD

- **Method/guideline followed:** OECD TG 204
- **Type :** 14-d mortality
- **GLP:** Yes
- **Year:** 1998
- **Species/Strain/Supplier:** *Oryzias latipes* (Medaka); obtained from commercial hatcheries.
- **Analytical monitoring:** Measured by gas chromatography 3 times during the exposure.
- **Exposure period:** 14 days
- **Statistical methods:** Dunnett test for multiple comparison
- **Remarks field for Test Conditions:**
  - **Test fish:** Acclimated for 14 d before testing; any groups showing > 5 % mortality during this period were not used for testing; fish with 20-25 mm in length were selected at random.
  - **Test conditions**
    - · Details of test: Flow-through
    - · Dilution water source: Dechlorinated tap water
    - · Dilution water chemistry: Hardness: 63 mg/L as $CaCO_3$; pH 7.8
    - · Stock and test solution: the test substance (2.25 g) and HCO-40(45.00 g) was dissolved in pure water to produce the stock solution of 2,250 mg/L.
    - · Concentrations dosing rate, flow-through rate, in what medium: One concentration of 4.99 mg/L, vehicle control and control were tested. The flow-through rate was about 6 times a day.
    - · Vehicle/solvent and concentrations: HCO-40 (100 mg/L)
    - · Stability of the test chemical solutions: Not described.
    - · Exposure vessel type: 5-L glass beaker with a siphon drain
    - · Number of replicates, fish per replicate: ten fish per a container
    - · Water chemistry in test (O_2, pH) in the control and one concentration where effects were observed: DO 6.2-8.3 mg/L; pH 7.4-7.8
    - · Feeding: Tetramin®, 2 % body weight /day
  - **Test temperature range :** 24.0-24.6°C (Containers used for testing were placed in an incubator)

RESULTS

- **Nominal concentrations (as mg/L):** 4.99
- **Measured concentrations (as mg/L):** 4.91(Day 0), 5.22(Day 7), 5.04(Day 14)
- **Unit [results expressed in what unit]:** % survival after 7, 14 d
- **Element value :** LC_{50} at 7 and 14 d is greater than 4.99 mg/L based on nominal concentration.
- **Statistical results :** Not described.
- **Remarks field for Results:**
  - **Biological observations: mean body weight and body length at the end of the test:**

. Body weight (g)

Group	Samples	Mean	S.E.	S.D.	Variance
Control	10	0.2268	0.0139	0.0440	0.0019
S.control	10	0.2093	0.0076	0.0242	0.0006
4.99mg/L	10	0.2224	0.0105	0.0332	0.0011

. Body length (cm)

Group	Samples	Mean	S.E.	S.D.	Variance
Control	10	2.3680	0.0430	0.1359	0.0185
S.control	10	2.3130	0.0372	0.1177	0.0138
4.99mg/L	10	2.3580	0.0380	0.1202	0.0144

S.E.: Standard error
S.D.: Standard deviation

– Table showing cumulative mortality:

Nominal concentration (mg/L)	Measured concentration (mg/L)	Cumulative mortality (%)						
		1 day	2 days	3 days	7 days	9 days	10 days	14 days
Control	-	0	0	0	0	0	0	0
S.control[a]	-	0	0	0	0	0	0	0
4.99	5.06[b]	0	0	0	0	0	0	0

a : Solvent control
b : geometric mean

– **Lowest test substance concentration causing 100 % mortality:** > 4.99 mg/L
– **Mortality of controls:** No mortality in the controls
– **Abnormal responses:** No abnormal responses in the test concentration and the controls
– **Reference substances (if used) – results:** LC_{50} of copper sulphate pentahydrate at 96 hours = 0.73 mg/L
– **Any observations, such as precipitation that might cause a difference between measured and nominal values:** Not described.

CONCLUSIONS

HCO-40 was used in this test to prepare the test solution due to the substance with low water solubility and the limit test at 4.99 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). There was no mortality during the exposure and LC_{50} (14d) and LC_0 (14d) were greater than the concentration used in the limit test. There were no abnormal responses during the exposure and no statistically significant differences observed in body weight and body length at the end of the test between the test concentration and the controls. So NOEC (14d) was greater than 4.99 mg/L.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks field for Data Reliability:** Well conducted study

REFERENCES

Ministry of the Environment (MOE), Japan (1998), conducted by Mitsubishi Chemical Safety Institute, Ltd. Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

ACUTE TOXICITY INVERTEVRATES (E.G., DAPHNIA)

TEST SUBSTANCE

- **Identity:** Docosanoic acid
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd., Lot No. FBW01, purity ; 96.5 %, melting point: 79.5°C

METHOD

- **Method/guideline followed:** OECD TG 202
- **Type:** 48-h immobility
- **GLP:** Yes
- **Year:** 1998
- **Species/Strain/Supplier:** *Daphnia magna*; obtained from National Institute for Environmental Studies (NIES).
- **Analytical monitoring:** Measured by gas chromatography at start and end of the test.
- **Exposure period (h):** 48
- **Statistical methods:** Not described
- **Remarks field for Test Conditions:**
  - **Test organisms:**
    - · Source, supplier: Supplied by NIES
    - · Pre-treatment: The group of parents, which showed less than 5% mortality for 14 days prior to test, was used.
    - · Age at study initiation: < 24h old
  - **Test conditions**
    - · Stock and test solution: the test substance (100 mg) and HCO-40 (2,000 mg) was dissolved in pure water to produce the stock solution of 1,000 mg/L and the appropriate amount of the stock solution was added into the test water.
    - · Test temperature range: 20.4-20.7 °C
    - · Exposure vessel type: 100 mL test solution in a 100 mL glass beaker; 4 beakers per treatment
    - · Dilution water source: Dechlorinated tap water
    - · Dilution water chemistry: Hardness: 63 mg/L as $CaCO_3$; pH: 7.8
    - · Lighting: <1,200 lx, 16h: 8h light-darkness cycle
    - · Water chemistry in test: DO= 8.3-8.6 mg/L; pH=7.7-7.9
  - **Element (unit) basis: Immobilization**
  - **Test design:** Number of replicates=4; individuals per replicate=1; concentrations: One concentration of 5.00 mg/L, vehicle control and control were tested.
  - **Method of calculating mean measured concentrations:**
  - **Exposure period:** 48 h
  - **Analytical monitoring:** 103 % of the nominal concentration at preparation; 98 % just before the renewal of the test water

RESULTS

- **Nominal concentrations (as mg/L):** 5.00
- **Measured concentrations (as mg/L):** 5.16(Day 0)-4.88(Day 2)

- **Unit (results expressed in what unit):** % immobilization after 24, 48 h
- **Element value :** EC_{50} at 48 hours is greater than 5.00 mg/L based on nominal concentration
- **Statistical results :** Not described

- **Remarks field for Results:**
  - **Biological observations**
    · Number immobilised as compared to the number exposed:

Nominal concentration (mg/L)	Measured concentration (mg/L)	Cumulative numbers of immobilized *Daphnia* (Percent immobility)	
		24 hours	48 hours
Control	-	0 (0)	0 (0)
S.control[a]	-	0 (0)	0 (0)
5.00	5.02[b]	0 (0)	2 (10)

a : Solvent control
b : geometric mean

· Concentration response with 95 % confidence limits: Not described
· Cumulative immobilization: 10 % immobility in 5.00 mg/L, 0 % immobility in control and vehicle control
· Was control response satisfactory (yes/no/unknown) : Yes

CONCLUSIONS

HCO-40 was used in this test to prepare the test solution due to the substance with low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). There was 10% inhibition of immobilization and no abnormal responses during the exposure, and EC_{50} (48h) was greater than the concentration used in the limit test.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks field for Data Reliability:**

REFERENCES

Ministry of the Environment (MOE), Japan (1998), conducted by Mitsubishi Chemical Safety Institute, Ltd., Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

TOXICITY TO AQUATIC PLANTS (E.G., ALGAE)

TEST SUBSTANCE

- **Identity:** Docosanoic acid
- **Remarks:** Source: Tokyo Kasei Kogyo Co., Ltd
  Lot No. FBW01, purity ; 96.5 %, melting point ; 79.5°C

METHOD

- **Method/guideline followed:** OECD TG 201
- **Test type:** Static
- **GLP:** Yes
- **Year:** 1998
- **Species/strain # and source:** *Selenastrum capricornutum* ATCC22662 (purchased from ATCC)
- **Element basis:** Area under the growth curve and growth rate
- **Exposure period:** 72 h
- **Analytical monitoring:** Measured by gas chromatography at start and end of the test
- **Statistical methods:** Student t test, subsequent to F test for homogeneity of variances (because a mean value at 5.00 mg/L was compared to that of vehicle control).
- **Remarks field for Test Conditions:**
  - **Test Conditions**
    - Test temperature range: 22.5-23.4 °C
    - Growth/test medium: OECD medium
    - Shaking: 100 rpm
    - Dilution water source:
    - Exposure vessel type: 100 mL medium in a 300 mL conical flask with a cap which allow ventilation.
    - Water chemistry in test (pH) in one replicate of each concentration (at start and end of the test): pH=7.9 at start and 10.0 at end of the test (72 h)
    - Stock and test solution: The test substance (100 mg) and HCO-40(2,000 mg) was dissolved in hot test medium to produce the stock solution of 1,000 mg/L and the appropriate amount of the stock solution was added into the test medium.
    - Light levels and quality during exposure: 4,000-5,000 lx, continuous
  - **Test design:**
    - Number of replicates: Triplicate
    - Concentrations: One concentration of 5.00 mg/L, vehicle control and control were tested.
    - Initial cell number in cells/mL: 1×10^4

RESULTS

- **Nominal concentrations (as mg/L):** 5.00
- **Measured concentrations (as mg/L):** 4.59 (Day 0)- 3.70 (Day 3)
- **Unit [results expressed in what unit]:** Cell density (cells/mL)
- **Element value:** ErC_{50} > 5.00 mg/L (24-72 h); NOEC(r) > 5.00 mg/L, EbC_{50} > 5.00 mg/L (0-72 h); NOEC(b) > 5.00 mg/L calculated based on nominal concentration
- **Was control response satisfactory:** Yes: mean cell density increased to 2.69×10^6 cells/mL for control and 2.72×10^6 cells/mL for vehicle control after 72 h
- **Statistical results:** Significant differences were not observed in area under growth curve and growth rate between values at 5.00 mg/L and in the

vehicle control

- **Remarks field for Results:**
  - **Biological observations**

· Cell density at each flask at each measuring point:

Nominal concentration (mg/L)	Measured cocentration (mg/L)	Cell concentration for each exposure ($x10^4$ cells/mL)[c]			
		0 hour	24 hours	48 hours	72 hours
Control	-	1.0	6.9 ± 0.3	41.0 ± 2.6	268.9 ± 7.8
S.control[a]	-	1.0	7.0 ± 0.4	51.2 ± 2.0	271.6 ± 3.5
5.00	4.59-3.70[b]	1.0	7.5 ± 0.1	54.7 ± 1.9	312.3±18.9

a : Solvent control
b : value at start and end of the test
c : mean ± standard deviation

· Growth curves:
· Percent biomass/growth rate inhibition per concentration: -12.7 % for area under growth curve, 0.4 % for growth rate (24-48 h), -1.7 % growth rate (48-72 h)

Analytical observations: The concentration of the test substance in the test solution at the end of the test was 3.70 mg/L. The value was 74% and not within ±20% of the nominal concentration. Precipitation or uptake to algal cells of the test substance might cause the reduction in the test substance concentration between freshly prepared and after 72 hours. The results were based on the nominal concentration because the test substance concentration at 0 hour was within ±20% of the nominal concentration.

CONCLUSIONS

HCO-40 was used in this test to prepare the test solution due to the substance with low water solubility and the limit test at 5.00 mg/L was performed in order to keep the recommended concentration of vehicle (i.e. 100 mg/L in the final test solution). There was no statistical significant difference in inhibition rate compared with the vehicle control and both EC_{50} (72h) and NOEC (72h) were greater than the concentration used in the limit test.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks field for Data Reliability:**

REFERENCES

Ministry of the Environment (MOE), Japan (1998), conducted by Mitsubishi Chemical Safety Institute Ltd., Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks**

CHRONIC TOXICITY TO AQUATIC INVERTEBRATES (E.G., DAPHNIA)

TEST SUBSTANCE

- Identity: Docosanoic acid
- Remarks: Source: Tokyo Kasei Kogyo Co., Ltd., Lot No. FBW01, purity ; 96.5 %, melting point ; 79.5 °C

METHOD

- Method/guideline followed: OECD TG 211
- Test type: 21-d reproduction test
- GLP: Yes
- Year: 1998
- Analytical procedures: Measured by gas chromatography 4 times during the exposure (before and after the replacement of the test water)
- Species/Strain: *Daphnia magna*; obtained from National Institute for environmental Studies (NIES).
- Test details: Semi-static (water renewal: 3 times a week)
- Statistical methods: Bartlett test for homogeneity of variances, one-way ANOVA, Dunnett or Williams test for multiple comparison
- Remarks field for Test Conditions:

– Test organisms:

· Source, supplier, any pretreatment, breeding method: Supplied by NIES
· Age at study initiation
· Control group

– Test conditions

· Stock solutions preparation and stability: HCO-40 and DMF used
· Test temperature range: 19.9-20.6 °C
· Exposure vessel type: 80 mL test solution in a 100 mL glass beaker; 10 beakers per treatment
· Dilution water source: Elendt M4
· Dilution water chemistry: Hardness: 225-275 mg/L as $CaCO_3$
· Lighting: <1,200 lx, 16h : 8h light-darkness cycle
· Water chemistry in test: DO= 6.0-8.6 mg/L; pH=7.0-8.0
· Feeding: *Chlorella vulgaris*, 0.15 mgC/day/individual

– Element (unit) basis: Mean cumulative numbers of juveniles produced per adult (reproduction)

– Test design:

· Number of replicates: 10
· Individuals per replicate: 1
· Concentrations: 0.30, 0.55 and 1.00 mg/L, because EC_{50} (48 h Immobilization test) was greater than 5.00 mg/L

– Method of calculating mean measured concentrations: time-weighted mean
– Exposure period: 21 days
– Analytical monitoring: 83-103 % of the nominal concentration at preparation; 71-98 % just before the renewal of the test water.

RESULTS

- Nominal concentrations (as mg/L): 0.30, 0.55, 1.00

- Measured concentrations (as mg/L):

Nominal concentration (mg/L)	Measured concentration (mg/L)								
	0 day[a]	2 days[b]	7 days[a]	9 days[b]	9 days[a]	12 days[b]	19 days[a]	21 days[b]	Mean[c]
Control	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	-
S.control	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	-
0.30	0.30	0.27	0.26	0.29	0.31	0.25	0.26	0.23	0.27
0.55	0.56	0.48	0.51	0.50	0.55	0.46	0.48	0.44	0.49
1.00	1.00	0.81	0.88	0.98	0.88	0.80	0.83	0.71	0.84

a : freshly prepared test solution
b : old test solution before renewal
c : time-weighted mean

- **Unit [results expressed in what unit]:** Mean cumulative numbers of juveniles produced per live adult after 21 d
- **EC_{50}, LC_{50}:** > 0.84 mg/L, EC_{50} (14 d, reproduction) ; > 0.84 mg/L, EC_{50} (21 d, reproduction) ; > 0.84 mg/L, LC_{50} for parental *Daphnia* (14 d) ; > 0.84 mg/L, LC_{50} for parental *Daphnia* (21 d) ; > 0.84 mg/L calculated based on measured concentrations
- **Statistical results:** Differences in mean cumulative numbers of young produced per adult alive between vehicle control and *Daphnia* treated with 0.30, 0.55 and 1.00 mg/L were not statistically significant.
- **Remarks field for Results:**
  - **Biological observations**
    · Cumulative number of dead parental *Daphnia*:

Nominal concentration (mg/L)	Measured concentration (mg/L)	Cumulative number of dead parental *Daphnia*					
		1 day	2 days	4 days	7 days	14 days	21 days
Control	-	0	0	0	0	1	1
S. Control[a]	-	0	0	0	0	2	2
0.30	0.27[b]	0	0	0	0	1	1
0.55	0.49[b]	0	0	0	0	2	2
1.00	0.84[b]	0	0	0	0	1	2

a : Solvent control
b : time-weighted mean

· Time of the first production of young:

Nominal concentration (mg/L)	Measured concentration (mg/L)	Time of the first production of young	
		Min. (days)	Max. (days)
Control	-	7	8
S.control[a]	-	7	10
0.30	0.27[b]	7	10
0.55	0.49[b]	7	10
1.00	0.84[b]	7	11

a : Solvent control
b : time-weighted mean

· Mean cumulative numbers of young produced per adult alive:

Nominal concentration (mg/L)	Measured concentration (mg/L)	Mean cumulative numbers of young produced per adult alive	
		14 days	21days
Control	-	79.0	137.4
S.control[a]	-	75.0	135.9
0.30	0.27[b]	82.7	146.7
0.55	0.49[b]	88.1	154.9
1.00	0.84[b]	73.4	137.5

a : Solvent control
b : time-weighted mean

· Was control response satisfactory: Yes

CONCLUSIONS

HCO-40 and DMF were used in this test to prepare the test solution due to the substance with low water solubility. There was no statistically significant difference in mean cumulative numbers of young produced per adult alive between the test concentrations and the vehicle control. Also, no significant difference between treated control, vehicle control and treated groups was observed on cumulative number of dead parental. Hence, both EC_{50} (21d) and NOEC (21d) values of docosanoic acid on chronic *Daphnia* reproduction test were greater than 0.84 mg/L as the concentration of time-weighted mean.

DATA QUALITY

- **Reliabilities:** Reliable without restrictions
- **Remarks field for Data Reliability:**

REFERENCES

Ministry of the Environment (MOE), Japan (1998), conducted by Mitsubishi Chemical Safety Institute, Ltd., Japan

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

HEALTH ELEMENTS
ACUTE ORAL TOXICITY

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS No 112-85-6)
- **Remarks:** Source: NOF CORPORATION, Lot No. 60805X, Purity: 85.9 %,
  Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) and C_{24} fatty acid (2.3 %), Kept at room temperature until use.

METHOD

- **Method/guideline** OECD TG 401
- **Test type:** Acute oral toxicity
- **GLP:** Yes
- **Year:** 1998
- **Species:** Rat
- **Strain:** Crj:CD (SD)
- **Route of administration:** Oral (gavage)
- **Doses/concentration levels:** 0, 2,000 mg/kg
- **Sex:** Male & female
- **Vehicle:** Corn oil
- **Control group and treatment:** Concurrent vehicle
- **Post exposure observation period**: 14 days
- **Statistical methods:** Not applicable because of no fatality.

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**
  · Age at study initiation: 5 weeks
  · No. of animals per sex per dose: 5 per sex per dose group

– **Study Design:**
  · Vehicle: Corn oil. 20 w/v% for 2,000 mg/kg.
  · Satellite groups and reasons they were added: none
  · Clinical observations performed and frequency:
  Clinical signs were observed continuously up to 1 hour after the treatment. Then each rat observed once an hour from 1 to 6 hour and once a day from day 2 to day 15.

RESULTS

- **LD_{50}:** Male: > 2,000 mg/kg
  Female: > 2,000 mg/kg

REMARKS FIELD FOR RESULTS

There were no treatment-related adverse effects.

– **Body weight:** No compound-related effects were observed. Body weight changes in treated groups were similar to that of the control.
– **Food/water consumption:** Not examined.
– **Clinical signs:** Although soft faeces were observed in treated groups due to the solvent consumption, the same finding was recognized in control group. The effects were considered to be attributed to

corn oil as a vehicle.

- **Haematology:** Not examined.
- **Biochemistry:** Not examined.
- **Ophthalmologic findings**: Not examined
- **Mortality and time to death:** None
- **Gross pathology incidence and severity:** No treatment-related abnormalities.
- **Organ weight changes:** Not examined.
- **Histopathology:** Not examined.

CONCLUSIONS

There were no treatment related abnormalities. LD_{50} is greater than 2,000 mg/kg for both sexes.

DATA QUALITY

- **Reliabilities:** Reliable without restriction
- **Remarks field for Data Reliability:** Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Japan).

REFERENCES

Ministry of Health, Labour and Welfare (MHLW, former MHW), Japan (1998), Toxicity Testing Reports of Environmental Chemicals 6, 236-246.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

REPEATED DOSE TOXICITY

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS No 112-85-6)

Remarks: Source: NOF CORPORATION, Lot No. 60805X, Purity: 85.9 %, Impurities: (C_{14}-C_{20}) fatty acids (10.9 %) and C_{24} fatty acid (2.3%), Kept at room temperature until use.

METHOD

- **Method/guideline:** OECD TG 422
- **Test type:** OECD Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test
- **GLP:** Yes
- **Year:** 1998
- **Species:** Rat
- **Strain:** Crj:CD (SD)
- **Route of administration:** Oral (gavage)
- **Duration of test:** Males: 43 days; Females: from 14 days prior to mating to day 4 of lactation
- **Doses/concentration levels:** 0, 100, 300, 1,000 mg/kg/day (in corn oil)
- **Sex:** Male & female
- **Exposure period:** Males: 42 days; Females: from 14 days prior to mating to day 3 of lactation
- **Frequency of treatment:** Daily
- **Control group and treatment:** Concurrent vehicle
- **Post exposure observation period:** None
- **Statistical methods:** Dunnett's or Scheffe's test for continuous numerical data, Chi square test for copulated index and fertility index, and Mann-Whitney U test or Fisher's test for histopathological examination data.

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**

· ***Age at study initiation*:** 8 weeks old

· ***No. of animals per sex per dose*:** 13 animals per sex per dose group

– **Study Design:**

· ***Vehicle*:** Corn oil

· ***Satellite groups and reasons they were added*:** none

· ***Clinical observations performed and frequency*:** Clinical signs were observed at least once a day, body weights were basically determined once a week. Also, food consumption was measured nearly once a week except for mating period.

Hematological examinations (only for males): Red blood cell count (RBC), white blood cell count (WBC), platlet count, hemoglobin (Hb), hematocrit (Ht), mean corpuscular volume (MCV),mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC),differentiation of leukocytes

Blood chemical examinations (only for males): total protein, albumin, A/G, blood urea nitrogen (BUN), creatinine, glucose, total cholesterol, total

bilirubin, triglyceride, sodium (Na), potassium (K), chloride (Cl), calcium (Ca), inorganic phosphorus (IP), alkaline phosphatase (ALP), GPT, GOT, ?-GTP.

Organs examined at necropsy: organ weights: heart, liver, kidneys, thymus, testes, epididymides histopathological examinations: all animals in control and 1,000 mg/kg, and any organs which have histopathological changes at the higher doses: brain, heart, liver, spleen, thymus, kidney, adrenal, testis, epididymis, urinary bladder, ovary (only for females which were non pregnant or not copulated).

General remarks: This study was conducted to examine both repeated dose toxicity and reproductive/developmental toxicity as an OECD screening combined study. Therefore, haematological and blood chemical examinations, and urinalysis for females were not performed. Functional observation, estrous cycle length and pattern, and sperm examination were not performed because the test was conducted by the TG adopted in 1990.

RESULTS

- NOAEL 1,000 mg/kg/day
- LOAEL >1,000 mg/kg/day

REMARKS FIELD FOR RESULTS

There were no treatment-related adverse effects though some slight changes in blood biochemistry and histopathology in testes.

- **Body weight:** No treatment-related abnormalities.
- **Food/water consumption:** No treatment-related abnormalities.
- **Clinical signs:** No treatment-related abnormalities.
- **Haematology:**

Males: Decrease of MCHC at 300 and 1,000 mg/kg ($p<0.01$). However, this change in both groups was concluded as a casual one, because the degree of the change in both groups was very slight (the same 2.3 % decrease) and no other haematological changes were noted.

Biochem:

Males: Decrease of serum ALP in treated groups ($p<0.05$) and decrease of glucose at 1,000 mg/kg ($p<0.05$). However, these changes were considered to be toxicologically meaningless ones since they were slight and related histopathological findings were not observed.

- **Ophthalmologic findings**: Not examined.
- **Mortality and time to death:** None
- **Gross pathology incidence and severity:** No treatment-related abnormalities.
- **Organ weight changes:** No statistically significant differences from controls in any organs.
- **Histopathology:**

Males: No treatment-related abnormalities in heart, liver, spleen, kidneys, adrenals and epididymides. In testes, atrophy of seminiferous tube was recognized in two of thirteen at 1,000 mg/kg group, but they were considered not to be treatment related specific findings, because they were slight and sometimes observed in historical control data in the laboratory conducting this study. No abnormalities detected in brain, thymus and urinary bladder.

Females: No treatment-related abnormalities in brain, liver, spleen, thymus, kidneys and adrenals. No abnormalities detected in heart, urinary bladder and

ovaries.

CONCLUSIONS

No treatment related adverse effects were found in either dose group up to 1,000 mg/kg. NOAEL is estimated to be 1,000 mg/kg/day for this repeated dose toxicity study.

DATA QUALITY

- **Reliabilities:** Reliable without restriction.
- **Remarks field for Data Reliability:** Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Japan).

REFERENCES

Ministry of Health, Labour and Welfare (MHLW, former MHW), Japan (1998), Toxicity Testing Reports of Environmental Chemicals 6, 236-246.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

TOXICITY TO REPRODUCTION/DEVELOPMENT

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS No 112-85-6)
- **Remarks:** Source: NOF CORPORATION, Lot No. 60805X, Purity: 85.9 %, Impurities: C_{14}-C_{20} fatty acids (10.9 %) and C_{24} fatty acid (2.3 %), Kept at room temperature until use

METHOD

- **Method/guideline** OECD TG 422
- **Test type** OECD Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test
- **GLP (Y/N):** Yes
- **Year (study performed):** 1998
- **Species:** Rat
- **Strain:** Crj;CD (SD)
- **Route of administration:** Oral (gavage)
- **Doses/concentration levels:** 0, 100, 300, 1,000 mg/kg/day (in corn oil)
- **Vehicle:** Corn oil
- **Sex:** Male & Female
- **Exposure period:** Males: 42 days; Females: from 14 days prior to mating to day 3 of lactation.
- **Frequency of treatment:** Daily
- **Control group and treatment:** Concurrent vehicle
- **Duration of test:** Males: 43 days; Females: from 14 days prior to mating to day 4 of lactation.
- **Statistical methods:** Dunnett's or Scheffe's test for continuous data, Chi square test for copulated index and fertility index, and Mann-Whitney U test or Fisher's test for histopathological examination data.

REMARKS FIELDS FOR TEST CONDITIONS

Age at study initiation was 8 week old for both sexes. Males were killed on the day after the administration period. Females were sacrificed on the day 4 of lactation. Females with no delivery were killed 4 days after the delivery expected date. Females with no copulation were sacrificed at the termination of mating period.

- **Weight at study initiation:** 312.1-363.7 g for males, 205.3 - 230.8 g for females
- **Number of animals per dose:** 13 per sex per dose
- **Mating procedures:** Male/female per cage; 1/1, length of cohabitation; at the most 14 days, until proof of pregnancy (formation of vaginal closing or sperm detection in vagina)
- **Clinical observations performed and frequency:**
  Parent: Performed once a day
  Foetus: Performed once a day after birth
- **Parameters assessed during study:** Body wt (basically once a week), food consumption (basically once a week), No. of pairs with successful copulation, copulation index (No. of pairs with successful copulation/No. of pairs mated x 100), pairing days until copulation, frequency of vaginal estrus, No. of pregnant females, fertility index = (No. of pregnant animals/No. of pairs with successful copulation x 100), No. of corpora lutea, No. of implantation sites, implantation index (No. of implantation sites/No. of corpora lutea x 100), No. of living pregnant females, No. of pregnant

females with parturition, gestation length, No. of pregnant females with live pups on day 0, gestation index (No. of females with live pups/No. of living pregnant females x 100), No. of pregnant females with live pups on day 4, delivery index (No. of pups born/No. of implantation sites x 100), No. of pups alive on day 0 of lactation, live birth index (No. of live pups on day 0/No. of pups born x 100), sex ratio (Total No. of male pups/Total No. of female pups), No. of pups alive on day 4 of lactation, viability index (No. of live pups on day 4/No. of live pups on day 0 x 100), body wt. of live pups (on day 0 and 4).

– **Organs examined at necropsy:**
Parent: organ weight: heart, liver, kidneys, thymus, testes, epididymidesHistopathological examinations: all animals in control and 1,000 mg/kg, and any organs which have histopathological changes at the higher doses: brain, heart, liver, spleen, thymus, kidney, adrenal, testis, epididymis, urinary bladder, ovary (only for females which were non pregnant or not copulated).
Foetal: full macroscopic examinations on all of pups

RESULTS

- **NOAEL (NOEL) and LOAEL (LOEL) maternal toxicity:** NOAEL: 1,000 mg/kg/day
- **NOAEL (NOEL) and LOAEL (LOEL) foetal toxicity:** NOAEL: 1,000 mg/kg/day
- **Actual dose received by dose level by sex, if available:** 0, 100, 300, 1,000 mg/kg/day for both sexes
- **Maternal data with dose level (with NOAEL value):** No abnormalities were found in all reproductive parameters (fertility index, number of implantations and implantation index) in each dose group.
- **Foetal data with dose level (with NOAEL value):** No abnormalities were found in all indexes (No. of pups born, No. of pups alive, pups weight, sex ratio, viability etc.) obtained from pups in each dose group.
- **Statistical results, as appropriate:** All of the above changes were not statistically significant.
- **Remarks for Results**.
  - **Mortality and day of death:** No deaths occurred in all dams through the study period.
  - **Body weight:** No stat. sig. difference from controls
  - **Food/water consumption:** No stat. sig. difference from controls
  - **Reproductive data:** No stat. sig. difference from controls
  - **Fetal data:** No stat. sig. difference from controls
  - **Grossly visible abnormalities, and external abnormalities**:
    No abnormalities were found in all pups examined in either the external observation at day 0 or the autopsy performed at day 4 after birth.

CONCLUSIONS

There were no treatment related abnormalities. NOAELs for both maternal and foetal toxicity are 1,000 mg/kg/day.

DATA QUALITY

- **Reliabilities:** Reliable without restriction.
- **Remarks field for Data Reliability:**
Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Japan).

REFERENCES (Free Text)

Ministry of Health, Labour and Welfare (MHLW, former MHW), Japan (1998), Toxicity Testing Reports of Environmental Chemicals 6, 236-246.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

GENETIC TOXICITY IN VITRO (BACTERIAL TEST)

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS No 112-85-6)
- **Remarks:** Source: NOF CORPORATION, Lot No. 60805X, Purity: 85.9 %, Impurities: C_{14}-C_{20} fatty acids (10.9 %) and C_{24} fatty acid (2.3 %), Kept at room temperature until use

METHOD

- **Method/guideline:** OECD TG 471 and 472, and Japanese Guidelines for Screening Mutagenicity Testing of Chemicals
- **Test type:** Reverse mutation assay
- **GLP:** Yes
- **Year:** 1998
- **Species/Strain:** *Salmonella typhimurium* TA100, TA1535, TA98, TA1537 *Escherichia coli* WP2 *uvr* A
- **Metabolic activation:** S9 from rat liver, induced with phenobarbital and 5,6-benzoflavone
- **Statistical methods:** No statistic analysis

REMARKS FIELD FOR TEST CONDITIONS

- **Study Design:**

Concentration:	-S9: 0, 156, 313, 625, 1,250, 2,500, 5,000 ug /plate +S9: 0, 156, 313, 625, 1,250, 2,500, 5,000 ug /plate
Number of replicates:	2
Plates/test:	3
Procedure:	Pre-incubation
Solvent:	DMSO
Positive controls:	-S9 mix; 2-(2-Furyl)-3-(5-nitro-2-furyl) acrylamide (TA100, TA98, WP2 uvrA), Sodium azide (TA1535) and 9-Aminoacridine hydrochloride (TA1537) +S9 mix; 9-Aminoanthracene (all strains)

RESULTS

- **Cytotoxic concentration:** Toxicity was not observed up to 5,000 ug/plate in all strains with or without S9 mix.
- **Genotoxic effects:**

	+	?	-
– With metabolic activation:	**[ ]**	**[ ]**	**[X]**
– Without metabolic activation:	**[ ]**	**[ ]**	**[X]**

REMARKS FIELD FOR RESULTS.

CONCLUSIONS

Bacterial reverse mutation tests showed negative results with and without metabolic activation.

DATA QUALITY

- **Reliabilities:** Reliable without restriction.
- **Remarks field for Data Reliability:** Well conducted study, carried out by Biosafety Research Center, Foods, Drugs and Pesticides (Japan).

REFERENCES (Free Text):

Ministry of Health, Labour and Welfare (MHLW, former MHW), Japan (1998), Toxicity Testing Reports of Environmental Chemicals 6, 236-246.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**

GENETIC TOXICITY IN VITRO (NON-BACTERIAL IN VITRO TEST)

TEST SUBSTANCE

- **Identity:** Docosanoic acid (CAS No 112-85-6)
- **Remarks:** Source: NOF CORPORATION, Lot No. 60805X, Purity: 85.9 %, Impurities: C_{14}-C_{20} fatty acids (10.9 %) and C_{24} fatty acid (2.3 %), Kept at room temperature until use.

METHOD

- **Method/guideline:** OECD TG 473 and Japanese Guidelines for Screening Mutagenicity Testing of Chemicals
- **Test type:** Chromosomal aberration test
- **GLP**: Yes
- **Year:** 1998
- **Species/Strain:** CHL/IU cells
- **Metabolic activation:** S9 from rat liver, induced with phenobarbital and 5,6-benzoflavone
- **Statistical methods:** No statistic analysis

REMARKS FIELD FOR TEST CONDITIONS

– **Study Design:**

For continuous treatment, cells were treated for 24 or 48 hrs without S9. For short-term treatment, cells were treated for 6 hrs with and without S9 and cultivated with fresh media for 18 hrs.

Concentration: -S9 (24hr continuous treatment): 0, 350, 700, 1,400, 2,800 ug/mL
-S9 (48hr continuous treatment): 0, 288, 575, 1,150, 2,300 ug/mL
-S9 (short-term treatment): 0, 875, 1,750, 3,500 ug/mL
+S9 (short-term treatment): 0, 875, 1,750, 3,500 ug/mL

Plates/test: 2

Solvent: 1 % Carboxymethylcellulose sodium

Positive controls: -S9 mix; Mitomycin C
+S9 mix; Cyclophosphamide

RESULTS

- **Cytotoxic concentration:**

Fifty percent inhibition of cell proliferation was observed at 2,703 ug/mL for 24hr continuous treatment and at 2,242 ug/mL for 48hr continuous treatment, respectively. Cell proliferation inhibition was not observed in short-term treatment with or without S9 mix.

- **Genotoxic effects:**

	clastogenicity			polyploidy		
	+	?	-	+	?	-
– With metabolic activation:	[ ]	[ ]	**[X]**	[ ]	[ ]	**[X]**
– Without metabolic activation:	[ ]	[ ]	**[X]**	[ ]	[ ]	**[X]**

REMARKS FIELD FOR RESULTS.

Structural chromosomal aberrations and polyploidy were not induced up to a maximum concentration of test substance under conditions of continuous treatment, and short-term treatment with and without an exogenous metabolic activation system.

CONCLUSIONS

Chromosomal aberration test in CHL/IU cells was negative with and without metabolic

activation.

DATA QUALITY

- **Reliabilities:** Reliable without restriction.
- **Remarks field for Data Reliability:** Well conducted study, carried out by Biosafety Research Center, Foods, Drugs and Pesticides (Japan).

REFERENCES (Free Text):

Ministry of Health, Labour and Welfare (MHLW, former MHW), Japan (1998), Toxicity Testing Reports of Environmental Chemicals 6, 236-246.

OTHER

- **Last changed:**
- **Order number for sorting:**
- **Remarks field for General Remarks:**