FOREWORD INTRODUCTION

1-METHOXY-2-PROPANOL ACETATE

CAS N°: 108-65-6

SIDS INITIAL ASSESSMENT PROFILE

CAS No.	108-65-6
Chemical Name	1-Methoxy-2-propyl acetate
Structural Formula	CH_3O-CH_2-$CH(CH_3)$-O-$COCH_3$

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

It is anticipated that rapid and extensive hydrolysis of 1-Methoxy-2-propyl acetate also known as 2-methoxy-1-methylethyl acetate (PMA) will occur *in vivo* following either oral, inhalation or dermal exposures to yield the corresponding glycol ether, propylene glycol monomethyl ether (PM). Thus, it is presumed that no substantial differences in the systemic toxicities of PM or PMA will exist. In particular, dermal testing with PMA in rats suggests that any effects arising from PMA would be overestimated by using PM toxicity data.

Acute toxicity of this chemical is low in rodents because LD_{50} values are greater than 5,000 mg/kg by oral or dermal routes and greater than 10,800mg/m^3 by inhalation.

This chemical is slightly irritating to the eye, but not to the skin. PMA is not skin-sensitising in guinea pigs.

In a oral rat study carried out according to the OECD combined repeated dose and reproductive/ developmental toxicity screening test [OECD TG 422], a dose of 1,000 mg/kg/day of PMA exerted some effects in only male rats. Blood examination revealed decreases in glucose and inorganic phosphorus and an increase in relative weight of the adrenals was also noted in males. However, such changes were not observed in females. Histopathological examination revealed none of the alteration of tissues at the highest dose group for both sexes. As such changes in males were considered not to be adverse effect, a NOAEL was considered to be 1,000 mg/kg bw/day for both sexes.

An inhalation study conducted for 6 hr/day, 5 day/week for 2 weeks using rats and mice at doses of 300, 1,000 or 3,000 ppm (1.62, 5.39 or 16.18 mg/L) demonstrated that haematology and clinical chemistry analyses revealed no treatment-related effect. However, the kidneys of all male rats and two of five females in the 3,000 ppm-exposure group appeared to be slightly reticulated at necropsy. The change noted in these animals was a slight increase in the eosinophilic granularity of the proximal convoluted tubules of the kidneys. The same slight renal change was also observed in one of five male rats at 1,000 ppm. Another detectable effect in rats and mice was slight-to-moderate degeneration of olfactory epithelium in the nasal cavities. A NOAEL for inhalation toxicity in rats was established at 300 ppm (1.62 mg/L) for males and at 1,000 ppm

(5.39 mg/L) for females, whereas a NOAEL for inhalation toxicity in mice was not established because the lowest dose at 300 ppm induced a minimum effect on the nasal cavity of mice. The change in nasal cavity is likely caused by acetic acid from PMA hydrolysis at the exposure site.

In reproductive/developmental oral toxicity study [OECD TG 422], there were no statistically significant adverse effects on reproductive parameters and no evidence of malformations at any doses. Likewise, in developmental/teratogenicity inhalation study, there were no statistically significant adverse effects on reproductive and teratogenic parameters at any doses, although some systemic toxicities were observed in dams at 2,000 and 4,000 ppm. A NOAEL was established at 1,000 mg/kg bw/day for reproductive/developmental toxicity by gavage and at 4,000 ppm (22,464 mg/m^3) for developmental/teratogenicity toxicity by inhalation, respectively.

Two bacterial mutation tests, unscheduled DNA synthesis in rat hepatocytes and chromosomal aberration test *in vitro* show negative results.

PMA tested in the animal studies contained approximately a maximum of 2 % of the beta-isomer.

Environment

PMA is readily biodegradable (OECD TG 301F: 99 % after 28 days). This chemical is stable to chemical hydrolysis in water at pH 4 and 7, whereas it is hydrolyzed at pH 9 with half-life of 8.10 days at 25 °C.

The toxicity to aquatic plants (algae; *Selenastrum capricornutum*) was >1,000mg/L for EC_{50} (72 hr) and NOEC (72 hr). The acute toxicity data in fish (medaka; *Oryzias latipes*) were >100 mg/L for 96h LC_{50}, 63.5 mg/L for 14d LC_{50} and 47.5 mg/L for 14d NOEC. In *Daphnia magna,* EC_{50} (48h) for acute toxicity and NOEC (21-d reproduction) for chronic toxicity were 373 mg/L and ≥100 mg/L, respectively. When assessment factor of 100 was applied to the 14d LC_{50} for medaka and the chronic toxicity for *Daphnia*, PNECs were calculated as 0.635 and ≥1.0 mg/L, respectively. The lowest PNEC was thus determined to be 0.635 mg/L.

Exposure

The production volume in Japan was approximately 15,000 tonnes/year in use, while estimated global production is 100,000-500,000 tonnes/year according to IUCLID 1999. Commercially available PMA contains less than 0.5 % of the ß-isomer. PMA has a variety of uses including as a solvent for paints, inks, lacquers, varnishes and cleaners, coatings and ink-removers, and as a pesticide inert.

Generic fugacity models (Level III Fugacity Model and Unit World Equilibrium Model) show this chemical would be distributed mainly to water if it was released into water.

As this chemical is contained as a solvent for specific paint products and used in industrial sites, user exposure may take place in the industry and consumer. PMA occurred in 366 chemical products on American market according to MSDS-OHS 2000.

NATURE OF FURTHER WORK RECOMMENDED

No recommendation.

FULL SIDS SUMMARY

CAS NO: 108-65-6		SPECIES	PROTOCOL	RESULTS
PHYSICAL-CHEMICAL				
2.1	Melting Point		JIS K 0065-1966 (Japan)	< - 10 °C (263 K)
2.2	Boiling Point		ASTM D86	145.8 °C (at 1,013 hPa)
2.3	Density		DIN 51 757	0.965-0.970g/cm^3 at 20 °C
2.4	Vapour Pressure		Twin Ebulliometry	3.7 hPa (2.8 Torr) at 20 °C
2.5	Partition Coefficient (Log Pow)		OECD TG 107	0.36 at 25 °C
2.6	Water Solubility		OECD TG 105	> 100 g/L at 25 °C
	pH			None
	pKa			None
2.12	Oxidation: Reduction Potential			None
ENVIRONMENTAL FATE AND PATHWAY				
3.1.1	Photodegradation			$T_{1/2}$=32 hours (Indirect photolysis)
3.1.2	Stability in Water		OECD TG 111	Stable at pH 4 and 7 at 50°C $T_{1/2}$=8.10 days at pH 9 at 25°C
3.2	Monitoring Data			In air = None In surface water = None In soil/sediment = None In biota = None
3.3	Transport and Distribution		Calculated (Level III Fugacity Model)	(Release 100% to air) Air Water Soil Sediment 73.30% 26.31% 0.57% 0.06% (Release 100% to water) Air Water Soil Sediment 0.60% 99.90% 0.00% 0.23% (Release 100% to soil) Air Water Soil Sediment 1.10% 19.41% 79.49% 0.04%
			(local exposure)	PEC_{local} = None
3.5	Biodegradation		OECD TG 301C	Readily biodegradable
3.7	Bioaccumulation			None
ECOTOXICOLOGY				
4.1	Acute/Prolonged Toxicity to Fish	*Oryzias latipes*	OECD TG 203	LC_{50} (96 hr) > 100 mg/L
			OECD TG 204	LC_{50} (7 d) = 85 mg/L LC_{50} (14 d) = 63.5 mg/L NOEC (14d) = 47.5 mg/L LOEC (14 d) = 85 mg/L
4.2	Acute Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 202	EC_{50} (24 hr) = 407 mg/L EC_{50} (48 hr) = 373 mg/L NOEC(48 hr) = 278 mg/L
4.3	Toxicity to Aquatic Plants e.g. Algae	*Selenastrum capricornutum* (ATCC22662)	OECD TG 201	EC_{50} (72 hr) > 1,000 mg/L NOEC (72 hr) > 1,000 mg/L (Growth inhibition)

4.5.2	Chronic Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 211	EC_{50} (14 d) > 100mg/L (Reproduction) EC_{50} (21 d) > 100mg/L (Reproduction) NOEC (21 d) ≥ 100mg/L (Reproduction) LC_{50} (14 d) > 100mg/L (Parental Daphnia) LC_{50} (21 d) > 100mg/L (Parental Daphnia)
4.6.1	Toxicity to Soil Dwelling Organisms			None
4.6.2	Toxicity to Terrestrial Plants			None
4.6.3	Toxicity to Other Non-Mammalian Terrestrial Species (Including Birds)			None
TOXICOLOGY				
5.1.1	Acute Oral Toxicity	Rat	Other (unknown)	LD_{50} > 10,000 mg/kg (male) LD_{50} > 8,532 mg/kg (female)
5.1.2	Acute Inhalation Toxicity	Rat	Other (unknown)	No lethal effects in saturated atmosphere of 4,345 ppm (23,463 mg/m3)
5.1.3	Acute Dermal Toxicity	Rabbit	Other (unknown)	LD_{50} > 5,000 mg/kg
5.2.1	Skin Irritation	Rabbit	Other (unknown)	Not irritating
5.2.2	Eye Irritation	Rabbit	Other (unknown)	Slightly irritating
5.3	Skin Sensitisation	Guinea pig	Magnusson-Kigman	Not sensitising
5.4	Repeated Dose Toxicity	Rat Rat	OECD TG 422 (Oral gavage) Other (unknown) (Inhalation)	NOAEL = 1,000 mg/kg/day (male) NOAEL = 1,000 mg/kg/day (female) NOAEL = 300 ppm (1.62 mg/L) (male) NOAEL = 1,000 ppm (5.39 mg/L) (female)
5.5	Genetic Toxicity *In Vitro*			
	Bacterial Test (Gene mutation)	*S.typhimurium, E. coli*	Japanese TG and OECD TG 471 & 472	- (With metabolic activation) - (Without metabolic activation)
	Non-Bacterial *In Vitro* Test (Chromosomal aberrations)	CHL cells	Japanese TG and OECD TG 473	- (With metabolic activation) - (Without metabolic activation)
5.6	Genetic Toxicity *In Vivo*			None
5.7	Carcinogenicity			None
5.8	Toxicity to Reproduction	Rat	OECD TG 422	NOAEL Parental = 1,000mg/kg/day (male) NOAEL Parental = 1,000mg/kg/day (female) NOAEL F1 Offspring = 1,000mg/kg/day
5.9	Developmental Toxicity/Teratogenicity	Rat		NOAEL Maternal = 500ppm(2,700mg/m^3, measured) NOAEL Teratogenicity = 4,000ppm(22,464mg/m^3, measured)
5.11	Experience with Human Exposure			None

SIDS INITIAL ASSESSMENT REPORT (SIAR)

1-Methoxy-2-propanol acetate

1. IDENTITY

IUPAC name: 2-Methoxy-1-methylethyl acetate

CAS number: 108 - 65 - 6

Molecular formula: $C_6H_{12}O_3$

Structural formula: $CH_3O\text{-}CH_2\text{-}CH(CH_3)\text{-}O\text{-}COCH_3$

Synonyms:
1-Methoxy-2-acetoxy propane
1-Methoxy-2-propanol acetate
1-Methoxy-2-propyl acetate
1-Methoxy-2-acetoxypropane
2-Acetoxy-1-methoxypropane
2-Methoxy-1-methylethyl acetate
2-Propanol, 1-methoxy-, acetate
Methoxy Propyl Acetate
Methoxypropylacetate
Methyl Proxitol Acetate
MPA
PMA
PGMEA
Acetic acid, 2-methoxy-1-methylethyl ester
Propylene glycol methyl ether acetate
Propylene glycol 1- methyl ether 2- acetate

Purity: 99.5-99.8 % (High purity), practical/technical grades may contain following impurities: 2-Methoxy-1-propyl acetate (beta-isomer)(ca. 0.3-0.5% weight/weight), Propanol (mixed isomers)(ca. 0.2 % weight/weight), 2,6-bis (1,1-dimethylethyl)-4-methyl phenol (additive)(0.004-0.006% weight/weight), (additive for prevention of peroxides formation) and water
(American Chemistry Council PGE Panel)

Physical and chemical properties:

ITEMS	PROTOCOL	RESULTS
Melting Point	JIS K 0065-1966 (Japan)	< - 10 °C (263 K)
Boiling Point	ASTM D86	145.8 °C (1,013 hPa)
Vapour Pressure	Twin Ebulliometry (Antoine Equation)	3.7 hPa (2.8 Torr) (20 °C)
Flash point	DIN 51 755	45 °C
Auto flammability	DIN 51 794	315 °C
Partition Coefficient (Log Pow)	OECD TG 107	0.36 (25 °C)
Water Solubility	OECD TG 105	> 100 g/L (25 °C)

2. GENERAL INFORMATION ON EXPOSURE

1-Methoxy-2-propanol acetate (PMA) is produced in fully closed system in Japan and used industrially in coatings, ink-removers and etc. The production volume of PMA in Japan was approximately 15, 000 tonnes/year (Daicel, 1999), while estimated global production is 100,000-500,000 tonnes/year according to IUCLID 1999. The entire chemical produced in Japan is used as a solvent in industrial products. PMA occurred in 366 chemical products on American market according to MSDS-OHS (MDL, 2000).

Since PMA has a variety of uses including as a solvent for paints, inks, lacquers, varnishes and cleaners, coatings and ink-removers, and as a pesticide inert, release of PMA to the environment may occur at the production site, specific industrial sites and consumer under conditions of use in Japan.

2.1 Environmental Fate

- PMA is readily biodegradable in activated sludge (OECD 301F, 99 % by DOC and OECD 301C, 87 % by BOD, after 28 days) (Dow, 1998 and Daicel, 1978, respectively) and in soil (DT50 < 1day, Gonsior, 1995).
- This chemical is stable to chemical hydrolysis in water at pH 4 and 7, whereas it is hydrolyzed at pH 9 with half-life of 8.10 days at 25 °C (Chemicals Evaluation and Research Institute, 1998).
- Direct photodegradation is not expected because PMA has no absorption band in the UV and VIS region, whereas indirect photodegradation may occur as a result of reactions with photochemically generated hydroxy radicals, as described in the case of PM with the half-life of 3.1 hours (Dilling, et al., 1976).
- PMA has low bioaccumulative potential based on Log Pow (0.36 at 25 °C) (Chemicals Evaluation and Research Institute, 1998).
- During the course of the regular use of consumer products, PMA rapidly diffuses away into air. Although direct photodegradation is not expected, PMA in air decomposes and disappears by photolytic reactions with photochemically generated hydroxy radicals.
- The indirect photochemical hydroxyl radical photolysis has an estimated half-life of 32 hours with an estimated rate constant of 1.19×10^{-11} cm^3/mol sec and an assumed hydroxyl radical concentration 0.5×10^6 OH/cm^3 (Meylan and Howard 1993).
- For these reasons, there is little potential for accumulation of PMA in air sphere.

0. Human Exposure

(Occupational exposure)

- Occupational exposures at production sites may occur by inhalation and dermal route.
- Dermal absorption can be a significant route of entry into the body for all glycol ethers, including PMA.
- Absorption of PMA through the intact respiratory tract of anaesthetised rats was roughly quantitative and estimated to be 85 % under the exposure level of 5,400 mg/m^3 (1,000ppm) (Stott & McKenna, 1984).
- The Norwegian National Institute of Occupational Health had analysed personal air samples of volatile organic compounds collected from the work places (Einar Fjeldstad). The monitored data for PMA are shown in Table 1.
- From these data, the highest average level was measured around metal production and aircraft lacquering. Relatively low levels were measured in silk screen-printing.

Table 1: Available workplace monitoring data for PMA (Job activities associated with exposure to propylene glycol ethers, Einar Fjeldstad)

Occupation (Country)	Activity	Monitoring data	Comment	Source
Metal production (Norway)	Not known	556mg/m^3 (103ppm) (Maximum concentration)	97mg/m^3 (18ppm) (Average concentration)	Einar Fjeldstd
Air-craft lacquering (Norway)	Not known	491mg/m^3 (91ppm) (Maximum concentration)	65mg/m^3 (12ppm) (Average concentration)	Einar Fjeldstd
Silk screen-printing (Norway)	Not known	65mg/m^3 (12ppm) (Maximum concentration)	5mg/m^3 (0.9ppm) (Average concentration)	Einar Fjeldstd

- From Table 1, if a single worker (body weight; 70 kg, respiratory volume; 1.25 m^3/hr) is assigned to implement all daily operation without protection, the highest daily intake (respiratory EHE) is calculated as 79.4 mg/kg/day (8 h) for the worst case of metal production (556 mg/m^3) or as 9.3 mg/kg/day (8 h) for most likely case of silk screen printing (65 mg/m^3), respectively, by assuming that the absorption efficiency in the respiratory tract is 1.00 in such a dilute atmosphere of PMA. Since workers always wear protective gloves and respiratory protective equipment (mask) during the operation, PMA uptake can be avoided, practically.
- Acetate esters of aliphatic alcohols are rapidly hydrolysed by enzymes in the respiratory epithelium, lung and blood. PMA uptake in the body would therefore be rapidly converted to PM. Hence, at equimolar doses the two compounds may be expected to act similarly with respect to kinetics as well as toxicity. At very high doses of PMA, however, the acetic acid formed in the hydrolysis may have adverse effects (Miller et al., 1984 and Johanson, 1990).
- Dermal absorption rate for PMA is assumed to be 1.17 mg/cm^2/hr, based on the conservative estimate, whereas 0.37 mg/cm^2/hr is calculated when 0.315 for AUC ratio of PM/PMA in rats is applied (Sumner, 1999).
- Dermal exposure to PMA by workers was estimated using the equation based on U.S. Environmental Protection Agency (USEPA) guidance (1989) in similar manner as those described with PM (SIAR: 1-methoxypropan-2-ol) because PMA and/or PM are contained as solvents for specific paint products on similar purposes and used in industrial sites. Rastogi reported that printers' ink for serigraphy contains as much as 0.1-61.4 and 3.5-40.2 % (w/w) of PM and PMA, respectively (Rastogi, 1991).

$$\text{Dermal dose} = (\%\ \text{PMA} * \text{ET} * \text{EF} * \text{ED} * \text{SA} * \text{AR}) / (\text{AT} * \text{BW})$$

Where,

Dermal dose	=	average daily dermal dose (mg/kg/day)
% PMA	=	percent PMA in product contacted by worker (10 % and 50 % assumed, most likely and worst case, respectively)
ET	=	exposure time (1 and 2 hours assumed)
EF	=	exposure frequency (125 and 250 days/year assumed)
ED	=	exposure duration (25 years as an upper bound for occupational tenure)

SA	=	surface area of exposed skin (840 cm^2 for hands only; 1980 cm^2 for hands and forearms)
AR	=	absorption rate (1.17 $mg/cm^2/hr$)
AT	=	averaging time (9,125days based on ED assumption)
BW	=	body weight (70 kg)

Based on this hypothetical scenario, a worker's daily dermal dose for PMA was calculated to range from 0.481 mg/kg/day (most likely case) to 22.7 mg/kg/day (worst case).

- Occupational exposure limits for PMA are listed below for several countries.

Type of Limit (Country)		
WEEL (AIHA, USA)	540 mg/m^3	100 ppm
MAK (DE)	110 mg/m^3	--------
MAK (DE)	--------	50 ppm
STEL (DE)	--------	100 ppm
MAK (DE)	275 mg/m^3	50 ppm

(Consumer exposure)

- Consumer products contain PMA as a solvent for paints, lacquers, varnishes, pesticides, household cleaners and miscellaneous products, occurring in 366 chemical products on American market according to MSDS-OHS 2000.
- Concentration of PMA in most paints is in the range of about 5-15 %, sometime as high as 20% (MDL, 2000).
- Consumer exposure may occur in Japan. Exposure to this chemical from spray paint etc. is probable.
- Although information is not available on the exposure levels of PMA arising from the use of consumer products, the following scenario leads to an estimation of consumer exposure to PMA. In Finland, air concentrations of PM ranging from 37 to 232 mg/m^3 were reported during varnishing work (BUA, 1997). Air concentrations of 2 to 26 mg/m^3 were detected in rooms recently painted with water-based paints (BUA, 1997). Based on these data, the highest daily intake (respiratory EHE) for PMA is calculated as 48.6 mg/kg/day for the worst case (232 mg/m^3) or as 5.4 mg/kg/day for most likely case (26 mg/m^3), respectively.
- Dermal exposure to PMA by consumers was also estimated using the equation based on U.S. Environmental Protection Agency (USEPA) guidance (1989) and similar parameters those described in PM (SIAR: 1-methoxypropan-2-ol).

$$\text{Dermal dose} = (\%\ \text{PMA} * \text{ET} * \text{EF} * \text{ED} * \text{SA} * \text{AR}) / (\text{AT} * \text{BW})$$

Where,

Dermal dose	=	average daily dermal dose (mg/kg/day)
% PMA	=	percent PMA in product contacted by worker (5 % and 20 % assumed, most likely and worst case, respectively)
ET	=	exposure time (0.5 and 1 hours assumed)
EF	=	exposure frequency (25 and 50 days/year assumed)
ED	=	exposure duration (30 years)
SA	=	surface area of exposed skin (840 cm^2 for hands only; 1980 cm^2 for hands and forearms)
AR	=	absorption rate (1.17 mg/ cm^2/hr)

AT = averaging time (10,950 days based on ED assumption)
BW = body weight (70 kg)

Based on this hypothetical scenario, a consumer's daily dermal dose for PMA was calculated to range from 0.024 mg/kg/day (most likely case) to 0.907 mg/kg/day (worst case).

- Recent studies show that PM AUC (the Area Under the Curve) resulting from PM application is at least 4-times higher than that resulting from PMA application. Any effects arising from administration of PMA would thus be overestimated by using PM toxicity data in place of PMA data (Sumner, 1999).

(Environmental exposure)

- In the Mackay level III fugacity model described in Section 3.4, the generic environmental area of the effect is assumed to be 10,000 km^2 in Tokyo bay area and water surface area is assumed to be 20 % of the total area (2,000 km^2) with depth of 10 m (Daicel Chemical Industries, 2000).
- In Japan, annual quantity of PMA production is estimated to be 15,000 tonnes and 4 tonnes of PMA is treated by activated sludge as process waste water (Daicel Chemical Industries, 1999).
- A worst case and most likely case scenarios were based on that all of the annual production of 15,000 tonnes is discharged to water and the process waste water containing 4 tonnes of PMA/year is released without the sludge treatment within a single geographical area, respectively.
- Since the fugacity model approach of PMA resulted in approximately 99 % of PMA is distributed to the water sphere, the exposure to PMA in other compartment is considered to be negligible (Section 3.4).
- For exposure to surface water, PECs of 0.0002 mg/L and 0.75 mg/L were calculated for most likely case and worst case modelling evaluations, respectively.
- Assuming that individuals use untreated water as their sole source of drinking water (2 L/day for a 70 kg adult), EHE values of 0.00000571 mg/kg/day (most likely case) and 0.0214 mg/kg/day (worst case) were calculated.
- Potential exposure via consumption of fish is anticipated to be negligible because PMA is expected to have a low potential for bioaccumulation and readily biodegradable in activated sludge (Dow, 1998 Daicel, 1978) and in soil (Gonsior, 1995).
- There is little potential for accumulation of PMA in air sphere because of rapid decomposition by the reaction with photochemically generated hydroxy radicals.

3 EFFECTS ON THE ENVIRONMENT

3.1 Aquatic Effects

PMA has been tested in a limited number of aquatic species. Results are summarized in Table 2.

Table 2: Summary of effects of PMA on aquatic organisms

Organism	Test duration	Result (mg/L)	Reference
Micro-organisms			
Green alga (*Selenastrum capricornutum*)	0-72 h (cl)	EC_{50} >1,000 (nc*) NOEC >1,000 (nc*) (Growth inhibition)	Japan EA (1998)

Invertebrates			
Water flea (*Daphnia magna*)	24 h (op, s)	EC_{50} (Imm) = 407 (nc*)	Japan EA (1998)
	48 h (op, s)	EC_{50} (Imm) = 373 (nc*) NOEC(Imm) = 278 (nc*)	Japan EA (1998)
Water flea (*Daphnia sp.*)	48 h	EC_{50} > 408	Dow Chem. Company (1980)
Water flea (*Daphnia magna*)	14 d	EC_{50} (Rep) >100 (nc*)	
	21 d (op, ss)	EC_{50} (Rep) >100 (nc*)	Japan EA (1998)
	21 d (op, ss)	NOEC(Rep) ≥100 (nc*)	Japan EA (1998)
Fish			
Medaka (*Oryzias latipes*)	96 h (op, ss)	LC_{50}>100 (nc*) LC_{20} = 100 (nc*)	Japan EA (1998)
Medaka (*Oryzias latipes*)	7 d (op, f) 14 d (op, f) 14 d (op, f)	LC_{50} = 85 (m) LC_{50} = 63.5 (m) NOEC = 47.5 (m)	Japan EA (1998)
Fathead Minnow (*Pimephales promelas*)	96 h (s)	LC_{50} = 161	Dow Chem. Co. (1980)
Rainbow Trout (*Salmo gairdneri*)	96 h (s) 96 h (s)	LC_{50} = 100-180 NOEC= 100	BASF AG (1987)

cl = closed system
m = measured concentration
f = flow through
op = open system
s = static
ss = semi-static
nc = nominal concentration
nc* = calculated based on nominal concentrations, because measured concentrations were >80% of nominal concentrations
Bms = biomass
Imm = immobilization
Rep = reproduction

3.2 Terrestrial effects

There is no available information.

3.3 Other

There is no available information.

3.4 Initial Assessment for the Environment

The Mackay level III fugacity model was employed to estimate the environmental distribution of PMA in air, water, soil and sediment. This was considered the key study and the results are shown below.

Estimated Distribution Under Three Emission Scenarios

Compartment	Release 100 % to air	Release 100 % to water	Release 100 % to soil
Air	73.30 %	0.60 %	1.10 %
Water	26.31 %	99.90 %	19.41 %
Soil	0.57 %	0.00 %	79.49 %
Sediment	0.06 %	0.23 %	0.04 %

The calculation revealed that in the case of 100 % release to water, 99.90 % of PMA is expected to stay in water due to the high solubility to water, but if it is released into air and/or soil, it is likely to be distributed in other compartments (Daicel Chemical Industries, 2000). In another approach using Equilibrium-Steady State Model, approximately 10% and 90 % of PMA are distributed into air and water sphere, respectively (Gonsior, 1990). Since biologically mediated hydrolysis is the predominant pathway in the primary degradation step when PMA is discharged to the environment, the fugacity approach of PM was compared with the results of PMA. The calculation resulted in that greater than 99.9 % of the PM released to the environment was distributed to the water compartment (SIAR: 1-methoxypropan-2-ol). The exposure to PMA in other compartment is thus considered to be negligible. PMA is readily biodegradable in activated sludge (Dow, 1998 and Daicel, 1978) and in soil (Gonsior, 1995), and is expected to have a low potential for bioaccumulation based on a low Log Pow (0.36).

Although information on the aquatic toxicity of PMA is limited, results and corresponding Predicted No Effect Concentrations (PNECs) for algae, fish and/or aquatic invertebrates are summarized below. The toxicity (growth inhibition) to aquatic plants (algae; *Selenastrum capricornutum*) was >1,000 mg/L (nominal) for EC_{50} (72 h) and >1,000 mg/L for NOEC (72hr) (Japan EA, 1998). LC_{50} of the acute (96 h) and prolonged toxicity (7 d, 14 d) for *Oryzias latipes* (medaka) were determined as >100 mg/L (nominal) (80 % fish survived), 85mg/L (measured) and 63.5mg/L (measured), respectively (Japan EA, 1998). NOEC (14 days) of 47.5mg/L (measured) was reported for fish. The acute (mortality or immobility) and chronic data (reproduction) for *Daphnia magna* were 407 mg/L (EC_{50}, 24 h), 373 mg/L (EC_{50}, 48 h) and ≥ 100 mg/L (21 d NOEC), respectively, based on nominal concentration (Japan EA, 1998). Thus, PMA can be classified as a not- hazardous chemical to aquatic organisms. The PNECs of 0.635 and ≥1.0 mg/L were derived from the LC_{50} (14 d) for medaka and the NOEC for *Daphnia*, respectively, when an assessment factor of 100 was used, since chronic toxicity data for fish were not available. Hence, the lowest PNEC was determined as 0.635 mg/L for the aquatic environment.

4. HUMAN HEALTH HAZARDS

4.1 Effects on Human Health

a) Toxicokinetics and metabolism

A single oral dose and 6 h-inhalation studies in male rats were conducted using ^{14}C labeled PMA (Miller et al. 1984). In oral study, more than 50 % and 20 % of the radioactivities were eliminated via lungs as ^{14}CO and via urine within 48 hours, respectively. Unchanged PMA was not present in urine and the urinary metabolites consisted of propylene glycol, propylene glycol monomethyl ether

(PM), and its sulfate and glucuronide conjugates, indicating rapid and extensive hydrolysis of PMA to PM *in vivo*. Metabolism and disposition of PMA in single oral exposure were very similar to those in inhalation exposure.

In recent experiment, the blood pharmacokinetics of PMA and PM in male rats was conducted following a single 6-hr dermal exposure at 100 or 1,000 (nominal) mg/kg (Sumner, 1999). Dermal application of PMA at 130 mg/kg and 935 mg/kg resulted in the average PM AUC of 88 and 1,580 ug/mL, respectively. Similarly, PM application gave the average PM AUC of 1,663 and 15,051 ug/mL at the dose of 126 and 995 mg/kg, respectively. When AUCs were normalised to applied dose in terms of mmole basis, the mean combined PM AUC after PMA and PM application were 0.0044 AUC/dose and 0.0141 AUC/dose, respectively. When AUC/dose of PM is compared to that of PMA, the ratio is 0.315, meaning that the efficiency of dermal absorption for PMA is approximately 30% of that of PM in rats. This work demonstrates that the existing extensive toxicological database for PM is relevant for PMA hazard assessment purposes (Sumner, 1999).

b) Acute toxicity

Acute toxicity via oral, inhalation and dermal route using rats, mice and rabbits were summarized in Table 3.

Table 3: Acute toxicity of PMA in experimental animals

Route	Animals	Values	Type	References
Oral	Rat	>10,000mg/kg (male)	LD_{50}	Dow Chem. Co., 1992
Oral	Rat	8,532mg/kg (female)	LD_{50}	Dow Chem. Co., 1992
Oral	Rat	13,700mg/kg (male)	LD_{50}	UCC (1961)
Inhalation	Rat	10,800mg/m^3 (3h), (male)	LC_0	Dow Chem. Co., 1985
Inhalation	Mouse	10,800mg/m^3 (3h), (male)	LC_0	Dow Chem. Co., 1985
Inhalation	Rat	23,463mg/m^3 (6h)	LC_0	Dow Chem. Co., 1980
Inhalation	Rat	Concentrated vapor (8h)	LC_0	UCC (1961)
Dermal	Rat	>5,000 mg/kg	LD_{50}	Dow Chem. Co., 1980
Dermal	Rabbit	19,400mg/kg	LC_0	UCC (1961)

LC_0: no lethality concentration

Among the above, an oral rat study (Dow Chemical Company, 1992) was identified as the key study because it was well conducted and described in detail whereas any information on the test guideline and GLP was lacking. Details of the study follow.

Male and female Fischer 344 rats were administered orally at doses of 500, 1,000, 2,000, 4,000, 6,300, and 10,000mg/kg and observed for two weeks. Signs of toxicity were lethargy, piloerection, watery eyes, anorexia, shallow breathing and/or excess salivation. Mortality was recorded only for female rats at 10,000mg/kg. Gross pathology revealed no treatment-related changes at the end of two weeks for both sexes. From these results, acute toxicity of PMA is considered to be low.

Human data

There is no available information.

Conclusions:

Acute toxicity of this chemical is low in rodents because LD_{50} values are greater than 5,000 mg/kg by oral or dermal routes and greater than 10,800 mg/m^3 by inhalation.

c) Repeat dose toxicity

Three studies are available. The first study of rats and mice via inhalation exposure (Dow Chemical Company, 1985), resulting in adverse effects on olfactory epithelium, however, was discounted due to too short exposure period, lacking information on test guideline and detailed conditions for the study. Oral rat study (MHW, Japan: 1998) and inhalation study using rats and mice (Miller et al. 1984) were identified as the key studies because they were well conducted and described in detail. Details of these studies are described bellow.

(Oral Gavage) Using an OECD combined repeat dose and reproductive/developmental toxicity screening test [OECD TG 422], SD (Crj: CD) rats were received gavage doses of 0 (vehicle; distilled water), 100, 300 and 1,000 mg/kg/day, for males for 44 days from 2 weeks prior to mating and for females for 41-45 days from 14 days before mating to day 3 postpartum (MHW, Japan: 1998).

A dose of 1,000 mg/kg/day of PMA exerted some effects in only male rats. Blood examination revealed decreases in glucose and inorganic phosphorus and an increase in relative weight of the adrenals was also noted in males. However, such changes were not observed in females. Histopathological examination revealed none of the alteration of tissues at the highest dose group for both sexes. As such changes in males were considered not to be adverse effect, a NOAEL was considered to be 1,000 mg/kg bw/day for both sexes.

(Inhalation) Short-term vapour inhalation toxicity was studied for F344 rats and B6C3F1 mice for males and females at a dose of 0, 300, 1,000 or 3,000 ppm (0, 1.62, 5.39 or 16.18 mg/L) for six hours per day on 5 consecutive days, followed by 4 additional consecutive days of exposure after a weekend interruption (Miller et al. 1984).

(Rats) After two weeks experimental period, haematology and clinical chemistry analyses revealed no treatment-related changes. However, the kidneys of all male rats and two of five females in the 3,000 ppm-exposure group appeared to be slightly reticulated at necropsy. Other slight renal changes were also observed histologically in one of five male rats at 1,000 ppm. The change noted in these animals was a slight increase in the eosinophilic granularity of the proximal convoluted tubules of the kidneys. This renal change observed at 1,000 and 3,000 ppm seems to be uncertain whether it is solely due to the accumulation of the male rat specific protein complex, alpha-2m-globulin, because female rats in addition to male rats suffered from kidney lesion at 3,000 ppm, equivalent to an approximate dose of 2,000 mg/kg/day. Another histologically detectable effect in rats was slight-to-moderate degeneration of olfactory epithelium in the nasal cavities of three of five males and one of five females in the 3,000 ppm-exposure group. This nasal change is likely caused by acetic acid from PMA hydrolysis at the exposure site. A NOAEL was established at 300 ppm (1.62 mg/L) for males and at 1,000 ppm (5.39 mg/L) for females.

(Mice) After two weeks experimental period, haematology and clinical chemistry analyses revealed no treatment-related changes. The only histopathologic changes occurred in the nasal cavities. Degeneration of olfactory epithelium, similar to that observed in rats, was present to some degree in all male and female mice in the 300, 1,000 and 3,000 ppm exposure group. This acute degenerative change occurred in a dose-related manner, although this change was minimum at 300 ppm, and was

generally more severe and more extensive in animals exposed to 3,000 ppm (16.18 mg/L). A NOAEL was not established and LOAEL was 300 ppm (1.62 mg/L) for males and females.

There is no available information on human.

(Carcinogenicity)
There is no available information on carcinogenicity.

Conclusions:
An oral repeated dose study shows no adverse effect even at the highest dose, 1,000 mg/kg/day. An inhalation study reveals that the critical effects are toxicity in kidney and nasal cavities in rats, whereas only degeneration of olfactory epithelium occurs in mice. A NOAEL for repeat dose oral toxicity in rats was 1,000 mg/kg/day for both sexes. A NOAEL for repeat inhalation toxicity in rats was established at 300 ppm (1.62 mg/L) for males and at 1,000 ppm (5.39 mg/L) for females. However, a NOAEL for inhalation toxicity was not established because the lowest dose at 300 ppm (1.62 mg/L) induced a minimum effect on nasal cavity in mice.

d) Reproduction/developmental toxicity

Two studies were reviewed. The data from OECD repeat dose and reproductive toxicity by oral route (MHW, Japan: 1998) and the developmental toxicity for inhalation conducted by U.S. Army Environmental Hygiene Agency (USAEHA, 1989) were identified as the key studies because they were well conducted and reported. Details of these studies are as follows.

(Reproductive study) Using OECD combined repeat dose and reproductive/developmental toxicity screening test [OECD TG 422], SD (Crj: CD), rats received gavage doses of 0 (vehicle; distilled water), 100, 300 and 1,000 mg/kg/day, for males for 44 days from 2 weeks prior to mating and for females for 41-45 days from 14 days before mating to day 3 postpartum. The animals were sacrificed on the day 4 of lactation for females (MHW, Japan: 1998).

No effects related to chemical exposure were observed maternally at 1,000 mg/kg, although there was a single unsuccessful copulation at this dose level which was not statistically significantly different from the control ($p<0.05$). Similarly, no effects related to the chemical exposure were observed in foetal data at 1,000 mg/kg. Reproductive toxicity of PMA in rats by oral administration is not observed at the highest dose. A NOAEL was thus established at 1,000 mg/kg bw/day.

(Developmental study) Pregnant SD female rats were exposed to PMA vapour from Days 6 through 15 of gestation, once daily for 6 hours/day at nominal dose of 500, 2,000, 4,000 ppm (2,700, 10,800, 21,600 mg/m^3). The animals were sacrificed on Day 20 of gestation to evaluate the potential maternal, embryonic and teratogenic parameters of PMA (USAEHA, 1989).

Most of the effects observed in dams were transient in nature. Reductions in muscle tone (2,000 and 4,000 ppm), food consumption (500, 2,000 and 4,000 ppm) and body weight (2,000 and 4,000) were seen during the exposure period. At 2,000 and 4,000 ppm exposure groups, dyspnea, ruffled pelt and red discharges from the eyes or mouth were observed. No toxic signs were observed in the 500 ppm exposure group. The effect on nasal cavity was not examined in this experiment. No developmental toxicity was observed. A NOAEL was established at 500 ppm (2,700 mg/m^3, measured) for dams and 4,000 ppm (22,464 mg/m^3, measured) for foetuses.

There is no available information on humans.

Conclusions:
PMA did not produce any reproductive and developmental effects in rats. NOAEL was established at 1,000 mg/kg bw/day for reproductive toxicity by gavage and at 500 ppm (2,700 mg/m^3) for dams and 4,000 ppm (22,464 mg/m^3) for foetuses by inhalation, respectively. There was no evidence on teratogenicity of PMA.

e) Genotoxicity

Four *in vitro* studies were reported. This chemical did not induce gene mutation in bacteria (MHW, Japan: 1998, Dow Chemical Company, 1983) and chromosomal aberration in mammalian cultured cells (MHW, Japan: 1998), with and without an exogenous metabolic activation system. Using rat primary cell cultures of hepatocytes, PMA failed to elicit significant unscheduled DNA synthesis at any of the concentrations tested, while PMA was toxic to the hepatocyte cultures at 0.0316 and 0.1M as indicated by detachment of cells and/or a granular appearance (Mandrala A.L., Dow Chemical Company, 1983). Among these studies, MHW study was identified to be the key study because it was well conducted and reported.

Reverse gene mutation assay was conducted by OECD TG 471 and 472, using pre-incubation method. PMA was not mutagenic in *Salmonella typhimurium* TA100, TA1535, TA98, TA1537 and *Escherichia coli* WP2 *uvr*A at the concentrations up to 5,000 ug /plate, with or without an exogenous metabolic activation system (MHW, Japan: 1998).

Chromosomal aberration test by OECD TG 473 was conducted in cultured Chinese hamster lung (CHL/IU) cells. Structural chromosomal aberrations and polyploidy were not induced up to a maximum concentration of 1.3 mg/mL (10 mM) on continuous treatment, and with short-term treatment, with and without an exogenous metabolic activation system (MHW, Japan: 1998).

There were no available data on genotoxicity *in vivo*.

Conclusions:
This chemical is not genotoxic with and without an exogenous metabolic activation system in bacterial test and chromosomal aberration test *in vitro*.

f) Other human health related information

Irritation and sensitization

- Application of PMA induced no skin irritation in rabbits (Dow Chemical Company, 1980).
- Slight irritation of PMA to eyes in rabbits was reported (Dow Chemical Company, 1980).
- PMA needs to be labelled as an eye irritant according to the EEC criteria.
- Application of PMA induced no skin sensitisation in guinea pigs (Dow Chemical Company, 1980 and 1985, and Zissu, 1995).

Human data

There is no available information on humans.

Conclusions:
This chemical is not irritating to skin and slightly irritating to eyes in rabbits. There is no skin sensitisation in guinea pigs by PMA.

Information on structurally related chemicals

Several studies confirmed that rapid and extensive hydrolysis of PMA to PM occurred *in vivo* when PMA was administered by oral, inhalatory (Miller et al. 1984) or dermal route (Sumner, 1999). Since urinary metabolites and disposition profiles of PMA were approximately identical to the results obtained with PM (Miller et al. 1984), it is unlikely that there are substantial differences of the systemic toxicity between PMA and PM. In fact, toxicity of PM is almost the same of PMA as follows.

Oral LD_{50} ranges >5,000 to 6,100 mg/kg (BASF AG, 1964, 1979) and 6 month rabbit inhalation shows a NOAEL of >800 ppm (3,000 mg/m^3) (Landry et al., 1983). In a reproductive study, NOAELs observed on exposure to PM by inhalation ranged from 300 ppm (1,125 mg/m^3) for adult rats to 1,000 ppm (3,750 mg/m^3) for offspring (Liberacki et al., 1997). Studies in rats indicate that PM is neither teratogenic nor fetotoxic when administered via inhalation or oral administration. NOAELs of 1,500 ppm (5,625 mg/m^3) (parental) and 3,000 ppm (11,250 mg/m^3) (offspring) were observed in rats exposed via inhalation (Hanley et al., 1984). No maternal toxicity, fetotoxicity or teratogenicity was observed in rats, mice and rabbits administered via gavage.

From these results, it might be concluded that the toxicity of PM in mammals is low.

4.2 Initial Assessment for Human Health

It is anticipated that rapid and extensive hydrolysis of 1-methoxy-2-propanol acetate (PMA) will occur *in vivo* following either oral, inhalation or dermal exposures to yield the corresponding glycol ether, propylene glycol monomethyl ether (PM). Thus, it is most unlikely that there are substantial differences in the systemic toxicities between PMA and PM. Toxicokinetics in rats following dermal dose revealed that the PM AUC resulting from PM application is at least 4-times higher than that resulting from PMA application. These results suggest that any effects arising from PMA would be overestimated by using PM toxicity data.

Acute toxicity of this chemical is low in rodents because LD_{50} values are greater than 5,000 mg/kg by oral or dermal routes and greater than 10,800mg/m^3 by inhalation. This chemical is slightly irritating to eye, but not to skin. PMA is not skin-sensitising in guinea pigs. In oral rat study by an OECD combined repeated dose and reproductive/developmental toxicity screening test [TG 422], a dose of 1,000 mg/kg/day of PMA exerted some effects in only male rats. Blood examination revealed decreases in glucose and inorganic phosphorus and an increase in relative weight of the adrenals was also noted in males. However, such changes were not observed in females. Histopathological examination revealed none of the alteration of tissues at the highest dose group for both sexes. As such changes in males were considered not to be adverse effect, a NOAEL was considered to be 1,000 mg/kg bw/day for both sexes.

An inhalation study conducted for 6 hr/day, 5 day/week for 2 weeks using rats and mice at doses of 300, 1,000 or 3,000 ppm (1.62, 5.39 or 16.18 mg/L) demonstrated that haematology and clinical chemistry analyses revealed no treatment-related effect. However, the kidneys of all male rats and two of five females in the 3,000 ppm-exposure group appeared to be slightly reticulated at necropsy. Other slight renal changes were also observed histologically in one of five male rats at 1,000 ppm. The change noted in these animals was a slight increase in the eosinophilic granularity of the proximal convoluted tubules of the kidneys. Another detectable effect in rats and mice was slight-to-moderate degeneration of olfactory epithelium in the nasal cavities. A NOAEL for inhalation toxicity in rats was established at 300 ppm (1.62 mg/L) for males and at 1,000 ppm (5.39 mg/L) for females, whereas a NOAEL for inhalation toxicity in mice was not established because

the lowest dose at 300 ppm induced a minimum effect on nasal cavity of mice. The change in nasal cavity is likely caused by acetic acid from PMA hydrolysis at the exposure site.

In reproductive/developmental oral toxicity study [OECD TG 422], there were no statistically significant adverse effects on reproductive parameters and no evidence of malformations at any doses. Likewise, in developmental/teratogenicity inhalation study, there were no statistically significant adverse effects on reproductive and teratogenic parameters at any doses, although some systemic toxicities were observed in dams at 2,000 and 4,000 ppm. A NOAEL was established at 1,000 mg/kg bw/day for reproductive toxicity by gavage and at 4,000 ppm (22,464 mg/m^3) for developmental toxicity by inhalation, respectively.

Two bacterial mutation tests, unscheduled DNA synthesis in rat hepatocytes and chromosomal aberration test *in vitro* show negative results.

PMA used in the animal studies contained approximately maximum of 2 % of the beta-isomer.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Exposure
The production volume in Japan was approximately 15,000 tonnes/year in use, while estimated global production is 100,000-500,000 tonnes/year according to IUCLID 1999. Commercially available PMA contains less than 0.5 % of the beta-isomer. The entire chemical produced in Japan is used as a solvent industrially in coatings and in ink-removers, etc. Generic fugacity models (Level III Fugacity Model and Unit World Equilibrium Model) show this chemical would be distributed mainly to water if it was released into water. As this chemical is contained as a solvent for specific paint products and used in industrial sites, user exposure may take place in the industry and consumer. PMA occurred in 366 chemical products on American market according to MSDS-OHS 2000.

Hazards to the Environment
PMA is readily biodegradable (OECD TG 301F: 99 % after 28 days). This chemical is stable to chemical hydrolysis in water at pH 4 and 7, whereas it is hydrolyzed at pH 9 with half-life of 8.10 days at 25 °C. The toxicity (growth inhibition) to aquatic plants (algae; *Selenastrum capricornutum*) was > 1,000mg/L for EC_{50} (72 hr) and > 1,000 mg/L for NOEC (72 hr). The acute toxicity data in fish (medaka; *Oryzias latipes*) were > 100 mg/L for 96h LC_{50} (80 % fish survived), 63.5 mg/L for 14d LC_{50} and 47.5 mg/L for 14d NOEC. In *Daphnia magna,* EC_{50} (48h) for acute toxicity and NOEC (21-d reproduction) for chronic toxicity were 373 mg/L and ≥100 mg/L, respectively. When assessment factor of 100 was applied to the 14d LC_{50} for medaka and the chronic toxicity for *Daphnia*, PNECs were calculated as 0.635 and ≥ 1.0 mg/L, respectively. The lowest PNEC was thus determined to be 0.635 mg/L.

Human Health Hazards
Metabolism and disposition of PMA in rats are very similar to the results from PM exposure. Oral LD_{50} values in rats range greater than 8,000 mg/kg. An oral repeated dose study shows no adverse effect even at the highest dose, 1,000 mg/kg/day. An inhalation study reveals that the critical effects are toxicity in kidney and nasal cavities in rats, whereas only degeneration of olfactory epithelium occurs in mice. The NOAEL for repeat dose oral toxicity in rats is 1,000 mg/kg/day for both sexes, while the NOAELs for inhalation toxicity in rats were established at 300 ppm (1.62 mg/L) for

males and at 1,000 ppm (5.39 mg/L) for females. However, a NOAEL for inhalation toxicity was not established because the lowest dose at 300 ppm (1.62 mg/L) induced a minimum effect on nasal cavity of mice. In reproductive/developmental toxicity study, PMA does not cause any significant reproductive/developmental effects in rats at 1,000 mg/kg/day when orally administrated. Inhalation toxicity studies indicate no effects on the developing foetus at exposure concentrations as high as 4,000 ppm (21,600 mg/m^3), although some maternal systemic effects were seen at 2,000 and 4,000 ppm (10,800 and 21,600 mg/m^3, respectively). All the mutagenic test results indicate that this chemical is not genotoxic *in vitro*.

As for other human related information, this chemical is slightly irritating to eye, but not to skin in rabbit and not skin sensitising in guinea pigs.

5.2 Recommendations

None.

REFERENCES

American Chemistry Council PGE Panel

BASF AG. (1964). Abt Toxikologie XIV/257, 29.09.1964, unpublished report.

BASF AG. (1979). Abt Toxikologie 78/186, 19.07.1979, unpublished report.

BUA Report 173 and 174 (1997). Methoxypropanol (propylene glycol methylether), Dipropylene glycol methylether. GDCh-Advisory Committee on Existing Chemicals of Environmental Relevance (BUA).

Chemicals Evaluation and Research Institute (Kurume, Japan) (1998). Report No. 8 (2) 3144K.

Daicel Chemical Industries Ltd. (1978). Technical Report No. 78-124.

Daicel Chemical Industries Ltd. (1999). unpublished report.

Daicel Chemical Industries Ltd. (2000). unpublished report.

Dilling W.L., et al.(1976). Env Sci Res 10, 351-356.

Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

Dow Chemical Company (1983) "Evaluation of DOWANOL® PM Acetate in the Ames Salmonella/mammalian microsomal mutagenicity assay", unpublished report.

Dow Chemical Company (1985) "Propylene glycol monomethylether acetate: inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate (DOWANOL® PGMA): skin sensitisation study in the guinea pig", unpublished report.

Dow Chemical Company (1998). EPA/OTS; Doc #86-980000183S. NTIS Order No.: NTIS/OTS0559518.

Einar Fjeldstad, Norwegian National Institute of Occupational Health (1990). NEG and NIOSH Basis for an Occupational Health Standard: Propylene Glycol Ethers and Their Acetates, Arbete och Halsa 32 9-12.

Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of the Dow Chemical Company.

Gonsior SJ and West RJ (1995) "Biodegradation of glycol ethers in soil" Environ Toxicol and Chem 14(8): 1273-1279.

Environment Agency of Japan (1998)

Hanley T. R. et al. (1984) Fund Appl Toxicol 4, 784-794.

Johanson G (1990) Arbete och Halsa, Vol. 32, 14 p.

Landry T. D. et al. (1983) Fund Appl Toxicol 3, 627-630.

Liberacki A. B. et al. (1997) "Propylene glycol monomethyl ether: Two Generation Inhalation Reproduction Study in Sprague-Dawley Rats", unpublished report of Dow Chemical Company.

Mandrala, A. L. (1983) "Evaluation of DOWANOL® PMAcetate in the rat hepatocyte UDS assay", unpublished report of the Dow Chemical Company

MDL Information Systems, Inc. (2000) MSDS-OHS, OHSN OHS00134

Meylan W.M. and Howard P.H. (1993) Chemosphere 26, 2293-2299.

Miller, R.A. et al. (1984) Toxicol Appl Pharm 75, 521-530.

Ministry of Health & Welfare (Japan) (1998). Toxicity Testing Reports of Environmental Chemicals vol. 6 205- 227.

Rastogi S. C. (1991) Arch. Environ. Contam. Toxicol. 20, 543-547.

SIDS Initial Assessment Report (1-methoxypropan-2-ol), Sponsor Country: USA

Sumner, Susan C.J. (1999) Blood Pharmacokinetics of Propylene Glycol Methyl Ether (PGME) and Propylene Glycol Methyether Acetate (PGMEA) in Male F-344 Rats after Dermal Application, Final Report 98003.

Stott W.T. and McKenna M.J. (1984) The comparative absorption and excretion of chemical vapours by the upper, lower, and intact respiratory tract of rats. Fundam Appl Toxicol 5 399-404.

Union Carbide Corporation (1961), "Propylene glycol monoethylether acetate: (USAR) Solvent LM Acetate", unpublished report.

U.S. Army Environmental Hygiene Agency (1989) “Assessment of the developmental toxicity of propylene glycol monomethyl acetate (PM Acetate) in rats”

Zissu D (1995) Contact Dermatitis, 32 74-77.

Appendix

(Occupational exposure)

- EHEs of 0.481 mg/kg/day (most likely case) and 22.7 mg/kg/day (worst case) for dermal absorption were defined in Section 2.2 for workers using products containing 10 % and 50 % PMA.
- Using these EHEs and a NOAEL of 1,000 mg/kg/day, the margins of safety for dermal route were calculated as 2,080 (most likely case) and 44 (worst case), respectively. Similarly, respiratory EHEs of 9.3 mg/kg/day (most likely case) and 79.4 mg/kg/day (worst case) were estimated for workers at silk screen-printing and metal production, respectively. For respiration, the margins of safety were calculated as 108 (most likely case) and 13 (worst case), respectively, from these EHEs and a NOAEL of 1,000 mg/kg/day.
- At working sites, absorption of PMA via dermal and inhalation routes may occur simultaneously. Hence, the margins of safety combined for both routes were calculated as 102 (most likely case) and 9.8 (worst case), respectively. From these results, workers are not expected to be at risk of toxic health effects from occupational exposure to PMA under regular conditions of the usage equipped with protective gears.

(Consumer exposure)

- EHEs of 0.024 mg/kg/day (most likely case) and 0.907 mg/kg/day (worst case) for dermal absorption, and respiratory EHEs of 5.4 mg/kg/day (most likely case) and 48.6 mg/kg/day (worst case) are defined in Section 2.2 for consumers using products containing 5 % and 20 % PMA and PM monitoring data.
- Using these EHEs and a NOAEL of 1,000 mg/kg/day, the margins of safety for dermal absorption were calculated as of 41,700 (most likely case) and 1,103 (worst case). Similarly, the margins of safety of 184 (most likely case) and 20 (worst case) were estimated for respiratory absorption.
- The margins of safety combined for both routes were calculated as 185 and 20 for most likely case and worst case, respectively.

(Environmental exposure)

- EHE values of 0.00000571 mg/kg/day (most likely case) and 0.0214 mg/kg/day (worst case) were defined in Section 2.2 by assuming that individuals use untreated water as their sole source of drinking water (2 L/day for a 70 kg adult).
- The margins of safety were calculated as 175,000,000 and 46,700 for most likely case and worst case, respectively. The results suggest that adverse effects by PMA uptake via the environmental route could be negligibly small.
- Potential exposure via consumption of fish is anticipated to be negligible because PMA is expected to have a low potential for bioaccumulation and readily biodegradable.

REVISED OECD HPV FORM 1

SIDS DOSSIER
ON THE HPV CHEMICAL

1-Methoxy-2-propanol acetate

CAS No. 108 - 65 - 6

Sponsor Country: Japan

DATE: October 2, 2000

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†; Data elements specially required for inorganic chemicals

1. GENERAL INFORMATION

1.01 SUBSTANCE INFORMATION

***A.**	**Cast number**	108 - 65 - 6
B.	**Name** (IUPAC name)	2-Methoxy-1-methylethyl acetate
***C.**	**Name** (OECD name)	1-Methoxy-2-propanol acetate
†D.	**CAS Descriptor**	Not applicable in this case
E.	**EINECS-Number**	203 - 603 - 9
F.	**Molecular Formula**	$C_6H_{12}O_3$
***G.**	**Structural Formula**	$CH_3O\text{-}CH_2\text{-}CH(CH_3)\text{-}O\text{-}COCH_3$
		SMILES Line Notation: CC(OC(C)COC)=O
H.	**Substance Group**	Not applicable
I.	**Substance Remark**	None
J.	**Molecular Weight**	132.18

1.02 OECD INFORMATION

A. Sponsor Country: Japan

B. Lead Organisation:

Name of Lead Organisation: Daicel Chemical Industries, Ltd.
Contact person: Mr. TOMITA, Koji
Address: Ministry of Foreign Affairs
Economic Affairs Bureau
Second International Organizations Div.
2-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100

C. Name of responder

Name: The same as the contact person

Address: The same as the contact person

1.1 GENERAL SUBSTANCE INFORMATION

A. Type of Substance

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

B. Physical State (at 20 °C and 1,013 hPa)

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

C. Purity

99.5-99.8% weight/weight

1.2 SYNONYMS

1-Methoxy-2-acetoxy propane
1-Methoxy-2-propanol acetate
1-Methoxy-2-propyl acetate
1-Methoxy-2-acetoxypropane
2-Acetoxy-1-methoxypropane
2-Methoxy-1-methylethyl acetate
2-Propanol, 1-methoxy-, acetate
Methoxy Propyl Acetate
Methoxypropylacetate
Methyl Proxitol Acetate
MPA
PMA
PGMEA
Acetic acid, 2-methoxy-1-methylethyl ester
Propylene glycol methyl ether acetate
Propylene glycol 1- methyl ether 2- acetate

1.3 IMPURITIES

CAS No.:	70657-70-4
EINECS No.:	274-724-22
Name:	2-Methoxy-1-propyl acetate (beta-isomer)
Value:	ca. 0.3-0.5% weight/weight
Remarks:	None.
Reference:	American Chemistry Council PGE Panel.

CAS No.:	1320-67-8
EINECS No.:	
Name:	Propanol (mixed isomers)
Value:	ca. 0.2 % weight/weight
Remarks:	None.
Reference:	American Chemistry Council PGE Panel.

1.4 ADDITIVES

CAS No.:	128-37-0
EINECS No.:	204-881-4
Name:	2,6-bis (1,1-dimethylethyl)-4-methyl phenol
Value:	0.004-0.006% weight/weight

Remarks: Added to prevent formation of peroxides.
Reference: American Chemistry Council PGE Panel.

*1.5 QUANTITY

Remarks: In Japan, ca. 15,000 tonnes/year, produced by two Japanese companies. Estimated global production is 100,000-500,000 tonnes/year; Two major manufacturers are Dow Chemical and Lyondell.
Reference: Company data (Daicel Chemical, 1999).

1.6 LABELLING AND CLASSIFICATION (USE AND/OR TRANSPORTATION)

Labelling
Type: As in Directive 67/548/EEC
Specific limits: No
Symbols: Xi
Nota:
R-phrases: (10) Flammable
(36) Irritating to eyes
S-phrases: (2) Keep out of reach of children
(25) Avoid contact with eyes
Text of S-phrases:
Remarks: Irritant labelling not supported by toxicity studies; see Section 5.2.2.

Classification
Type: As in Directive 67/548/EEC
Category of danger: Flammable
R-phrases: (10) Flammable
Remarks: Not stated.

Type: As in Directive 67/548/EEC
Category of danger: Irritant
R-phrases: (36) Irritating to eyes
Remarks: Irritant labelling not supported by toxicity studies; see Section 5.2.2.

*1.7 USE PATTERN

A. General

Type of Use: **Category: Non dispersive**
(a) Main industrial use: Chemical industry: intermediate

Type of Use: **Category: Wide dispersive**
(b) Main industrial use: Paints, inks, lacquers, varnish industry solvents, cleaners
(c) Agricultural use: Pesticide inert
(d) Other: Solvents.

Remarks: Not stated.
Reference: American Chemistry Council PGE Panel.

B. Uses in Consumer

Function	Amount present	Physical state
KONFORM Urethane resin	15-20 %	Aerosol
ZEPENOURE Sealer Clear	5-10 %	Liquid
BRITE Touch Spray Paint	5-15 %	Aerosol, liquid
KRYLON Engine Colour	5-10 %	Aerosol
etc.		

Remarks: Not stated.
Reference: MSDS-OHS, OHSN OHS00134 (2000), MDL Information Systems, Inc.

1.8 OCCUPATIONAL EXPOSURE LIMIT

Exposure limit value

(a) Type: WEEL (AIHA, USA)
Value: 100 ppm (approx. 540 mg/m^3)
Reference: American Industrial Hygiene Association ERPG and WEEL Guides, 1996.

(b) Type: MAK (DE)
Value: 110 mg/m^3
Reference: Rhone-Poulenc Chimie, Courbevoie Cedex

(c) Type: MAK (DE)
Value: 50 ppm
Reference: BASF AG Ludwigshafen.

(d) Type: MAK (DE)
Value: 275 mg/m^3
Reference: TRGS 900 (1993)

Short term exposure limit value

Value: 100 ppm
Length of exposure period: 5 minutes.
Frequency: No more than 8 times per day.
Remarks: Not stated.
Reference: TRGS 900 (1993)

*1.9 SOURCES OF EXPOSURE

A. Potential human exposure: The production process is fully closed and exposure can be negligible by applying protective measures as written below.

(a) At a production site: Exposure is possible when sampling and analysing the product but only for short time. Based on a calculation, the exposure time is estimated for 6 hours/year/person for sampling. During the cleaning the production line, the worker is exposed to the substance and the exposure is estimated for 25 hours/year/person. The work place is provided with an air ventilator and a worker is equipped with on protective gear

such as mask, rubber gloves and goggles to prevent exposure (by MSDS Daicel Chemical, 1999). Spill is collected and incinerated.

(b) At user's facility: Material is used as a solvent in paints, other coating and inks, all of which are used in the industrial sector. Potential exposure is controlled by the use of efficient exhaust ventilation. Exposure is possible during dispensing the substance from drum or tank lorry into a container at user's facility. A worker may be exposed to the vapour.

A worker is recommended to put on protective gear such as mask, rubber gloves and goggles to prevent exposure (by MSDS Daicel Chemical, 1998). Spill is collected and incinerated.

B. Potential environmental exposure:

(a) At a production site:
Source: Media release: Process waste water
Quantities per media: estimated max. ca. 4,000 kg/year in a production site in Japan (1999), in which ca. 15,000 t/year of the chemical substances was produced. (Estimated by Daicel)
Remarks: Data used for the estimation:
Waste water released: ca. 570 m^3/year
Content of PMA: 2.6 g/L
Reference: Company data (Daicel Chemical, 1999).

(b) At an user's facility:
No substantial exposure is probable. Potential exposure is controlled by the use of efficient exhaust ventilation.
Remarks: Not stated.
Reference: Company data (Daicel Chemical, 1999).

1.10 ADDITIONAL REMARKS

A. Options for disposal

Remarks: Should be disposed of in USA according to USEPA 40CFR 262;
Hazardous waste number: D001. Dispose in accordance with all applicable regulations.
Reference: MSDS-OHS, OHSN OHS00134 (2000), MDL Information Systems, Inc.

B. Other remarks

Remarks: Substance not listed in the Seveso directive 82/501/CEE.
US SARA Hazard Categories
SARA Sections 311/312 (40CFR 370.25)
Acute = Y
Chronic =Y
Fire = Y
Reactive = N
Sudden Release = N

Reference: MSDS-OHS, OHSN OHS00134 (2000), MDL Information Systems, Inc.

2. PHYSICAL-CHEMICAL DATA

*2.1 MELTING POINT

(a) **Preferred result**

Value: < -10 °C (263 K).
Decomposition: Yes **[ ]** No **[X]** Ambiguous **[ ]**
Sublimation: Yes **[ ]** No **[X]** Ambiguous **[ ]**
Method: JIS K 0065-1966
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Remarks: Not stated
Reference: Chemicals Evaluation and Research Institute (Kurume, Japan)(1998), Report No. 8(2) 3144K.

(b) Value: < -67 °C
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Sublimation: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated
Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000):DOWANOL® PMA Master Safety Data Sheet.

(c) Value: -55 °C
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Sublimation: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: Not specified
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated
Reference: Daicel Chemical Industries Material Safety Data Sheet, February 1998.

*2.2 BOILING POINT

(a) **Preferred result**

Value: 145.8 °C
Pressure: at 1,013 hPa
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: ASTM D 86
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

(b) Value: 146 °C
Pressure: at 1,013.247 hPa
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: Not specified.

GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Daicel Chemical Industries Material Safety Data Sheet, February 1998.

(c) Value: 145 - 147 °C
Pressure: No data available
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: DIN 53 171
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: BASF AG Safety Data Sheet, 05.04.1994.

(d) Value: ca. 140 °C
Pressure: at 1,013 hPa
Decomposition: Yes **[ ]** No **[ ]** Ambiguous **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Lyondell Chemical Company Material Data Sheet, 1989.

†2.3 DENSITY

(a) **Preferred result**
Type: Bulk density **[ ]**; Density **[X]**; Relative Density **[ ]**
Value: 0.965 - 0.970 g/cm^3
Temperature: 20 °C
Method: DIN 51 757
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: BASF AG Safety Data Sheet, 05.04.1994.

(b) Type: Bulk density **[ ]**; Density **[X]**; Relative Density **[ ]**
Value: 0.970 g/cm^3
Temperature: 20 °C
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Daicel Chemical Industries Material Safety Data Sheet, February 1998.

(c) Type: Bulk density **[ ]**; Density **[X]**; Relative Density **[ ]**
Value: ca. 960 kg/m^3
Temperature: 25 °C
Method: Not specified
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Lyondell Chemical Company Material Data Sheet, 1989.

*2.4 VAPOUR PRESSURE

(a) **Preferred result**

Value:	3.7 hPa (2.8 Torr)
Temperature:	20 °C
Method:	calculated **[ ]**; measured **[X]**
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	The technique used was a twin ebulliometry and the experimental data was regressed to the Antoine equation.
Reference:	Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

(b) Value:	3.37 hPa
Temperature:	20 °C
Method:	calculated **[ ]**; measured **[ ]**
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Not stated
Reference:	BASF AG Safety Data Sheet, 05.04.1994.

(c) Value:	4.67 hPa
Temperature:	20 °C
Method:	calculated **[ ]**; measured **[ ]**
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Not stated
Reference:	Daicel Chemical Industries Material Safety Data Sheet, February 1998.

(d) Value:	ca. 5.07 hPa
Temperature:	25 °C
Method:	calculated **[X]**; measured **[ ]**
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Not stated.
Reference:	Lyondell Chemical Company Material Data Sheet, 1989.

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

(a) **Preferred result**

Log Pow:	0.36
Temperature:	25°C ±1°C.
Method:	calculated **[ ]**; measured **[X]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Remarks:	Test condition: OECD TG107
Reference:	Chemicals Evaluations and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

(b) Log Pow:	0.43
Temperature:	No data available
Method:	calculated **[X]**; measured **[ ]**
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	Test condition: Kow was estimated from Pomona-Med Chem structural fragment method (unitless).

Reference: Gonsior S.J. (1990) "Environmental assessment for glycol ethers", Dow Chemical Company (1990) unpublished report.

*2.6 WATER SOLUBILITY

A. Solubility

(a) **Preferred result**

Value: >100 g/L
Temperature: 25°C ±1°C
Description: Miscible **[ ]**; Of very high solubility **[X]**;
Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**;
Of low solubility **[ ]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method: OECD TG 105 (flask method).
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Remarks: Not stated.
Reference: Chemicals Evaluation and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

(b) Value: 198 g/L
Temperature: Not specified.
Description: Miscible **[ ]**; Of very high solubility **[X]**;
Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**;
Of low solubility **[ ]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: International Chemical Safety Card

(c) Value: ca. 19,800 mg/L
Temperature: 25°C
Description: Miscible **[ ]**; Of very high solubility **[X]**;
Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**;
Of low solubility **[ ]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Dow Chemical Company (1980)"Evaluation of propylene glycol methyl ether acetate (PMacetate) in the aquatic environment", unpublished report.

(d) Value: 20.5 wt.% (in water)
Temperature: 20 °C
Description: Miscible **[ ]**; Of very high solubility **[X]**;
Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**;
Of low solubility **[ ]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Daicel Chemical Industries Material Safety Data Sheet, February 1998.

(e) Value: No data available.
Temperature: No data available.
Description: Miscible **[ ]**; Of very high solubility **[X]**;
Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**;
Of low solubility **[ ]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Appreciable.
Reference: Lyondell Chemical Comany Material Data Sheet, 1989.

B. pH Value, pKa Value

No dissociation group.

2.7 FLASH POINT (liquids)

(a) **Preferred result**
Value: 45 °C
Type of test: Closed cup **[ ]**; Open cup **[ ]**; Other **[X]**
Method: DIN 51 755
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: BASF AG Safety Data Sheet, 05.04.1994.

(b) Value: 42 °C
Type of test: Closed cup **[X]**; Open cup **[ ]**; Other **[ ]**
Method: Not specified
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

(c) Value: ca. 47 °C
Type of test: Closed cup **[X]**; Open cup **[ ]**; Other **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Lyondell Chemical Company Material Data Sheet, 1989.

2.8 AUTO FLAMMABILITY (solid/gases)

(a) **Preferred result**
Value: 315 °C
Pressure: No data available.
Method: DIN 51 794
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: BASF AG Safety Data Sheet, 05.04. 1994.

(b) Value: 333 °C
Pressure: No data available.

Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Not stated.
Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

2.9 FLAMMABILITY

Results: Extremely flammable **[ ]**; Extremely flammable - liquified gas **[ ]**; Highly Flammable **[ ]**; Flammable **[X]**; Non flammable **[ ]**; Spontaneously flammable in air **[ ]**; Contact with water liberates highly flammable gases **[ ]**; Other **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Lower and upper flammability limits (% vol./vol.) in air are 1.5 and 10.8 vol. %, respectively.
Reference: BASF AG Safety Data Sheet 05.04.1994.

2.10 EXPLOSIVE PROPERTIES

Results: Explosive under influence of a flame **[ ]**;
More sensitive to friction than m-dinitrobenzene **[ ]**;
More sensitive to shock than m-dinitrobenzene **[ ]**;
Not explosive **[X]**;
Other **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Remarks: Upper and lower explosive limits in air: 1.5 and 10.8 vol. %.
Reference: BASF AG Safety Data Sheet, 05.04.1994.

2.11 OXIDISING PROPERTIES

Results: Maximum burning rate equal or higher than reference mixture **[ ]**;
Vigorous reaction in preliminary test **[ ]**;
No oxidising properties **[ ]**;
Other **[ ]** ;
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[ ]**
Remarks: Avoid contact with oxidizing materials.
Reference: Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold (1975)

ADDITIONAL REMARKS

Remarks: Dry point: ca. 150 °C
Reference: Lyondell Chemical Company Material Safety Data Sheet,1989.

Remark: Evaporation rate: ca. 0.3 (Butyl acetate = 1)
Reference: Lyondell Chemical Company Material Safety Data Sheet,1989.

Remark: Vapour specific gravity: ca. 4.6 (air = 1)

Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

Remark: Hazardous reaction may occur with oxidizers
Reference: BASF AG Safety Data Sheet, 05.04.1994.

2.12 OXIDATION: REDUCTION POTENTIAL

No studies located.

2.13 ADDITIONAL DATA

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

No studies located.

B. Other data:

No studies located.

3. ENVIRONMENTAL FATE AND PATHWAYS

3.1 STABILITY

*3.1.1 PHOTODEGRADATION

No studies located.

*3.1.2 STABILITY IN WATER

Type: Abiotic (hydrolysis) **[X]**; biotic (sediment) **[ ]**;
Half life: 8.10 days at pH 9, at 25 °C
Degradation: No hydrolysis at pH 4 and 7 at 50 °C in 5 days
Hydrolysis at pH 9 at 60, 70 and 80 °C
Method: OECD TG111
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Wako Pure Chemical Industries, Lot No. WTP4494,
Purity: > 99.7 %, Impurity: water; 0.01 %.
Remarks: Hydrolysis rates at pH 9 were determined at 60, 70 and 80 °C, and they were extrapolated to 25 °C using Arrhenius relationship. Half life at 25 °C was calculated from the rate constant.
Reference: Chemicals Evaluation and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

3.1.3 STABILITY IN SOIL

(a) Type: Field trial **[ ]**; Laboratory **[X]**; Other **[ ]**
Radiolabel: Yes **[X]** No **[ ]** ? **[ ]**
Concentration: (1) 2.5 ppm (2.5 ug/g) and 20 ppm (20 ug/g)
(2) 20 ppm (20 ug/g)

(3) 20 ppm (20 ug/g)
(ppm : based on weight of soil-water mixture)

Soil temperature: 25 °C

Soil humidity: 100 g water/100g soil dry weight

Soil classification: DIN19863 **[ ]**; NF X31-107 **[ ]**; USDA **[X]**; Other **[ ]**

Year: Not specified.

Content of clay etc.: (1) Clay 12 %, Silt 16 %, Sand 72 %
(2) Clay 14 %, Silt 12 %, Sand 74 %
(3) Clay 2 %, Silt 4 %, Sand 94 %

Organic Carbon: (1) 2.5 %
(2) 2 %
(3) 0.4 %

Soil pH: (1) 7.5
(2) 6.7
(3) 5.7

Cation exchange capacity:
(1) 9.5 meq/100 g soil dry weight
(2) 7.3 meq/100 g soil dry weight
(3) 0.9 meq/100 g soil dry weight

Microbial biomass: (1) 9.9 x 10^6 bacteria/g soil
(2) 5.1 x 10^6 bacteria/g soil
(3) 9.3 x 10^5 bacteria/g soil

Dissipation time: DT 50 : < 1 day in all cases studied, (1), (2) and (3).
DT 90: Not determined.

Dissipation: > 50 % after 1 day (time) in all cases studied, (1), (2) and (3).

Method: Not specified.

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

Test substance: As prescribed by 1.1 - 1.4, purity: Specific activities 14.5mCi/mmole, radiochemical purities >98 %, obtained from Sigma Chemical Co. St. Louis, MO).

Remarks: (1) Test was performed under aerobic and anerobic conditions with 9.9×10^6 bacteria/gram soil. PMA at a concentration of 20 ppm had a dissipation time < 1 day under aerobic condition. Extensive degradation to carbon dioxide was observed under aerobic conditions. PMA rapidly hydrolyzed to 1-methoxy-2-propanol in anaerobic microcosms with greater than 50 % of the transformation occurring within several hours. Thereafter no degradation of the intermediate was apparent after 2 months under anaerobic conditions. The soil was a Londo Sandy Loam with 9.9×10^6 bateria/gram of soil.

(2) Test was run under aerobic condition. The soil was a Tappan Sandy Loam with 5.1×10^6 bateria/gram of soil. PMA at a concentration of 20 ppm had a dissipation time < 1 day. PMA rapidly hydrolyzed to propylene glycol monomethyl ether (PM) that rapidly degraded with greater than 95% removal occurring within 6 days.

(3) Test was run under aerobic condition. The soil was Sand with 9.3×10^5 bateria/gram of soil. PMA at a concentration of 20 ppm had a dissipation time < 1 day. PMA rapidly hydrolyzed to propylene

glycol monomethyl ether (PM) of which 12% degraded within 12 days.

Reference: Gonsior SJ and West RJ (1995) "Biodegradation of glycol ethers in soil"Environ Toxicol and Chem 14(8): 1273-1279

*3.2 MONITORING DATA (ENVIRONMENTAL)

No studies located.

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

*3.3.1 TRANSPORT

Type: Adsorption **[ ]**; Desorption **[ ]**; Volatility **[X]**; Other **[ ]**
Media: water - air
Method: Caluculated.
Results: Air/water partition (Kaw) is estimated to be 1.33×10^{-4} based on water solubility and vapour pressure.
Adsorption (Koc) estimated from Kow using Karickhoffs equation is 2.3 (log Koc = 0.36)
Remarks: Not stated.
Reference: Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of the Dow Chemical Company.

*3.3.2 THEORETICAL DISTRIBUTION (FUGACITY CALCULATION)

(a) **Preferred result**
Media: Air-biota **[ ]**; Air-biota-sediment-soil-water **[X]**; Soil-biota **[ ]**; Water-air **[ ]**; Water-biota **[ ]**; Water-soil **[ ]**; Other **[ ]**
Method: Fugacity leve l I **[ ]**; Fugacity level II **[ ]**; Fugacity level III **[X]**; Fugacity level IV **[ ]**; Other (calculation) **[ ]**;
Other (measurement) **[ ]**

Results:

Predicted distribution of PMA using Fugacity level III

Compartment	Release 100% to air	Release 100% to water	Release 100% to soil
Air	73.30 %	0.60 %	1.10 %
Water	26.31 %	99.90 %	19.41 %
Soil	0.57 %	0.00 %	79.49 %
Sediment	0.06 %	0.23 %	0.04 %

Remarks: Refer to Appendix 1.
Reference: Daicel Chemical Industries Ltd. (2000), unpublished report.

(b)
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 **[ ]**; Fugacity level IV **[ ]**; Other (calculation) **[X]**; Other (measurement) **[ ]**

Results: Predicted distribution of PMA using Unit World Equilibrium Model:

10.22 % to Air
89.73 % to Water
0.02 % to Sediment
0.03% to Soil
0.0 % to Biota (Fish)
0.0 % to Suspended Solid in Water

Remarks: PMA is biodegraded to propylene glycol monomethyl ether (PM) which, in turn, is degraded to carbon dioxide. Biologically mediated hydrolysis is the predominant pathway in the primary degradation step.

Reference: Gonsior SJ (1990) "Environmental assessment for glycol ethers", unpublished report of the Dow Chemical Company.

3.4 IDENTIFICATION OF MAIN MODE OF DEGRADABILITY IN ACTUAL USE

No studies located.

*3.5 BIODEGRADATION

(a) **Preferred result**

Type: aerobic **[X]**; anaerobic **[ ]**

Inoculum: adapted **[ ]**; non-adapted **[X]**; other: Belebstschlamm aus der BASF-Klaeranlage

Concentration of the chemical: No data available, related to COD **[ ]**; DOC **[X]**; test substance **[ ]**

Medium: water **[X];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**

Degradation: 99 % after 28 day based on DOC.

Results: readily biodeg. **[X];** inherently biodeg. **[ ]**; under test condition no biodegradation observed **[ ]**, other **[ ]**

Kinetic: Not stated.

Method: OECD Guideline 301 F

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

Test substance: Dow Chemical Company, Midland, Michigan 48674, purity: 99.7 %.

Remarks: By definition, biodegradation starts when the percent degradation exceeds the 10 % level. PMA exhibited an average of 83 % biodegradation based on O_2 consumption at the end of the 10 day window.

Reference: Dow Chemical Company (1998). "Evaluation of ready biodegradability of five Glycol ethers using the OECD 301F: Manometric respirometry test, EPA/OTS; Doc #86-980000183S. NTIS Order No.: NTIS/OTS0559518

(b) Type: aerobic **[X]**; anaerobic **[ ]**

Inoculum: adapted **[ ]**; non-adapted **[X]**; other: Belebstschlamm aus der BASF-Klaeranlage

Concentration of the chemical:
100.3 mg/L. related to COD **[ ]**; DOC **[ ]**; test substance **[X]**
Medium: water **[X];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation: 87.2 % after 28 days (by BOD)
94.9 % after 28 days (by TOC)
100 % after 28 days (by GC)
Results: readily biodeg. **[X];** inherently biodeg. **[ ]**;
under test condition no biodegradation observed **[ ]**, other **[ ]**
Kinetic: 28.5 % in 7 day by BOD.
69.1 % in 14 day by BOD.
87.2 % in 28 day by BOD.
Method: OECD TG301C
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: Daicel Chem. Ind.Ltd., purity: 99.86%
Remarks: Not stated.
Reference: Technical Report No. 78-124, Daicel Chem. Ind.Ltd. unpublished report (1978).

(c) Type: aerobic **[X]**; anaerobic **[ ]**
Inoculum: adapted **[ ]**; non-adapted **[ ]**; other: Belebstschlamm aus der BASF-Klaeranlage
Concentration of the chemical:
785 mg/L. related to COD **[ ]**; DOC **[ ]**; test substance **[X]**
Medium: water **[ ];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation: 100 % after 8 day.
Results: readily biodeg. **[ ];** inherently biodeg. **[X]**;
under test condition no biodegradation observed **[ ]**, other **[ ]**
Kinetic: 38 % in 1 day.
58 % in 3 day.
> 100% in 6 day.
Method: OECD Guideline 302 B
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: Not specified, purity: No data available.
Remarks: OECD Guide-line 302 B "Inherent biodegradability: Modified Zahn-Wellens Test" (1981)
Reference: BASF AG(1985), Labor Oekologie: Unveroeffentlichte Untersuchung (85/1268) vom 03.10.85 bis 11.10.85.

(d) Type: aerobic **[ ]**; anaerobic **[ ]**
Inoculum: adapted **[ ]**; non-adapted **[ ]**; other: Belebstschlamm aus der BASF-Klaeranlage
Concentration of the chemical:
No data available, related to COD **[ ]**; DOC **[ ]**; Test substance **[ ]**
Medium: water **[ ];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation: Not stated.
Results: readily biodeg. **[X];** inherently biodeg. **[ ]**;
under test condition no biodegradation observed **[ ]**, other **[ ]**
Kinetic: Not stated.
Method: OECD TG301F
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Not specified, purity: No data available.

Remarks: PMA was biodegraded to 83% in a closed bottle test after 28 days. The material is expected to pass the closed bottle test for ready biodegradability in 28 days.
Reference: Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

(e) Type: aerobic **[X]**; anaerobic **[ ]**
Inoculum: adapted **[ ]**; non-adapted **[X]**; other: Belebstschlamm aus der BASF-Klaeranlage
Concentration of the chemical:
No data available, 40 mg/L related to COD **[ ]**; DOC **[X]**; test substance **[ ]**
Medium: water **[ ];** water-sediment **[ ];** soil **[ ];** sewage treatment **[ ]**
Degradation: 70% after 28 day.
Results: readily biodeg. **[ ];** inherently biodeg. **[ ]**;
under test condition no biodegradation observed **[ ]**, other **[X]**
Kinetic: Not stated.
Method: OECD Guideline 301 E
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: Not stated, purity: No data available.
Remarks: Guideline 301 E: Modified OECD Sceening Test, PMA degraded but did not meet "10 day window" for classification of ready biodegradability
Reference: Dow Europe S.A. (1994) Unpublished report.

3.6 BOD_5, COD OR RATIO BOD_5/COD

Ratio BOD_5/COD: 0.63
Method: Directive 84/449/EEC, C.8 "Biodegradation: Biochemical Oxygen Demand"
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Year: No data available.
Remarks: DOC = 523 mg/g; CSB = 1520 mg/g and BSB5 = 330 mg/g.
Reference: BASF AG (1985) Labour Oekologielabor: Unveroeffentlichte Untersuchung.

BOD_5
Method: Not specified.
Concentration: related to COD **[ ]**; DOC **[ ]**; Test substance **[ ]**
Value: 0.36 mg O_2/L
GLP: Yes **[ ]** No **[ ]** ? **[X]**

COD
Method: Not specified.
Value: 1.74 mg O_2/g
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Result: The ThOD is 1.82 p/p. BOD5, BOD10 and BOD20 for industrial inoculum are 0.36, 1.04 and 1.12 p/p respectively. For municipal inoculum the values are 0.36, 0.37 and 0.5 p/p, respectively. The compound will biodegrade in the environment.

Remarks: COD was measured using the K_2CrO_7 method. Using $KMnO_4$, the COD was 1.54 p/p.
Reference: Dow Chemical Company (1980) unpublished report.

3.7 BIOACCUMULATION

No studies located.

3.8 ADDITIONAL REMARKS

A. Sewage treatment

Remarks: No additional remarks.

B. Other information

Remarks: No additional remarks.

4. ECOTOXICITY

*4.1 ACUTE/PROLONGED TOXICITY TO FISH

A. ACUTE TOXICITY TO FISH

(a) **Preferred result**

Type of test: static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other (e.g. field test) **[ ]** open-system **[ ]**; closed-system **[ ]**
Species: Oryzias latipes (Medaka, fresh water)
Exposure period: 96 hour(s)
Results: LC_{50} (96 h) >100.0 mg/L based on nominal concentrations.
Analytical monitoring: Yes **[X]** No **[ ]** ? **[ ]**
Method: OECD TG 203 (1992).
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: As prescribed by 1.1-1.4.
Remarks: Drinking water was used after dechlorinated by passing through activated carbon. Vehicle was not used. Test was conducted at the nominal concentrations of 0, 9.5, 17.1, 30.9, 55.6, 100 mg/L. Test solutions were replaced every 24 hours by newly prepared ones. When test solutions were analysed after 24 hours, the measured concentrations showed more than 80 % of the nominal concentrations. At the nominal concentrations of 0, 9.5, 17.1, 30.9, 55.6 mg/L, 100% of fish survived until 96 h; At 100 mg/L, fish survived, 90% (24 h), 80% (48 h), 80% (72h), 80% (96 h). At 48 hr, one fish showed abnormal swimming behaviour at 100.0mg/L.
Reference: Environment Agency of Japan (1998).

(b) Type of test: static **[X]**; semi-static **[ ]**; flow-through **[ ]**; other (e.g. field test) **[ ]** open-system **[ ]**; closed-system **[ ]**
Species: Pimephales promelas (fresh water)

Exposure period: 96 hour(s)
Results: LC_{50} (96 h) = 161 mg/L
Analytical monitoring: Yes **[ ]** No **[ ]** ? **[X]**
Method: Not stated.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Not stated.
Remarks:
Reference: Dow Chemical Company (1980)

(c) Type of test: static **[X]**; semi-static **[ ]**; flow-through **[ ]**; other (e.g. field test) **[ ]**; open-system **[ ]**; closed-system **[ ]**
Species: Salmo gairdneri (estuary, fresh water)
Exposure period: 96 hour(s)
Results: LC_{50} (96 h) = 100-180 mg/L
NOEC = 100 mg/L
Analytical monitoring: Yes **[ ]** No **[ ]** ? **[X]**
Method: OECD Guide-line 203 "Fish, Acute Toxicity Test"
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: Not stated.
Remarks:
Reference: BASF AG (1987).

B. PROLONGED TOXICITY TO FISH

Type of test: static **[ ]**; semi-static **[ ]**; flow-through **[X]**; other (e.g. field test) **[ ]**; open-system **[ ]**; closed-system **[ ]**
Species: Oryzias latipes (Medaka, fresh water)
Exposure period: 14 days.
Results: LC_{50} (7 days) = 85 mg/L (measured concentration)
LC_{50} (14 days) = 63.5 mg/L (measured concentration)
NOEC (14 days) = 47.5 mg/L (measured concentration)
LOEC (14 days) = 85 mg/L (measured concentration)
Analytical monitoring: Yes **[X]** No **[ ]** ? **[ ]**
Method: OECD TG 204.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: As prescribed by 1.1-1.4.
Remarks: Test was conducted at the nominal concentrations of 0, 30.9 (23.1), 55.6 (47.5), 100 (85) mg/L (measured mean concentration of test chemical during test period). At measured concentration of 85 mg/L, reduction of food intake, abnormal respiration, abnormal swimming behaviour and loss of swimming ability were observed. There was no significant difference in fish body weight between groups less than at 47.5mg/L and in control.
Reference: Environment Agency of Japan (1998).

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

*A. Daphnia

(a) **Preferred result**
Type of test: static **[X]**; semi-static **[ ]**; flow-through **[ ]**; other (e.g. field test) **[ ]**

open-system **[ ]**; closed-system **[ ]**
Species: Daphnia magna (Crustacea)
Exposure period: 48 hour(s)
Results: EC_{50} (24 h) = 407 mg/L
EC_{50} (48 h) = 373 mg/L
NOEC (48 h) = 278 mg/L
Analytical monitoring: Yes **[X]** No **[ ]** ? **[ ]**
Method: OECD TG 202
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: As prescribed by 1.1-1.4.
Remarks: Test concentration: 48, 86, 154, 278, 500, 900 mg/L. All the test solutions showed more than 90 % of the nominal concentrations after 48 hours.
Reference: Environment Agency of Japan (1998).

(b) Type of test: static **[ ]**; semi-static **[ ]**; flow-through **[ ]**; other (e.g. field test)**[ ]**
open-system **[ ]**; closed-system **[ ]**
Species: Daphnia magna (Crustacea)
Exposure period: 24 hour(s)
Results: EC_{50} (24 h) > 500 mg/L
EC_0 (24 h) = 500 mg/L
EC_{100} (24 h) > 500 mg/L
NOEC = 500 mg/L
Exposure period: 48 hour(s)
Results: EC_{50} (48 h) > 500 mg/L
EC_0 (48 h) > 500 mg/L
NOEC = 500 mg/L
Analytical monitoring: Yes **[ ]** No **[ ]** ? **[X]**
Method: EG-Richtlinie 79/831/EWG, C.2 Akute Toxizitaet fuer Daphnien
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: BASF AG, purity: No data available.
Remarks:
Reference: BASF AG (1987).

(c) Type of test: static **[ ]**; semi-static **[ ]**; flow-through **[ ]**; other (e.g. field test)**[ ]**
open-system **[ ]**; closed-system **[ ]**
Species: Daphnia sp. (Crustacea)
Exposure period: 48 hour(s)
Results: EC_{50} (48 h) > 408 mg/L
Analytical monitoring: Yes **[ ]** No **[ ]** ? **[X]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks:
Reference: Dow Chemical Company (1980).

B. Other aquatic organisms

No studies located.

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

Species:	Selenastrum capricornutum ATCC 22662
Endpoint:	Biomass **[X]**; Growth rate **[ ]**; Other **[ ]**
Exposure period:	72 h.
Results:	EC_{50} (0-72 h) > 1,000 mg/L NOEC (0-72 h) > 1,000 mg/L
Analytical monitoring:	Yes **[X]** No **[ ]** ? **[ ]**
Method:	OECD TG 201(1984) open-system **[ ]**; closed-system **[X]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	As prescribed by 1.1-1.4.
Remarks:	All the test groups (95, 171, 309, 556, 1,000 mg/L) showed normal and similar growth to control (210-232-fold increase after 72 hr).
Reference:	Environment Agency of Japan (1998).

4.4 TOXICITY TO BACTERIA

Type:	Aquatic **[ ]**; Field **[ ]**; Soil **[ ]**; Other **[X]**
Species:	Salmonella typhimurium (Bacteria)
Exposure Period:	18 hour(s)
Results:	In the Ames test using several Salmonella typhimurium strains (TA 98, TA 100, TA 1535, TA 1537 and TA 1538), 50 mg PMA/plate was toxic in all strains with and without metabolic activation.
Analytical monitoring:	Yes **[ ]** No **[ ]** ? **[X]**
Method:	Ames et al. (1975)
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Dow Europe S.A. , purity: No data available.
Remarks:	Method according to Ames et al., 1975. Toxicity to Salmonella typhimurium was measured as reduction in growth on plates and/or as a sparse background lawn.
Reference:	Dow Chemical Company (1983) "Evaluation of DOWANOL® PM Acetate in the Ames Salmonella/mammalian microsomal mutagenicity assay", unpublished report.

4.5 CHRONIC TOXICITY TO AQUATIC ORGANISMS

4.5.1 CHRONIC TOXICITY TO FISH

No studies located.

(*)4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

INVERTEBRATES

Type of test:	static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other (e.g. field test) **[ ]**; open-system **[ ]**; closed-system **[ ]**
Species:	Daphnia magna
Endpoint:	Mortality **[ ]**; Reproduction rate **[X]**; Other **[ ]**
Exposure period:	21 days.
Results:	EC_{50} (21-d, reproduction) >100 mg/L

NOEC (21-d, reproduction) ≥100 mg/L
LOEC (21-d, reproduction) >100 mg/L
(Calculated based on nominal concentrations)

Analytical monitoring: Yes **[X]** No **[ ]** ? **[ ]**
Method: OECD TG 211 (1997)
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: As prescribed by 1.1-1.4.
Remarks: A single exposure group (100 mg/L) against control group was studied.
Mean cumulative numbers of juveniles produced per adult alive for 21 days: Control: 93.8, 100 mg/L: 96.5. Time-weighted means of measured concentration of test chemical (100 mg/L) during 21-d exposure: 92 mg/L.
LC_{50} for parental Daphnia (14-d) >100 mg/L
LC_{50} for parental Daphnia (21-d) >100 mg/L
(Calculated based on nominal concentrations)
Reference: Environment Agency of Japan. (1998).

4.6 TOXICITY TO TERRESTRIAL ORGANISMS

4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

No studies located.

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

No studies located.

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

No studies located.

4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)

No studies located.

4.8 BIOTRANSFORMATION AND KINETICS

No studies located.

4.9 ADDITIONAL REMARKS

Results:
Remarks: No additional remarks.

5. TOXICITY

*5.1 ACUTE TOXICITY

5.1.1 ACUTE ORAL TOXICITY

(a) Type:	LD_0 **[ ]**; LD_{100} **[ ]**; LD_{50} **[X]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain:	Rat/Fischer 344
Value:	> 10,000 mg/kg b.w.(male) 8,532 mg/kg b.w.(female)
Discriminating dose:	0, 500, 1,000, 2,000, 4,000, 6,300, 10,000mg/kg b.w.
Method:	Not specified.
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substance:	Dow Europe S.A. , purity: No data available.
Remarks:	(Male) Observations of male rats include lethargy at all doses (500-10,000 mg/kg) and anorexia, rapid-shallow breathing and excess salivation at doses of 4,000 mg/kg or greater. No lethality of male rats was observed at the highest dose (10,000 mg/kg). No treatment-related lesions were observed upon gross pathology. (Female) Obsevations of female rats include lethargy at all doses (500-10,000 mg/kg) and anorexia, rapid-shallow breathing and excess salivation at doses of 4,000 mg/kg or greater. No treatment-related lesions were observed upon gross pathology.
Reference:	Dow Chemical Company (1992) “Propylene glycol monomethyl ether acetate: acute toxicological studies in rats with cover letter dated 072492”, EPS/OTS: Doc. #88-920005652. NTIS Order No.: NTIS/OTS 0544435.

(b) Type:	LD_0 **[ ]**; LD_{100} **[ ]**; LD_{50} **[X]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain:	Rat (albino)
Value:	> 14.1mL(13,700mg)/kg b.w.(male)
Discriminating dose:	At levels differing by a factor of 2.0 in a geometric series.
Method:	Not specified.
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substance:	USAR solvent LM Acetate (DS-10-52-1), purity: No data available.
Remarks:	Deaths, preceded by a narcotic-like state, occurred from one to three days after dosing. Gross examination at autopsy revealed congested lungs, kidneys and adrenals; mottled congested livers with prominent acini; and gastrointestinal haemorrhage. In one rat, bladder contained bloody urine.
Reference:	Union Carbide Corporation (1961), “Propylene glycol monoethyl ether acetate: (USAR) Solvent LM Acetate”, unpublished report.

5.1.2 ACUTE INHALATION TOXICITY

(a) Type:	LC_0 **[X]**; LC_{100} **[ ]**; LC_{50} **[ ]**; LCL_0 **[ ]**; Other **[ ]**
Species/strain:	rat
Exposure time:	7 hours
Value:	4,345 ppm (23,463 mg/m^3)
Method:	Not specified.
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substance:	Dow Europe S.A. , purity: No data available.
Remarks:	Exposure of rats to a saturated atmosphere of PMA at a nominal concentration of 4,345 ppm (23,463 mg/m^3) caused no adverse effects.

Reference: Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

(b) Type: LC_0 **[X]**; LC_{100} **[ ]**; LC_{50} **[ ]**; LCL_0 **[ ]**; Other **[ ]**
Species/strain: Rat / Fischer 344
Exposure time: 3 hours.
Value: 2,000 ppm (10,800 mg/m^3).
Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks: Male rats were exposed to 0, 300 ppm (1,620 mg/m^3),and 2,000 ppm (10,800 mg/m^3) PMA. Head-only exposure to PMA. Endpoint paramenters were respiratory frequency, tidal volume and minute volume. Respiratory frequency was reduced in Fischer 344 rats exposed to 2,000 ppm (10,800 mg/m^3). Mortality data not obtained.
Reference: Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate: Inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

(c) Type: LC_0 **[X]**; LC_{100} **[ ]**; LC_{50} **[ ]**; LCL_0 **[ ]**; Other **[ ]**
Species/strain: Mouse / B6C3F1
Exposure time: 3 hours.
Value: 2,000 ppm (10,800 mg/m^3).
Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks: Male mice were exposed to 0, 300 ppm (1,620 mg/m^3), and 2,000 ppm (10,800 mg/m^3) PMA. Head-only exposure to PMA. Endpoint paramenters were respiratory frequency, tidal volume and minute volume. Respiratory frequency was reduced in B6C3F1 mice exposed to 2,000 ppm (10,800 mg/m^3). Mortality data not obtained.
Reference: Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate: inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

(d) Type: LC_0 **[X]**; LC_{100} **[ ]**; LC_{50} **[ ]**; LCL_0 **[ ]**; Other **[ ]**
Species/strain: Rat (albino)
Exposure time: 8 hours.
Value: Not stated (concentrated vapour).
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: USAR solvent LM Acetate (DS-10-52-1), purity: No data available.
Remarks: No mortality obtained (0/6).
Reference: Union Carbide Corporation (1961), "Propylene glycol monoethyl ether acetate: (USAR) Solvent LM Acetate", unpublished report.

5.1.3 ACUTE DERMAL TOXICITY

(a) Type: LD_0 **[X]**; LD_{100} **[ ]**; LD_{50} **[ ]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain: Rat

Value: > 5,000mg/kg b.w.
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Dow Europe S.A., purity: No data available.
Remarks: PMA is not likely to be absorbed through skin in acutely toxic amounts. PMA was lethargic after application of the 5,000 mg/kg dose. No dose-related lesion were observed upon gross pathology.
Reference: Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

(b) Type: LD_0 **[X]**; LD_{100} **[ ]**; LD_{50} **[ ]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain: Rabbit
Value: > 20 mL(19,400mg)/kg b.w.
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: USAR solvent LM Acetate (DS-10-52-1), purity: No data available.
Remarks: No mortality at 20 mL/kg (0/4).
Reference: Union Carbide Corporation (1961), "Propylene glycol monoethylether acetate: (USAR) Solvent LM Acetate", unpublished report.

5.1.4 ACUTE TOXICITY, OTHER ROUTES OF ADMINISTRATION

Type: LD_0 **[ ]**; LD_{100} **[ ]**; LD_{50} **[X]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain: Mouse
Route of Administration: i.m. **[ ]**; i.p. **[X]**; i.v. **[ ]**; infusion **[ ]**; s.c. **[ ]**; other **[ ]**
Exposure time: No data available.
Value: 750 mg/kg bw.
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: No data available, purity: No data available.
Remarks: No information available except LD_{50}.
Reference: National Technical Information Services AD691-490 (Springfield, VA22161)

5.2 CORROSIVENESS/IRRITATION

5.2.1 SKIN IRRITATION/CORROSION

(a) Species/strain: Rabbit/New Zealand White
Results: Highly corrosive **[ ]**; Corrosive **[ ]**; Highly irritating **[ ]**; Irritating **[ ]**; Moderate irritating **[ ]**; Slightly irritating **[ ]**; Not irritating **[X]**
Classification: Highly corrosive (causes severe burns) **[ ]**; Corrosive (causes burns) **[ ]**; Irritating **[ ]**; Not irritating **[X]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks: The Primary Irritation (P.I.) Score was 0.0 out of a possible 8.0. According to EEC criteria, the substance is not irritating.

Reference: Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

(b) Species/strain: Rabbit
Results: Highly corrosive **[ ]**; Corrosive **[ ]**; Highly irritating **[ ]**; Irritating **[ ]**; Moderate irritating **[ ]**; Slightly irritating **[ ]**; Not irritating **[X]**
Classification: Highly corrosive (causes severe burns) **[ ]**; Corrosive (causes burns) **[ ]**; Irritating **[ ]**; Not irritating **[X]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: USAR solvent LM Acetate (DS-10-52-1), purity: No data available.
Remarks: Not stated.
Reference: Union Carbide Corporation (1961), "Propylene glycol monoethyl ether acetate: (USAR) Solvent LM Acetate", unpublished report.

5.2.2 EYE IRRITATION/CORROSION

(a) Species/strain: Rabbit / New Zealand white
Results: Highly corrosive **[ ]**; Corrosive **[ ]**; Highly irritating **[ ]**; Irritating **[ ]**; Moderate irritating **[ ]**; Slightly irritating **[X]**; Not irritating **[ ]**
Classification: Irritating **[X]**; Not irritating **[ ]**; Risk of serious damage to eyes **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Dow Europe S.A., purity: No data available.
Remarks: PMA caused, moderate conjunctival redness, slight conjunctival swelling, slight discharge, slight iritis and corneal opacity when applied to the eye of female New Zealand white rabbits (not washed). Mean scores for 9 rabbits were, for corneal opacity 0.2, for iris lesions 0.1, for conjunctival redness 0.8 and for chemosis 0.5. All signs of irritation had disappeared after 4 days. According to the results of this study, the substance needs to be labelled as an eye irritant according to the EEC criteria.
Reference: Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

(b) Species/strain: Rabbit
Results: Highly corrosive **[ ]**; Corrosive **[ ]**; Highly irritating **[ ]**; Irritating **[ ]**; Moderate irritating **[X]**; Slightly irritating **[ ]**; Not irritating **[ ]**
Classification: Irritating **[X]**; Not irritating **[ ]**; Risk of serious damage to eyes **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: USAR solvent LM Acetate (DS-10-52-1), purity: No data available.
Remarks: Eye injury, Grade 2.
Reference: Union Carbide Corporation (1961), "Propylene glycol monoethyl ether acetate: (USAR) Solvent LM Acetate", unpublished report.

5.3 SKIN SENSITISATION

(a) Type: Magnusson-Kligman maximization test
Species/strain: Guinea pig/Hartley-Dunkin
Results: Sensitizing **[ ]**; Not sensitizing **[X]**; Ambiguous **[ ]**
Classification: Sensitizing **[ ]**; Not sensitizing **[ ]**
Method: Magnusson-Kligman
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks: The Magnusson-Kigman maximisation test was used.
Reference: Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate (DOWANOL® PGMA): skin sensitization study in the guinea pig", unpublished report.

(b) Type: Magnusson-Kligman maximization test
Species/strain: Guinea pig/Hartley-Dunkin
Results: Sensitizing **[ ]**; Not sensitizing **[X]**; Ambiguous **[ ]**
Classification: Sensitizing **[ ]**; Not sensitizing **[ ]**
Method: Magnusson-Kligman
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Merk, purity: > 99 % by GC.
Remarks: Not stated.
Reference: Zissu D (1995) Contact Dermatitis, 32 74-77.

(c) Type: Other
Species/strain: Guinea pig/Hartley
Results: Sensitizing **[ ]**; Not sensitizing **[X]**; Ambiguous **[ ]**
Classification: Sensitizing **[ ]**; Not sensitizing **[ ]**
Method: Not specified.
GLP: Yes **[ ]** No **[ ]** ? **[X]**
Test substance: Dow Europe S.A. , purity: No data available.
Remarks: Type of test was a modified Maguire test (see Maguire, J Soc Cosmetic Chem, 23, 15l ff, 1973)
Reference: Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute Toxicological properties and industrial handling hazards", unpublished report.

*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: (male) 44 days
(female) From 14 days before mating to day 3 of lactation (41-45days)
Frequency of treatment: One administration/day
Post exposure observation period: None.
Dose: 0, 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 (male)

1,000 mg/kg/day (female)
LOAEL: Not determined under the conditions studied.
Method: OECD combined repeat dose and reproductive/developmental toxicity screening test (OECD TG 422).
Results: A dose of 1,000 mg/kg/day of PMA exerted some effects in both male and female rats. In males, depressions of body weight gain and a tendency for decrease in food consumption were observed. In females, low body weight gain during the premating period at 1,000 mg/kg was also observed. Blood examination revealed decreases in glucose and inorganic phosphorus. An increase in relative weight of the adrenals was also noted. In females, body weight gain was lower than in the control during the premating period. Tissue pathology revealed none of the alteration of tissues at the highest dose group for both sexes.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Kyowa Yuka Ltd., purity: >99.9 %
Remark: None
Reference: Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals vol.6 205-227 (1998)

(b) Species/strain: Rat / Fischer 344
Sex: Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration: Inhalation
Exposure period: Two weeks
Frequency of treatment: Six hours per day for 5 days, followed by a two day rest period, and then 4 days of additional exposure.
Post exposure observation period: None.
Dose: 300, 1,000, 3,000 ppm (1.62, 5.39, or 16.18 mg/L) (nominal)
Control group: Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL: Male : 300ppm (1.62 mg/L), Female : 1,000 ppm (5.39 mg/L)
LOAEL: Male : 1,000ppm (5.39 mg/L), Female : 3,000 ppm (16.18 mg/L)
Results: Haematology and clinical chemistry analyses revealed no changes in diagnostic of an adverse treatment-related effect. However, the kidneys of all male rats and two of five females in the 3,000 ppm (16.18 mg/L)-exposure group appeared to be slightly reticulated at necropsy. Slight renal changes were also observed histologically in all five male rats in the 3,000 ppm (16.18 mg/L)-exposure group and in one of five male rats at the 1,000 ppm (5.39 mg/L). The change noted in these animals was a slight increase in the eosinophilic granularity of the proximal convoluted tubules of the kidneys. At most, observed changes suggest the possibility of a slight effect on renal function of rats in the 1,000 (5.39 mg/L) and 3,000 ppm (16.18 mg/L) group for male and female rats, respectively. A second histologically detectable effect in rats which appeared to be related to exposure to the test material was slight-to-moderate degeneration of olfactory epithelium in the nasal cavities of three of five males and one of five females in the 3,000 ppm (16.18 mg/L)-exposure group.
Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Organic Chemicals, Dow Chemical USA, purity: >98% by GC.

Remark: Histologic evidence of irritation of the olfactory epithelium was reported at the highest concentration. There were no treatment-related changes in the trachea or lungs.
See also: Patty's Industrial Hygiene and Toxicology (1994) p. 2931-2933.
Reference: Miller et al. Toxicol. Appl. Pharm. 75 521-530 (1984)

(c) Species/strain: Rat / Fischer 344
Sex: Female **[ ]**; Male **[X]**; Male/Female **[ ]**; No data **[ ]**
Route of Administration: Inhalation
Exposure period: 4 days
Frequency of treatment: 6 h/day for 4 days ; 3 h/day on 5th day..
Post exposure observation period: None
Dose: 300 ppm (1,620 mg/ m^3), 2,000 ppm (10,800 mg/m^3)
Control group Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL: 300 ppm (1,620 mg/m^3)
LOAEL: 2,000 ppm (10,800 mg/m^3)
Results: One out of four rats exposed to 2,000 ppm (10,800 mg/m^3) showed a very slight effect on the olfactory epithelium.
Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Dow Europe S.A., purity: No data available.
Remark: Whole-body exposures to PMA. Endpoint parameters were respiratory frequency, tidal volume and minute volume.
Reference: Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate: inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

(d) Species/strain: Mouse / B6C3F1
Sex: Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration: Inhalation
Exposure period: Two weeks
Frequency of treatment: Six hours per day for 5 days followed by a two day rest period, and then 4 days of additional exposure.
Post exposure observation period: None.
Dose: 300, 1,000 and 3,000 ppm (1.62, 5.39 or 16.18 mg/L)
Control group: Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL: Not determined under the conditions studied.
LOAEL: 300 ppm (1.62 mg/L)
Results: Haematology and clinical chemistry analyses revealed no changes in diagnostic of an adverse treatment-related effect. The only histopathologic changes in mice, which were attributable to exposure to vapours of PMA, occurred in the nasal cavities. Degeneration of olfactory epithelium was present to some degree in all male and female mice in the 300, 1,000 and 3,000 ppm (1.62, 5.39 or 16.18 mg/L) exposure group. This acute degenerative change occurred in a dose-related manner and was generally more severe and more extensive in animals exposed to 3,000 ppm (16.18 mg/L). An acute

inflammatory exudate present in the lumen of the nasal cavities in the some animals of two higher doses.

Method: Not specified
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Organic Chemicals, Dow Chemical USA, purity: >99 % by GC.
Remark: See also: Patty's Industrial Hygiene and Toxicology (1994) p. 2931-2933.
Reference: Miller et al. Toxicol. Appl. Pharm. 75, 521-530 (1984)

(e) Species/strain: Mouse / B6C3F1
Sex: Female **[ ]**; Male **[X]**; Male/Female **[ ]**; No data **[ ]**
Route of Administration: Inhalation
Exposure period: 4 days
Frequency of treatment: 6 h/day for 4 days ; 3 h/day on 5th day.
Post exposure observation period: No
Dose: 300 ppm (1,620 mg/m^3), 2,000 ppm (10,800 mg/m^3)
Control group: Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOAEL: Not determined under the conditions studied.
LOAEL: 300 mg/m^3 (1,620 mg/m^3)
Results: Respiratory frequency decreased in mice at 2,000 ppm (10,800 mg/m^3).
All mice exposed to 300 ppm (1,620 mg/m^3) or 2,000 ppm (10,800 mg/m^3) had degeneration of olfactory epithelium. Very slight (3 of 4 mice) to slight (1 of 4 mice) olfactory degeneration at 300 ppm (1,620 mg/m^3) and slight (4 of 4 mice) olfactory degeneration at 2,000 ppm (10,800 mg/m^3).
Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: No data available, purity: No data available.
Remark: Whole-body exposures to PMA for 4 days with head-only (3 hr) exposure on 5th day. Endpoint parameters were respiratory frequency, tidal volume and minute volume (5th day).
Reference: Dow Chemical Company (1985) "Propylene glycol monomethyl ether acetate: inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

*5.5 GENETIC TOXICITY IN VITRO

A BACTERIAL TEST

(a) Type: Bacterial reverse mutation assay
System of testing: Salmonella typhimurium strains TA98, TA100, TA1535, TA1537, Escherichia coli WP2 uvr A
Concentration: 0, 0.313, 0.625, 1.25, 2.50, 5.00 mg/plate (without S 9)
0, 0.313, 0.625, 1.25, 2.50, 5.00 mg/plate (with S 9)
Metabolic activation: With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results: Negative.
Cytotoxicity conc: With metabolic activation: Not observed up to 5.00mg/plate (five strains)

Without metabolic activation: Not observed up to 5.00mg/plate (five strains)
Precipitation conc: Not stated.
Genotoxic effects: Negative.

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

Method: OECD Guidelines No.471 and 472
Guidelines for Screening Toxicity Testing of Chemicals (Japan)
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Kyowa Yuka Ltd., purity: >99.9 %
Remarks: For metabolic activation, mammalian metabolic preparations were used (pre-incubation assay).
Reference: Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals vol.6 205-227 (1998)

(b) Type: Bacterial reverse mutation assay
System of testing: Salmonella typhimurium strains TA98, TA100, TA1535, TA1537, TA1538
Concentration: 50, 10, 1.0, 0.1 mg/plate
Metabolic activation: With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results: Negative.
Cytotoxicity conc: With metabolic activation: No data available.
Without metabolic activation: No data available.
Precipitation conc: Data not available.
Genotoxic effects: Negative.

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

Method: Not specified.
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: DOWANOL® PM Acetate, purity: No data available.
Remarks: For metabolic activation mammalian metabolic preparations were used. (pre-incubation assay).
Reference: Dow Chemical Company (1983) "Evaluation of DOWANOL® PM Acetate in the Ames Salmonella/mammalian microsomal mutagenicity assay", unpublished report.

B. NON-BACTERIAL IN VITRO TEST

(a) Type: In vitro Mammalian Chromosome aberration test
System of testing: Chinese hamster lung (CHL/IU) cells
Concentration: 0, 0.33, 0.65, 1.30 mg/mL
Metabolic activation: With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results: PMA did not induce structural chromosomal aberrations and polyploidy up to the maximum concentration of 1.3mg/mL (10 mM), on continuous treatment, and on short-term treatment with and without an exogenous metabolic activation system.
Cytotoxicity conc: With metabolic activation: Not observed up to 1.3mg/mL for 6-hours exposure.

	Without metabolic activation: Not observed up to 1.3mg/mL for 24- and 48- hours exposure.
Precipitation conc:	Not observed.
Genotoxic effects:	Negative.

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

Method:	OECD Guidelines No.473 and Guidelines for Screening Toxicity Testing of Chemicals (Japan).
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Kyowa Yuka Ltd., purity: >99.9 %
Remarks:	Not stated.
Reference:	Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals vol.6 205-227 (1998)

(b) Type:	Unscheduled DNA synthesis
System of testing:	DNA repair in primary cell cultures of rat hepatocytes.
Concentration:	0.1, 0.0316, 0.01, 0.00316, 0.001, 0.000316, 0.0001, 0.0000316 M
Metabolic activation:	With **[ ]**; Without **[X]**; With and Without **[ ]**; No data **[ ]**
Results :	Negative. PMA failed to elicit significant UDS at any of the concentrations tested.
Cytotoxicity conc.:	With metabolic activation: Not applied. Without metabolic activation: PMA was toxic to the hepatocyte cultures at 0.0316 and 0.1M as indicated by detachment of cells and/or a granular appearance.
Precipitation conc.:	Not stated.
Genotoxic effects:	Negative.

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

Method:	OECD 482
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	DOWANOL® PM Acetate, purity: No data available.
Remarks:	Cells metabolically competent. The test substance failed to elicit significant UDS at any of the concentrations tested.
Reference:	Mandrala, A. L. (1983) "Evaluation of DOWANOL® PMAcetate in the rat hepatocyte UDS assay", unpublished report of the Dow Chemical Company.

*5.6 GENETIC TOXICITY IN VIVO

Referral to the PM database.

5.7 CARCINOGENICITY

Referral to the PM database.

*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: (male) 44 days
(female) from 14days before mating to day 3 of lactation(41-45days).
Post exposure observation period: None.
Premating exposure period: male: 14days. , female: 14day
Duration of the test: (male) 44 days
(female) 41-45 days
Doses: 0, 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 (male)
1,000 mg/kg/day (female)
NOAEL F1 Offspring: 1,000 mg/kg/day
Results: PMA did not exert any toxic effects on reproductive parameters including the copulation index, fertility index, gestation length, number of corpora lutea or implantations, implantation index, gestation index, delivery index and behaviour at delivery and lactation. General parental toxicity: A dose of 1,000 mg/kg of PMA exerted some effects in both Male and female rats. In males, depressions of body weight gain and a tendency for decrease in food consumption were observed. Blood chemical examination revealed decreases in glucose and inorganic phosphorus. An increase in relative weight of the adrenals was also noted. In females, body weight gain was lower than in the control during the premating period. Toxicity to offspring: There were no differences between dosed groups and control group in offspring parameters including numbers of offspring or live offspring, sex ratio, live birth index, viability index and body weights. No external or visceral abnormalities related to PMA were detected in any of the offspring.
Method: OECD 422, combined repeat dose and reproductive/developmental toxicity screening test..
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Kyowa Yuka Ltd., purity: >99.9 %
Remarks: Not stated.
Reference: Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals vol. 6 205- 227 (1998).

*5.9 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

Species/strain: Rat / Sprague-Dawley
Sex: Female **[X]**; Male **[ ]**; Male/Female **[ ]**; No data **[ ]**
Route of Administration: Inhalation.
Duration of the test: 21 days
Exposure period: Days 6-15 of gestation
Frequency of treatment: 6 hours/day
Doses: 500, 2,000, 4,000 ppm (2,700, 10,800, 21,600 mg/m^3).
Control group: Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**

NOAEL Maternal Toxicity: 500 ppm (2,700 mg/m^3).
LOAEL Maternal Toxicity: 2,000 ppm (10,800 mg/m^3)
NOAEL Teratogenicity: 4,000 ppm (21,600 mg/m^3).

Results: No teratological or other developmental effects were observed at any dose. Maternal general toxicity: Maternal effects were seen at the two highest doses, e.g. weight gain decreased at 2,000 ppm (10,800 mg/m^3) and 4,000 ppm (21,600 mg/m^3). Pregnancy/litter data: The number of corpora lutea, implantation sites and live foetuses per litter was the same in the exposed groups as that in controls.
Foetal data: There were no differences in the percent of foetuses per litter that were malformed, had variations or were normal.

Method: Not specified.

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

Test substance: Dow Chemical USA, Midland, MI 48674, purity: 99.3 % total PM acetate (97.3% of 2-methoxy-1-methylethyl acetate and 2.0 % of 1-methoxy-2-) methylethyl acetate).

Remarks: Not stated.

Reference: U.S. Army Environmental Hygiene Agency (1989) "Assessment of the developmental toxicity of propylene glycol monomethyl acetate (PM Acetate) in rats".

5.10 OTHER RELEVANT INFORMATION

A. Specific toxicities

Type: No studies located.
Results:
Remark:

B. Toxicodynamics, toxicokinetics

(a) Type: Toxicokinetics

Results: After a single oral dose (8.7 mmol/kg) of ^{14}C-labelled PMA was administered to male F-344 rats; 64% of the radioactivity was eliminated via the lungs as $^{14}CO_2$ and 24% via the urine in a 48 h period. Similarly, 53% of the dose was eliminated via the lungs as CO_2 and 26% via the urine within 48 h after a single 6 h inhalation exposure to 3,000 ppm (16,200 mg/m^3) ^{14}C-labeled PMA. Propylene glycol, propylene glycol monomethyl ether (PM), and its sulfate and glucuronide conjugates were identified as urinary metabolites after po dosing, as well as after inhalation exposure to PMA. However PMA was not detected in urine. The urinary metabolite profile and disposition of ^{14}C-labelled PMA were nearly identical to results previously obtained with PM, indicating that PMA is rapidly and extensively hydrolysed to PM in vivo.

Remark: Metabolism and disposition of PMA is very similar following acute oral or inhalation exposure.

Reference: Miller et al. Toxicol. Appl. Pharm. 75 521-530 (1984)

(b) Type: Toxicokinetics

Results: The blood pharmacokinetics was investigated using propylene glycol methyether (PM) and PMA in male F-344 rats after a single 6 hr dermal exposure. PM or PMA were applied to the dorsal region of the rat at 100 and 1,000 mg/kg. Blood was collected via a jugular cannula prior to dermal application (0 min) and at ~5, 10, 15, 30, and 40 min and 1,2,4, and 6 hr after dermal application. The site of application was washed following 6 hr of exposure initiation. A GC-MS method was used to quantitative PM and PMA in blood from exposed rats. Following dermal application, conclusions based on statistical evaluation of AUC (or AUC normalised to the applied dose) in this study are as follows:

1. The blood AUC of PM is different following a dermal dose (100 or 1,000 mg/kg) of PM as compared with PMA.
2. The AUC for PM is linearly related to dose between the low and high PM dermal exposures.
3. On administration of PMA, the AUC for PM increased linearly between the low and high dose of PMA
4. From this study, the PM AUC resulting from PM application is at least 4-times higher than that resulting from PMA application. Any effects arising from administration of PMA would thus be overestimated by using PM toxicity data in place of PMA data.

Remarks: The American Chemistry Council (ACC) sponsored this study. The American Chemistry Council is funding additional work to further determine and clarify the toxicodynamics of PMA.

Reference: Susan C.J. Sumner, Blood Pharmacokinetics of Propylene Glycol Methyl Ether (PM) and Propylene Glycol Methyether Acetate (PMA) in Male F-344 Rats after Dermal Application, Final Report 98003 (1999).

(c) Type: General Comment.

Results:

Remarks: PMA hydrolyzes rapidly to the corresponding glycol ether, PM (CAS No. 107-98-2). For a fuller appreciation of the toxicological data pertaining to PM, the SIDS Dossier for CAS No. 107-98-2 should be consulted.

Reference: SIDS Dossier for 1-methoxypropan-2-ol (CAS No. 107-98-2) (Sponsor country: USA)

*5.11 EXPERIENCE WITH HUMAN EXPOSURE

(a) Results: At the end of a workweek 23 silkscreen printers gave a urine sample for capillary gas chromatographic analysis for 1,2-propanediol. The mean concentration was 2.52 (S.D. 2.01) mmol mol creatinine-1 (median=1.76, n=23). The urinary excretion of 1,2-propanediol was linearly dependent on the preceding 1-methoxy-2-propanol exposure measured in the worker's breathing zone (y=0.99+0.28x, n=23, r=0.67, where y is the urinary 1,2-propanediol concentration, in mmol mol creatinine-1 and x is the concentration, in cm^3 m^{-3}, of 1-methoxy-2-propanol (90.2%), 1-ethoxy-2-propyl acetate (5.8%), PMA (2.1%) and 1-ethoxy-2-propanol (1.9%) in the air).

Methods: Not specified.

GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substances:	Not specified.
Remarks:	Urinalysis for exposure monitoring in workers'breathing zone.
Reference:	Laitinen J. et al., Journal of Chromatography B, 694 (1) 93-98 (1997)
(b) Results:	Study conducted among 54 silkscreen printers, who gave a urine sample to be analyzed using a capillary gas chromatograph for 2-methoxypropionic acid (2-MPA) and 2-ethoxypropionic acid (2-EPA). The mean urinary concentrations of 2-MPA and 2-EPA were 1.27 (S.D. - 1.60) mmol/mol creatinine (median - 0.53, n - 26) and 1.23 (S.D.- 2.31) mmol/mol creatinine (median - 0.26, n - 39), respectively. The urinary excretion of 2-MPA and 2-EPA immediately after shift was linearly dependent on the preceding technical grade PMA (y = 0.16x + 0.26, n = 26, R2 = 0.78) and technical grade 1-ethoxy-2-propanol acetate (y = 2.05x - 0.09, n = 39, R2 = 0.68) respective exposure, as measured in the workers' breathing zone.
Methods:	Not specified.
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Test substances:	Technical grade and purity not specified.
Remarks:	Urinalysis for exposure monitoring in workers'breathing zone.
Reference:	Laitinen J. Science of the Total Environment, 199 (1-2) 31-39. (1997).

REFERENCES

American Chemistry Council PGE Panel.

American Industrial Hygiene Association ERPG and WEEL Guides, 1996.

Anonymous (1975) Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold.

Anonymous (1985) European Chemical Industry, Ecology and Toxicology Centre, Avenue Louise 250, Box 63, 6050 Bruxelles, Belgium, 19 Apr. 1985. 68p.

Anonymous (1988) Toxikologisch-arbeitsmedizinische Begrundung von MAK-Werten (Maximale Arbeitsplatz-Konzentrationen) 4 p.

Anonymous (1992) Institut national de recherche et de securite, 30 rue Olivier-Noyer, 75680 Paris Cedex 14, France, 1992. 4p.

Asaki A E; Houpt J F (1989) NTIS Technical Report (NTIS/AD-A221 988): 23.

BASF AG (1985) Labour Oekologielabor: Unveroeffentlichte Untersuchung.

BASF AG Safety Data Sheet, 05.04.1994.

BASF CORP (1994). EPA/OTS; Doc #86940000390S. NTIS Order No. NTIS/OTS0572493.

Chemicals Evaluation and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

Daicel Chemical Industries Ltd. (1978). Technical Report No. 78-124.

Daicel Chemical Industries Material Safety Data Sheet, February 1998.

Daicel Chemical Industries Ltd. (2000), unpublished report.

Dangerous Properties of Industrial Materials. 4th ed. New York:, Van Nostrand Reinhold (1975).

Dow Chemical Company (1980), unpublished report (BOD_5, COD, ratio BOD_5/ COD).

Dow Chemical Company (1980)"Evaluation of propylene glycol methylether acetate (PMacetate) in the aquatic environment", unpublished report.

Dow Chemical Company (1980) "DOWANOL® PM Acetate: acute toxicological properties and industrial handling hazards", unpublished report.

Dow Chemical Company (1983) "Evaluation of DOWANOL® PM Acetate in the Ames Salmonella/mammalian microsomal mutagenicity assay", unpublished report.

Dow Chemical Company (1983)"Evaluation of DOWANOL® PMAcetate in the rat hepatocyte unscheduled DNA synthesis assay"unpublished report.

Dow Chemical Company (1985) "Propylene glycol monomethylether acetate: inhalation uptake in rats and effects on respiration in rats and mice", unpublished report.

Dow Chemical Company (1985) "Propylene glycol monomethylether acetate (DOWANOL® PGMA): skin sensitization study in the guinea pig", unpublished report.

Dow Chemical Company (1992). EPA/OTS; Doc #88-920005652. NTIS Order No.: NTIS/OTS0544435.

Dow Chemical Company (1992). EPA/OTS; Doc #88-920009358S. NTIS Order No.: NTIS/OTS0555411.

Dow Chemical Company (1998). EPA/OTS; Doc #86-980000183S. NTIS Order No.: NTIS/OTS0559518.

Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

Dutch expert committee on occupational standards (1993) Directorate-General of Labour, the Netherlands,. RA 5/93, 70 p.

ECETOC working group (1985) ECETOC Technical Report, 17, 66 p.

ECETOC working group (1995) ECETOC Technical Report, 64, 348 p.

Environment Agency of Japan (1998)

Gonsior SJ (1990) “Environmental assessment for glycol ethers”, unpublished report of the Dow Chemical Company.

Gonsior SJ and West RJ (1995) “Biodegradation of glycol ethers in soil”Environ Toxicol and Chem 14(8): 1273-1279.

Laitinen J. et al. (1997), Journal of Chromatography B, 694 (1) 93-98.

Laitinen J. (1997), Science of the Total Environment, 199 (1-2) 31-39.

Lyondell Chemical Company (1989) Material Data Sheet.

MDL Information Systems, Inc. (2000), OHSN OHS00134 MSDS-OHS.

Mandrala, A. L. (1983) “Evaluation of DOWANOL® PMAcetate in the rat hepatocyte UDS assay”, unpublished report of the Dow Chemical Company.

Miller, R.R. et al. (1984) Toxicol Appl Pharm 75, 521-530.

Miller R R (1987) Drug Metab. Rev, 18, 1-22.

Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals vol. 6, 205- 227 (1998).

National Technical Information Services AD691-490 (Springfield, VA22161).

Patty’s Industrial Hygiene and Toxicology (1994) p. 2931-2933.

Rastogi S C (1991) Arch Environ Contam Toxicol, 20 543-547.

Rhone-Poulenc Chimie, Courbevoie Cedex. Sax N. I.(1975) Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold p1065.

SDU Uitgeverij Plantijnstraat, Afdeling Verkoop Publikaties Arbeidsinspectie, Postbus 20014, 2500 EA Den Haag, Netherlands, 1993. 70p.

SIDS Dossier for 1-methoxypropan-2-ol (CAS No. 107-98-2) (Sponsor country: USA)

Susan C.J. Sumner, Blood Pharmacokinetics of Propylene Glycol Methyl Ether (PGME) and Propylene Glycol Methyether Acetate (PGMEA) in Male F-344 Rats after Dermal Application, Final Report 98003 (1999)

VCH, P.O. Box 101161, 6940 Weinheim, Germany; 220 East 23rd Street, New York NY 10010-4606, USA, 1993. v, 389p.

3M CO (1992). EPA/OTS; Doc #88-920004660. NTIS Order No.: NTIS/OTS0537641

TRGS 900 (1993)

Union Carbide Corp. (1994). EPA/OTS; Doc #86940001887. NTIS Order No.: NTIS/OTS0557477.

Union Carbide Corporation (1961), “Propylene glycol monoethylether acetate: (USAR) Solvent LM Acetate”, unpublished report.

U.S. Army Environmental Hygiene Agency (1989) “Assessment of the developmental toxicity of propylene glycol monomethyl acetate (PM Acetate) in rats”, unpublished report.

Zissu D (1995) Contact Dermatitis, 32 74-77.

Appendix 1 Parameters used in calculation of distribution by Mackay level III fugacity model.

Physico-chemical parameter

Chemical		PMA	
Molecular weight		132.18	measured
Melting point [℃]		-10	measured
Vapour pressure [Pa]		3.73E+02	measured
Water solubility [g/m3]		100000	measured
log Kow		0.36	measured
Half life [h]	In air	150	estimated
	In water	360	estimated
	In soil	12	estimated
	In sediment	360	estimated

Temp. [℃]	25

Intermedia Transport Parameter [m/h]

air side air-water MTC	5
water side air-water MTC	0.05
rain rate	1E-04
aerosol deposition	6E-10
soil air phase diffusion MTC	0.02
soil water phase diffusion MTC	1E-05
soil air boundary layer MTC	5
sediment-water MTC	1E-04
sediment deposition	5E-07
sediment resuspension	2E-07
soil water runoff	5E-05
soil solid runoff	1E-08

Environmental parameter

		volume [m^3]	depth [m]	area [m^2]	organic carbon content [-]	lipid content [-]	density [kg/m^3]	residence time [h]
bulk air	air	1E+13					1.2	100
	particles	2E+03						
	total	1E+13	1000	1E+10				
bulk water	water	2E+10					1000	1000
	particles	1E+06			0.04		1500	
	fish	2E+05				0.05	1000	
	total	2E+10	10	2E+09				
bulk soil	air	3.2E+08					1.2	
	water	4.8E+08					1000	
	solid	8E+08			0.04		2400	
	total	1.6E+09	0.2	8E+09				
bulk sediment	water	8E+07					1000	
	solid	2E+07			0.06		2400	50000
	total	1E+08	0.05	2E+09				

Theoretical distribution of PMA

scenario	emission rate [kg/h]			fugasity [Pa]				conc. [g/m³]			
case	b. air E_1	b. w.E_2	b. soilE_3	b.air f_1	b,w. f_2	b.soil f_3	b.sed. f_4	b.airC_1	b.w. C_2	b.soilC_3	b.sed.C_4
1	1000	0	0	1.2E-04	4.2E-06	3.3E-06	2.3E-06	6.2E-06	1.1E-03	3.0E-04	5.1E-04
2	0	1000	0	3.7E-06	6.2E-05	1.1E-07	3.4E-05	2.0E-07	1.7E-02	9.7E-06	7.6E-03
3	0	0	1000	4.4E-07	7.8E-07	1.2E-04	4.3E-07	2.4E-08	2.1E-04	1.1E-02	9.5E-05
4	600	300	100	7.1E-05	2.1E-05	1.4E-05	1.2E-05	3.8E-06	5.7E-03	1.2E-03	2.6E-03

scenario	amount [kg]	amount			total	trasformation rate by reaction [kg/h]				trasformation rate by advection [kg/h]		
case	b. air m_1	b. w. m_2	b. soil m_3	b.sed. m_4	[kg]	b. air R_1	b. w. R_2	b.soil R_3	b.sed. R_4	b. air A_1	b. w. A_2	b.sed. A_4
1	6.2E+04	2.2E+04	4.8E+02	5.1E+01	8.5E+04	2.9E+02	4.3E+01	2.8E+01	9.8E-02	6.2E+02	2.2E+01	1.0E-03
2	2.0E+03	3.3E+05	1.6E+01	7.6E+02	3.3E+05	9.2E+00	6.4E+02	9.0E-01	1.5E+00	2.0E+01	3.3E+02	1.5E-02
3	2.4E+02	4.2E+03	1.7E+04	9.5E+00	2.1E+04	1.1E+00	8.0E+00	9.8E+02	1.8E-02	2.4E+00	4.2E+00	1.9E-04
4	3.8E+04	1.1E+05	2.0E+03	2.6E+02	1.5E+05	1.7E+02	2.2E+02	1.2E+02	5.0E-01	3.8E+02	1.1E+02	5.2E-03

scenario	amount [kg]	amount			total	% to total			
case	b. air m_1	b. w. m_2	b. soil m_3	b.sed. m_4	[kg]	b. air	b. w.	b. soil	b.sed.
1	6.2E+04	2.2E+04	4.8E+02	5.1E+01	8.5E+04	73.30	26.31	0.57	0.06
2	2.0E+03	3.3E+05	1.6E+01	7.6E+02	3.3E+05	0.60	99.90	0.00	0.23
3	2.4E+02	4.2E+03	1.7E+04	9.5E+00	2.1E+04	1.10	19.41	79.49	0.04
4	3.8E+04	1.1E+05	2.0E+03	2.6E+02	1.5E+05	24.84	74.24	1.31	0.17

scenario	transport rate between spheres [kg/h]						
case	air→ water	water→ air	air→ soil	soil→ air	soil→ water	water→ sed.	sed.→ water
1	6.7E+01	2.2E+00	2.8E+01	9.7E-02	3.5E-01	2.2E-01	1.2E-01
2	2.2E+00	3.2E+01	9.1E-01	3.1E-03	1.1E-02	3.3E+00	1.8E+00
3	2.5E-01	4.1E-01	1.1E-01	3.4E+00	1.2E+01	4.2E-02	2.3E-02
4	4.1E+01	1.1E+01	1.7E+01	4.0E-01	1.4E+00	1.1E+00	6.3E-01

PROPOSED ROBUST SUMMARY for

1-Methoxy-2-propanol acetate

CAS No. 108 - 65 - 6

Sponsor Country: Japan

DATE: October 2, 2000

PHYSICAL/CHEMICAL ELEMENTS

MELTING POINT

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Wako Pure Chemical Industries, Lot No. WTP4494, Purity: > 99.7%, Impurity: water; 0.01 %. Stability during use confirmed by IR spectrometry. Kept at room temperature in desiccator until use.

METHOD

- **Method/guideline:** Other (JIS K 0065-1966, Japan)
- **GLP:** Yes.
- **Year:** 1998.
- **Remarks:** Not stated.

RESULTS

- **Melting point value:** < -10 °C (263 K).
- **Decomposition:** Not stated.
- **Sublimation:** Not stated.
- **Remarks:** Not stated.

CONCLUSIONS

Melting point is < -10°C (263 K).

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Well conducted study, carried out by Chemicals Evaluation and Research Institute (Kurume, Japan).

REFERENCES (Free Text)

Chemicals Evaluation and Research Institute (Kurume, Japan) Report No. 8(2)3144K (1998).

OTHER

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

BOILING POINT

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Unavailable.

METHOD

- **Method:** ASTM D 86
- **GLP:** Not stated.
- **Year:** 1980
- **Remarks:** Not stated.

RESULTS

- **Boiling point value:** 145.8°C
- **Pressure:** 1,013
- **Pressure unit:** hPa
- **Decomposition:** Not stated.
- **Remarks:** Not stated.

CONCLUSIONS

Boiling point is 145.8 °C at 1,013hPa.

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Not stated.

REFERENCES

Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

OTHER

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

VAPOR PRESSURE

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Unavailable.

METHOD

- **Method:** Twin ebulliometry
- **GLP:** Not stated.
- **Year:** 1980
- **Remarks:** The experimental data obtained was regressed to the Antoine equation.

RESULTS

- **Vapor Pressure value:** 3.7 hPa (2.8 Torr)
- **Temperature:** 20 °C
- **Decomposition:** Not stated.
- **Remarks:** Not stated.

CONCLUSIONS

Vapor pressure is 3.7 hPa (2.8 Torr) at 20 °C

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Not stated.

REFERENCES

Dow Europe S.A. Horgen, Switzerland (July 1993, revised February 2000): DOWANOL® PMA Master Safety Data Sheet.

OTHER

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

PARTITION COEFFICIENT

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Wako Pure Chemical Industries, Lot No. WTP4494, Purity: > 99.7%, Impurity: water; 0.01 %. Stability during use confirmed by IR spectrometry. Kept at room temperature in desiccator until use.

METHOD

- **Method/guideline:** OECD TG107.
- **GLP:** Yes.
- **Year:** 1998.
- **Remarks field for Test Conditions** Not stated.

RESULTS

- **Log P_{ow} :** 0.36
- **Temperature:** 25°C ±1°C
- **Remarks:** Test condition: Test was conducted in duplicate under the following three conditions. Test chemical was analyzed by gas chromatography.

Test condition	**Condition-1**	**Condition-2**	**Condition-3**
1-Octanol saturated with water	5 mL	10 mL	20 mL
Water saturated with 1-octanol	30 mL	25 mL	15 mL
Test chemical in 1-octanol saturated with water (4.78 mg)	5 mL	5 mL	5 mL

Test results	**Log Pow**		
	a	**b**	**Mean ±SD**
Condition-1	0.31	0.34	
Condition-2	0.34	0.37	0.36 ± 0.04
Condition-3	0.43	0.36	

CONCLUSIONS

Log P_{ow} is 0.36.

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Well conducted study, carried out by Chemicals Evaluation and Research Institute (Kurume, Japan).

REFERENCES

Chemicals Evaluation and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

OTHER

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

WATER SOLUBILITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks**: Source: Wako Pure Chemical Industries, Lot No. WTP4494, Purity: > 99.7%, Impurity: water; 0.01 %. Stability during use confirmed by IR spectrometry. Kept at room temperature in desiccator until use.

METHOD

- **Method:** OECD TG 105 (flask method).
- **GLP:** Yes.
- **Year:** 1998.
- **Remarks:** Not stated.

RESULTS

- **Value:** >100 g/L at 25 °C±1°C
- **Description of solubility:** Very soluble
- **pH value:** No dissociation group.
- **pKa value:** There is no pertinent functional group.
- **Remarks:** Not stated.

CONCLUSIONS

This chemical is very soluble in water.

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Well conducted study, carried out by Chemicals Evaluation and Research Institute (Kurume, Japan).

REFERENCES

Chemicals Evaluation and Research Institute (Kurume, Japan), Report No. 8 (2) 3144K (1998).

OTHER

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

ENVIRONMENTAL FATE AND PATHWAYS ELEMENTS

STABILITY IN WATER

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Wako Pure Chemical Industries, Lot No. WTP4494, Purity: > 99.7 %, Impurity: water; 0.01 %. Stability during use confirmed by IR spectrometry. Kept at room temperature in desiccator until use.

METHOD

- **Method/guideline:** OECD TG111
- **Type :** Hydrolysis as a function of pH
- **GLP:** Yes
- **Year:** 1998
- **Remarks:** No hydrolysis of test chemical was observed at pH 4 and pH 7 at 50°C ±1°C for 5 days. Hydrolysis rates at pH 9 were determined at 60, 70 and 80 °C, and they were extrapolated to 25 °C using Arrhenius relationship. Half life at 25 °C was calculated from the rate constant.

RESULTS

- **Nominal:** ca. 970 mg/L
- **Measured value:** Not stated.
- **Degradation:** No hydrolysis occurred in 5 days, at 50 °C at pH 4 and 7. At pH 9, test chemical was hydrolysed at all temperatures studied.
- **Half-life ($t_{(1/2)}$):** At pH 9, rate constant was calculated as 3.57×10^{-3}. By extrapolating against temperature, half-life at 25 °C was calculated to be 8.10 days.
- **Breakdown products:** Not stated.
- **Remarks:** Not stated.

CONCLUSIONS

This chemical is stable to chemical hydrolysis in aqueous water at pH 4 and 7 under the condition studied, but it is hydrolysed at pH 9 and 25 °C with half-life of 8.10 days.

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Well conducted study, carried out by Chemicals Evaluation and Research Institute (Kurume, Japan).

REFERENCES

Chemicals Evaluation and Research Institute (Kurume, Japan) (1998), Report No. 8 (2) 3144K.

OTHER

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

TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS (FUGACITY)

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Not applicable.

METHOD

- **Test :** Calculation
- **Method :** Fugacity level III
- **Year :** 2000
- **Remarks :** The parameters used are shown in Appendix.

RESULTS

- **Media :**
- **Estimated Distribution under three emission scenarios :**

Compartment	Release100 % to air	Release 100 % to water	Release 100 % to soil
Air	73.30 %	0.60 %	1.10 %
Water	26.31 %	99.90 %	19.41 %
Soil	0.57 %	0.00 %	79.49 %
Sediment	0.06 %	0.23 %	0.04 %

- **Remarks:** PMA is biodegraded to PM, which, in turn, is degraded to carbon dioxide. Biologically mediated hydrolysis is the predominant pathway in the primary degradation step.

CONCLUSIONS

If this chemical is released into water, the majority of PMA is expected to stay in water, but if it is released into air and/or soil, it is likely to be distributed in other compartments.

DATA QUALITY

- **Reliabilities:** Key study.
- **Remarks:** Not stated.

REFERENCES

Daicel Chemical Industries Ltd. (2000), unpublished report.

OTHER

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

BIODEGRADATION

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Dow Chemical Company, Lot. No. Unavailable. Purity 99.7%.

METHOD

- **Method/guideline:** OECD TG301F
- **Test Type:** Aerobic
- **GLP:** Yes
- **Year:** 1998
- **Contact time:** 28 days
- **Inoculum:** The inoculum consisted of activated sludge mixed liquor collected from the Midland Municipal Wastewater Treatment Plant (Midland, Michigan, USA). The mixed liquor was collected on the day prior to initiation of the test and continuously aerated to allow minimization of residual dissolved organic carbon. Prior to inoculation of the mineral medium, the average mixed liquor suspended solids (MLSS) concentration was determined to be 2,810 mg/L. Based on this determination, 12 litters of sterile mineral medium were inoculated with 128 mL of the mixed liquor to yield a final MLSS concentration of 30mg/L. The pH of the inoculated mineral medium was determined to be 7.4, which is within the OECD required range of 7.2-7.6.
- **Remarks:** Oxygen consumption and CO_2 evolution resulting from biodegradation of the compounds were measured over 28-day test period using a Columbus Instruments MicroOxymax respirometer system. In addition, removal of dissolved organic carbon (DOC) was determined at the beginning of the test (day 0) and after 28 days.
  The biodegradation reactions were maintained in a darkened room at a temperature of 22 ±1°C. The reactions were continuously stirred by magnetic stir bars at 150 r.p.m. over the 28-day test period.

RESULTS

- **Degradation:**

Test and Reference Material Biodegradation *(D_{O2}) Relative to the 10-day Biodegradation Window

Test material	Time to achieve (Days)		D_{O2} at	
	10% D_{O2}	60% D_{O2}	10-day window**	Day 28
Benzoate	0.7	2.6	102	107
PMA	1.3	5.9	83	96

*** : The % degradation (D_{O2}) at each sample interval was determined by dividing the BOD by the theoretical oxygen demand (ThOD) for each reaction as follows: D_{O2} =(BOD/ThOD)*100**

**** : the % degradation occurring at the end of 10-day window**

Removal of DOC and Mineralization to CO_2 in Biodegradation Test Reactions after 28 Days

Test material	*Ave. DOC (mg/L)		*Ave. D_{DOC} (%)	Ave. D_{CO2} (%)
	Initial	Final	Removal	
Benzoate	52.3	2.0	96	82
PMA	27.8	0.2	99	90

*** : Results are collected for corresponding blank values**

- **Results:** Readily biodegradable.

- **Kinetic:**

Percent Biodegradation of PMA

	*Percent degradation											
	5.0		10.0		15.0		20.0		25.0		28.0 (days)	
	D_{O2}	D_{CO2}	D_{O2}	D_{CO2}	D_{O2}	D_{CO2}	D_{O2}	D_{CO2}	D_{O2}	D_{CO2}	D_{O2}	D_{CO2}
PMA	27	22	81	64	90	78	101	89	100	93	96	90

*** : Data represents averages of duplicate reaction vessels.**

- **Breakdown products:** Not stated.
- **Remarks:** The average oxygen consumption in the inoculum blank reactions reached a maximum level of 55 mg/L after 28 days. This value is below the maximum allowable 60 mg/L for Method 301F.

CONCLUSIONS

This chemical is readily biodegradable.

DATA QUALITY

- **Reliabilities:** Key study
- **Remarks:** Well conducted study, carried out by Dow Chemical Company.

REFERENCES

Dow Chemical Company (1998). EPA/OTS; Doc #86-980000183S. NTIS Order No.: NTIS/OTS0559518.

OTHER

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

ECOTOCICITY ELEMENTS

ACUTE TOXICITY TO FISH

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks**: Source: Wako Pure Chemical Industries, Lot No. WTH5725, Purity > 97.0 %, Vapor pressure: 0.5 kPa (25 °C), Stability during use confirmed by gas chromatography. Kept at room temperature in a dark place until use.

METHOD

- **Method/guideline followed:** OECD TG 203
- **Type:** Semi-static.
- **GLP :** Yes.
- **Year :** 1998.
- **Species/Strain/Supplier:** *Oryzias latipes* (Medaka): Obtained from commercial domestic hatcheries.
- **Analytical monitoring** Yes. Test solutions were measured by gas chromatography before and after 24 hours exposure period. Test solutions were replaced every 24 hours to new ones.
- **Exposure period (h):** 96
- **Statistical methods:** Not applicable because of no fatality.
- **Remarks field for Test Conditions:**
  - Test fish: Acclimated for more than 12 days before testing; any groups showing no mortality for 7 days before test started. Fish with 22.1 mm (18.3~23.8 mm) in length were selected at random. Average body weight of fish was 0.1462 g (n=10).
  - Test conditions: ·Details of test: Semi-static (water changed every 24 hours)
    ·Dilution water source: Tap water after dechlorinated by passing through activated carbon.
    ·Dilution water chemistry: Hardness: 25 mg/L as $CaCO_3$; pH: 6.7
    ·Stock and test solution and how they are prepared: Pipette or pour the appropriate amount of the solution (0.3 wt% of test chemical) into the test waters.
    ·Concentrations dosing rate, flow-through rate, in what medium: Concentrations of 0, 9.5, 17.1, 30.9, 55.6, 100 mg/L were tested.
    ·Vehicle/solvent and concentrations: Not used.
    ·Stability of the test chemical solutions: Stable, no precipitate and colour formed during 96 h exposure period.
    ·Exposure vessel type: 10 fish per group in 3L glass beaker without aeration under room light.
    ·Number of replicates, fish per replicate: One replicate was done.
    ·Water chemistry in test (O_2, pH) in the control and one concentration where effects were observed: Dissolved oxygen readings and pH values were taken daily during 96 h exposure period.
    ·Dissolved oxygen concentration: 5.6~9.1 mg/L.
    ·pH values: 6.6~7.0.
  - Test temperature range:

·Water temperature at 23.6~23.9°C.

– Method of calculating mean measured concentrations:
·Geometric mean.

RESULTS

- **Nominal concentrations :**
0, 9.5, 17.1, 30.9, 55.6, 100 (mg/L)
- **Measured concentrations :**
< 0.5, 8.7, 16.0, 29.6, 52.1, 100.1 (mg/L) (0 hr)
< 0.5, 8.3, 15.8, 28.3, 51.6, 96.2 (mg/L) (24 hr)
- **Unit :** mg/L.
- **Element value:** LC_{50} at 96 hours >100.0 mg/L based on nominal concentrations.
- **Statistical results as appropriate:** Not applied.
- **Remarks field for Results:**

– Biological observations: Not described.
– Table showing cumulative mortality:

Percent mortality of Oryzias latipes exposed to the test chemical

Nominal concentration (mg/L)	Cumulative number of dead fish (% mortality)			
	24 hour	**48 hour**	**72 hour**	**96 hour**
Control	0(0)	0(0)	0(0)	0(0)
9.5	0(0)	0(0)	0(0)	0(0)
17.1	0(0)	0(0)	0(0)	0(0)
30.9	0(0)	0(0)	0(0)	0(0)
55.6	0(0)	0(0)	0(0)	0(0)
100	1(10)	2(20)	2(20)	2(20)

– Lowest test substance concentration causing 100% mortality:
Not obtained under the test conditions studied.
– Mortality of controls: No mortality observed during test period.
– Abnormal responses: At 48 hr, one fish showed abnormal swimming behaviour at 100.0 mg/L.
– Reference substances (if used) – results:
Copper(II)sulfate pentahydrate. LC_{50} at 96h was 0.43 mg/L.
– Any observations, such as precipitation that might cause a difference between measured and nominal values: No precipitates and colour formation by the test chemical.

CONCLUSIONS

Remarks field with the ability to identify source of comment, i.e. author and/or submitter:

DATA QUALITY

- **Reliabilities:** Klimisch Code: 1=reliable without restrictions.
Remarks field for Data Reliability:
Experimental design and analytical procedure were well documented.

REFERENCES

Environment Agency of Japan (1998).

OTHER

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

PROLONGED TOXICITY TO FISH

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks**: Source: Wako Pure Chemical Industries, Lot No. WTH5725, Purity > 97.0 %, Vapor pressure: 0.5 kPa (25 °C), Stability during use confirmed by gas chromatography. Kept at room temperature in a dark place until use.

METHOD

- **Method/guideline followed :** OECD TG 204
- **Type :** Flow-through.
- **GLP:** Yes.
- **Year :** 1998.
- **Species/Strain/Supplier:** *Oryzias latipes* (Medaka): Obtained from commercial domestic hatcheries.
- **Analytical monitoring:** Yes. Test solutions were measured by gas chromatography before and after 7 and 14days exposure period.
- **Exposure period :** 14 day.
- **Statistical methods:** Binomial method (TOXDAT MULTI-METHOD PROGRAM, USEPA) Dunnet method were used for LC_{50} and for fish body weight difference, respectively.
- **Remarks field for Test Conditions:**

  – Test fish:

  Acclimated for more than 12 days before testing; any groups showing no mortality for 7 days before test started. Fish with 22.2 mm (20.3~24.8 mm) in length were selected at random. Average body weight of fish was 0.1662 g (0.1170~0.2050 g)(n=10). Fish were starved for 24 hours before the test started.

  – Test conditions:

  ·Details of test: Flow-through.
  ·Dilution water source: Tap water after dechlorinated by passing through activated carbon.
  ·Dilution water chemistry: Hardness: 25 mg/L as $CaCO_3$; pH: 6.7
  ·Stock and test solution and how they are prepared: The working solution (0.2 wt% of test chemical) was prepared by diluting the stock solution (4 wt% of test chemical) with the dilution water. The test solution was supplied continuously by mixing the working solution and the dilution water with the help of a mechanically operated quantitative water-pump.
  ·Concentrations dosing rate, flow-through rate, in what medium: Nominal concentrations of 0, 30.9, 55.6 and 100 mg/L were tested.
  ·Vehicle/solvent and concentrations: Not used.
  ·Stability of the test chemical solutions: Stable, no precipitate and colour formed during the exposure period.
  ·Exposure vessel type: 10 fish per group in 3L glass beaker without aeration under room light.

·Number of replicates, fish per replicate: One replicate was done.
·Water chemistry in test (O_2, pH) in the control and one concentration where effects were observed: Dissolved oxygen readings and pH values were taken every 2~3 days during the exposure period.
·Dissolved oxygen concentration: 6.2~8.0 mg/L.
·pH values: 6.6~7.0.

– Test temperature range:
·Water temperature at 23.2~24.1°C (24±2°C).

– Method of calculating mean measured concentrations:
·Geometric mean.

RESULTS

- **Nominal concentrations :** 0, 30.9, 55.6, 100 (mg/L)
- **Measured concentrations :**

Measured concentration of the test chemical during a 14-day exposure of orange killifish (Oryzias latipes) under flow-through test conditions

Nominal concentration (mg/L)	Measured concentration (mg/L) (percent of nominal)			
	0 day	7 day	14 day	Mean
Control	< 0.5	< 0.5	< 0.5	--
30.9	27.0(87.4)	19.9(64.4)	22.5(72.8)	23.1(74.9)
55.6	51.8(93.2)	45.0(80.9)	45.6(82.0)	47.5(85.4)
100	95.3(95.3)	85.1 (85.1)	74.7(74.7)	85.0(85.0)

- **Unit :** mg/L.
- **Element value:**

LC_{50} (7 days) = 85mg/L (measured concentration)
LC_{50} (14 days) = 63.5mg/L (measured concentration)
NOEC (14 days) = 47.5 mg/L (measured concentration)

- **Statistical results as appropriate:**

The mean body weight of fish exposed to the concentrations at 23.1 mg/mL (measured) and 47.5 mg/mL (measured) of the test chemical was not significantly different from controls during the test period (alfa=0.05, Dunnet).

– Calculated LC_{50} values for fish exposed to the test chemical under flow-through test conditions.

Exposure period (day)	LC_{50} (mg/L)	95 % Confidence limits	Statistical method
7	85.0	47.5～	Binominal
14	63.5	47.5～85.0	Binominal

- **Remarks field for Results.:**

  - Biological observations: Not described.
  - Cumulative mortality:

Percent mortality of Oryzias latipes exposed to the test chemical under flow-through test conditions

Measured conc. (mg/L)	Cumulative number of dead fish (% mortality)														
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14 (days)**
Control	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(10)	1(10)	1(10)	1(10)	1(10)
23.1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
47.5	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
85.0	0(0)	1(10)	1(10)	1(10)	2(20)	3(30)	3(30)	5(50)	6(60)	7(70)	7(70)	8(80)	8(80)	8(80)	10(100)

– Fish weight:

Measured conc. (mg/L)	Fish weight (g)										
	No.1	**No.2**	**No. 3**	**No.4**	**No.5**	**No.6**	**No.7**	**No.8**	**No.9**	**No.10**	**Average**
Control	0.1395	0.1868	0.1574	0.1410	0.1736	0.1363	0.1755	0.1828	0.1421	nd	0.1594
23.1	0.1626	0.2312	0.2335	0.1530	0.2006	0.1327	0.2066	0.2065	0.1471	0.1905	0.1864
47.5	0.1472	0.1991	0.1693	0.2758	0.1631	0.0988	0.1349	0.1252	0.1782	0.1428	0.1634
85.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	--

nd: No measurement was made because fish was dead.

– Lowest test substance concentration causing 100% mortality: 85.0 mg/mL (measured).
– Mortality of controls: 10 % mortality observed during the test period (10 through 14 days).
– Food intake: Fish was fed with TetraMin® fish food (2 % of fish body weight). At measured concentration of 85.0 mg/mL, reduction of food intake was observed.

– Abnormal responses: At measured concentration of 85.0 mg/mL, fish showed abnormal respiration, abnormal behaviour and loss of swimming ability. No abnormal behaviour was not observed at 23.1 mg/mL (measured), 47.5 mg/mL (measured) and controls.
– Reference substances (if used) – results: Copper (II) sulfate pentahydrate. LC_{50} at 96h was 0.43 mg/L.
– Any observations, such as precipitation that might cause a difference between measured and nominal values: No precipitates and colour formation by the test chemical.

CONCLUSIONS

Remarks field with the ability to identify source of comment, i.e. author and/or submitter:

DATA QUALITY

- **Reliabilities:** Klimisch Code: 1=reliable without restrictions.
- **Remarks field for Data Reliability:** Experimental design and analytical procedure were well documented.

REFERENCES

Environment Agency of Japan (1998).

OTHER

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

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

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Wako Pure Chemical Industries, Lot No. WTH5725, Purity > 97.0 %, Vapor pressure: 0.5 kPa (25 °C), Stability during use confirmed by gas chromatography. Kept at room temperature in a dark place until use.

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.
- **Exposure period:** 72 h.
- **Analytical monitoring:** Yes, measured by gas chromatography at start and end of the test (72hr).
- **Statistical methods:** Bartlett test for homogeneity in variances and One-way Anova (EcoTox- Statistics Ver.1.0beta R1.4) were used for EC_{50}, LC_{50} and NOEC determination (p=0.05).

Remarks field for Test Conditions :

–Test organisms
·Laboratory culture: OECD medium
·Method of cultivation: Shaking at 100rpm
·Controls: OECD medium. EC_{50} of potassium dichromate was 0.41 mg/L.

–Test Conditions
·Test temperature range: 23±2 °C
·Growth/test medium: OECD medium.
·Shaking: 100 rpm
·Dilution water source: OECD medium.
·Exposure vessel type: 100 mL OECD medium in a 300 Ml Erlenmeyer flask with a silicon cap which allows ventilation.
·Water chemistry in test (pH) in at least one replicate of each concentration (at start and end of the test): pH=7.4-7.5 at start and 7.0-9.4 at end of the test (72 h).
·Stock solutions preparation : No stock solution was prepared. Test chemical was diluted to 2.0 wt.% with OECD medium and sterilised with filter before use.
·Light levels and quality during exposure: 4,000-5,000 lux, continuous illumination.

–Test design:
·Number of replicates: Triplicate
·Concentrations: 0,95, 171, 309, 556 and 1,000 mg/L
·Initial cell number in cells/mL: $1x10^4$

–Method of calculating mean measured concentrations:
·Geometric mean.

RESULTS

- **Nominal concentrations :**
  0, 95, 171, 309, 556 and 1,000 (mg/L)
- **Measured concentrations :**
  At start of the test (0 hr), <0.5, 93.4, 167.8, 305.4, 533.8, 995.0 (mg/L)
  At end of the test (72 hr), <0.5, 81.5, 145.0, 266.8, 466.1, 863.3 (mg/L)
- **Unit :** Cell density (cells/mL)
- **Results:** (calculated based on nominal concentrations)
  (1) Growth inhibition (comparison of area under growth curve)
  EC_{50} (0-72 h) > 1,000 mg/L
  NOEC (0-72 h)> 1,000 mg/L
  (2) Growth inhibition (comparison of growth rates)
  EC_{50} (24-48) > 1,000 mg/L
  EC_{50} (24-72) > 1,000 mg/L
  NOEC (24-72) > 1,000 mg/L
- **Was control response satisfactory:**
  Yes: Mean cell density increased to $2.25x10^6$ cells/mL (225-fold increase) after 72 hr.
- **Statistical results as appropriate:**
  Significant difference in the growth curve was not observed between values at 1,000 mg/L and in control.

Remarks field for Results:

–Biological observations

·Cell density at each flask at each measuring point:

Nominal Concentration (mg/L)	Cell Density ($x10^4$ cells/mL)			
	0 hr	24 hr	48 hr	72 hr
Control	1.0 ± 0.00	9.4 ± 0.84	62.8 ± 25.82	224.6 ±45.58
95	1.0 ± 0.00	15.5 ±6.63	42.8 ± 4.49	229.4 ±7.67
171	1.0 ± 0.00	8.7 ± 1.39	44.7 ± 2.18	211.7 ±25.87
309	1.0 ± 0.00	11.7 ± 8.63	46.7 ± 16.28	232.5 ±10.34
556	1.0 ± 0.00	7.2 ±1.18	40.7 ± 2.21	224.1 ±16.55
1,000	1.0 ± 0.00	5.8 ± 0.88	37.7 ± 14.69	209.6 ±13.89

(Each value represents the mean of three sample counts.)

·Growth curves: Logarithmic growth until end of the test (72 h).

·Percent biomass/growth rate inhibition per concentration: Not described.

·Observations:All test groups (95-1,000 mg/L) showed normal and similar growth to that of control (210-232-fold increase after 72 hr).

CONCLUSIONS

Remarks field with the ability to identify source of comment, i.e. author and/or submitter:

DATA QUALITY

- **Reliabilities:** Klimisch Code: 1=reliable without restrictions.
- **Remarks field for Data Reliability:**
  Experimental design and analytical procedure were well documented.

REFERENCES

Environment Agency of Japan (1998).

OTHER

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

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

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Wako Pure Chemical Industries, Lot No. WTH5725, Purity > 97.0 %, Vapor pressure: 0.5 kPa (25 °C), Stability during use confirmed by gas chromatography. Kept at room temperature in a dark place until use.

METHOD

- **Method/guideline:** OECD TG 211 (revised edition of No.202).
- **Test type:** Semi-static.
- **GLP :** Yes.
- **Year :** 1998.
- **Analytical procedures:** Yes. Measured by gas chromatography 2-3 times a week (before and after the replacement of the test water.
- **Species/Strain:** *Daphnia magna*
- **Test details:** Semi-static (water renewal: 3 times a week), open-system.
- **Statistical methods:** F & t-test (Yukms StatLight #3).

Remarks field for Test Conditions :

–Test organisms:

·Source, supplier, any pretreatment, breeding method: Supplied by NIES (Japan).
·Age at study initiation: Juveniles within 24h old.
·Control group: Yes.

–Test conditions

·Stock solutions preparation and stability: No solvent used. Test chemical was diluted to 1.0 wt.% with diluting water (Elendt M4) before use.
·Test temperature range: 19.4-20.8 °C (average temperature 21°C).
·Exposure vessel type: 80 mL test solution in a 100 ml glass beaker; 4 beakers per treatment
·Dilution water source: Dechlorinated tap water
·Dilution water chemistry: Hardness: 236-251 mg/L as $CaCO_3$
·Lighting: <1,200 lx, 16h:8h light-darkness cycle
·Water chemistry in test: DO= 7.4-8.6 mg/L; pH=7.2-7.8.
·Feeding: *Chlorella vulgaris*, 0.1-0.2 mgC/day/individual

– Element (unit) basis: Mean cumulative numbers of juveniles produced per adult (reproduction)
– Test design: Number of replicates=10; individuals per replicate=10; concentrations: 0 and 100 mg/L, because 48h-EiC_{50} for parent Daphnia (Acute immobilization test) was 373 mg/L.

–Method of calculating mean measured concentrations:

Geometric mean.

–Exposure period: 21 d

–Analytical monitoring: By GC analysis. 88.6-99.9% of the nominal concentration at preparation; 83.3-92.2% just before the renewal of the test water (after 2 days exposure).

RESULTS

- **Nominal concentrations:** 0, 100 mg/L
- **Measured concentrations:**

Time-weighted means of measured concentration of test chemical during 21-d exposure (92 mg/L for test solutions).

Measured concentration of test chemical during 21-day exposure

Nominal concentration	Measured concentration (mg/L)					
(mg/L)	0 day (new)	2 day (old)	7 day(new)	9 day(old)	14day(new)	16day(old)
Control	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
100	88.6	92.2	99.9	83.3	97.9	90.9

new: Freshly prepared test solutions.
old: Test solution after 2 days.

- **Unit :** mg/L

·NOEC (21-d, reproduction) : ≥100 mg/L,
·EC_{50} (14-d, reproduction) : >100 mg/L ,
·EC_{50} (21-d, reproduction) : >100 mg/L ;
·LC_{50} for parental *Daphnia* (14-d) : >100 mg/L,
·LC_{50} for parental *Daphnia* (21-d) : >100 mg/L; calculated based on nominal concentrations.

Mean cumulative numbers of juveniles produced per adult during 21-d.

Nominal concentration	Days																				
(mg/L)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	4.8	11.8	17.1	25.8	36.8	44.4	50.5	65.9	73.5	76.9	90.4	91.0	93.8
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.2	9.2	13.9	23.4	37.3	44.7	51.6	70.0	77.0	82.2	94.0	95.8	96.5

Cumulative numbers of dead parental Daphnia during 21-d.

Nominal concentration	Days																				
(mg/L)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- **Statistical results as appropriate:**

There was no statistically significant difference between data from the control and 100 mg/L test groups.

Remarks field for Results :

–Biological observations

·Cumulative numbers of dead parental *Daphnia*:
Control: 0 (mortality: 0%), 100 mg/L: 0 (mortality: 0%)
·Time of the first production of juveniles: 8 d.
·Mean cumulative numbers of juveniles produced per adult alive for 21 days: Control: 93.8, 100 mg/L: 96.5
·Was control response satisfactory: Yes. Mean cumulative numbers

of juveniles produced per adult was 93.8 > 60.

CONCLUSIONS

Remarks field with the ability to identify source of comment, i.e. author and/or submitter:

DATA QUALITY

- **Reliabilities:** Klimisch Code: 1=reliable without restrictions.
- **Remarks field for Data Reliability:** Experimental design and analytical procedure were well documented.

REFERENCES

Environment Agency of Japan (1998).

OTHER

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

HEALTH ELEMENTS

(a) ACUTE ORAL TOXICITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: The Dow Chemical Company, Midland, MI 48674, DOWANOL PM ACETATE, Lot No. Unavailable. Purity: Unavailable, Impurity: Unavailable.

METHOD

- **Method/guideline:** Other (Federal Register 43: 163.81-1, 1978).
- **Test type:** Acute Oral Toxicity Test
- **GLP:** Not specified.
- **Year:** 1980
- **Species:** Rat
- **Strain:** Fisher 344
- **Route of administration:** Oral (by single-dose gavage)
- **Doses/concentration levels:** 500, 1,000, 2,000, 4,000, 6,300 and 10,000 mg/kg/rat
- **Sex:** Male & Female
- **Control group and treatment:** No control and vehicle used.
- **Post exposure observation period:** Two weeks.
- **Statistical methods:** LD_{50} was calculated by the moving average method (Thomson and Weil, 1952).

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**

·***Age at study initiation*:** Not specified. /teratogenicity
·***Weight at study initiation*:** No data available.
·***No. of animals per sex per dose*:** 6 per sex per dose group

– **Study Design:**

·***Vehicle*:** No vehicle, undiluted.
·***Satellite groups and reasons they were added*:** None
·***Clinical observations performed and frequency*:**
Each rat was weighed immediately prior to treatment, the day after and weekly thereafter for two-week post-treatment observation period. The rats were observed periodically during this time for signs of toxicity. All rats were submitted for a gross pathological examination as they died spontaneously, or survivors two weeks post-treatment.

RESULTS

- **LD_{50}:** Male: > 10,000 mg/kg b.w. :
Female: 8,532 mg/kg b.w. (7,371-10,728 mg/kg b.w., 95% confidence interval)

REMARKS FIELD FOR RESULTS.

- ***Body weight:*** All surviving rats gained weight during the two-week observation period.
  No detailed body weight data available.
- ***Food/water consumption:*** No data available.
- ***Clinical signs :***

  Signs of toxicity were observed in rats at all dose levels tested, including lethargy, piloerection, watery eyes, anorexia, shallow breathing and/or excess salivation.

  Lethargy, piloerection; 500, 1,000, 2,000 mg/kg
  Lethargy, piloerection, watery eyes; 4,000 mg/kg
  Lethargy, piloerection, anorexia; 6,300 mg/kg
  Lethargy, piloerection, watery eyes, anorexia, shallow breathing, excess salivation; 10,000 mg/kg

Observations of male and female rats dosed orally with the undiluted test material

Dose level (mg/kg)	Sign of Toxicity	#Affected / #treated		Approximate Time of Onset	
		Males	Females	Males	Females
500	Lethargy	6/6	6/6	6 rats-4.5 hours	6 rats-4.5 hours
	Piloerection	6/6	0/6	6 rats-Day 7	--
1,000	Lethargy	6/6	6/6	6 rats-4.5 hours	6 rats-4.5 hours
	Piloerection	6/6	0/6	6 rats-Day 7	--
2,000	Lethargy	6/6	6/6	6 rats-4.5 hours	6 rats-4.5 hours
	Piloerection	6/6	0/6	6 rats-Day 7	
4,000	Lethargy	6/6	6/6	6 rats-1 hours	6 rats-1 hours
	Piloerection	6/6	6/6	6 rats-4.5 hours	6 rats-1 hours
	Watery Eyes	0/6	6/6	--	6 rats-1 hours
6,300	Lethargy	6/6	6/6	6 rats-1 hours	6 rats-1 hours
	Piloerection	6/6	6/6	6 rats-4.5 hours	6 rats-1 hours
	Anorexia	6/6	6/6	6 rats-Day 2	6 rats-Day 2
10,000	Lethargy	6/6	6/6	6 rats-1 hours	6 rats-1 hours
	Piloerection	6/6	6/6	6 rats-4.5 hours	6 rats-1 hours
	Watery Eyes	2/6	6/6	2 rats-2 hours	6 rats-2 hours
		4/6	0/6	4 rats-7 hours	--
	Anorexia	6/6	6/6	6 rats-Day 2	6 rats-Day 2
	Shallow breathing	0/6	6/6	--	6 rats-2 hours
	Excess salivation	0/6	6/6	--	6 rats-3.5 hours

- ***Haematology*:** Not done.
- ***Biochem:*** Not done.
- ***Ophthalmologic findings:*** Not examined.
- ***Mortality and time to death:***

Motality of male and female rats dosed orally with the undiluted test material

Dose level (mg/kg)	# Dead / # Treated		Time of Death	
	Males	Females	Males	Females
500	0/6	0/6	--	--
1,000	0/6	0/6	--	--
2,000	0/6	0/6	--	--
4,000	0/6	1/6	--	1 rat - Day 6
6,300	0/6	0/6	--	--
10,000	0/6	5/6	--	1 rat - Day 1 1 rat - Day 2 3 rats- Day 3

- ***Gross pathology incidence and severity:***
  No treatment-related lesions were observed upon gross pathological examination of all dead and surviving animals at the end of two weeks for both sexes.

- ***Organ weight changes:*** Not done.
- ***Histopathology*** *(incidence and severity)**:*** Not done.

CONCLUSIONS

LD_{50} was established at > 10,000 mg/kg for male and 8,532 mg/kg for female, respectively.

DATA QUALITY

- **Reliabilities:**
  Valid with restriction because of unspecified test guideline, no information on GLP and experimental conditions such as purity of the test material, lot No., animal strain/age, body weight during test period, et al.

- **Remarks field for Data Reliability**
  This study is not conducted by OECD test guideline and information on GLP is not described.

REFERENCES

Dow Chemical Company (1992) "Propylene glycol monomethylether acetate: acute toxicological studies in rats with cover letter dated 072492", EPS/OTS: Doc. #88-920005652. NTIS Order No.: NTIS/OTS 0544435.

GENERAL REMARKS

This study comprises acute oral toxicity in rats and eye irritation in rabbits of the referenced chemical.

(b) REPEATED DOSE TOXICITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Kyowa Yuka Co. Ltd., Lot No. 118, Purity > 99.9%, Impurity: Methoxy-2-methylethyl acetate; < 0.1 %. Stability during use confirmed by gas chromatography. Kept at 4°C until use.

METHOD

- **Method/guideline:** OECD TG 422
- **Test type:** OECD Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test
- **GLP:** Yes
- **Year:** 1997
- **Species:** Rat
- **Strain:** Crj: CD (SD)
- **Route of administration:** Oral (by gavage)
- **Doses/concentration levels:** 0, 100, 300, 1,000 mg/kg/day (in purified water)
- **Sex:** Male & Female
- **Exposure period:** Males; for 44 days from 2 weeks prior to mating
  Females; for 41-45 days from 14 days before mating to day 3 postpartum
- **Frequency of treatment:** Once daily.
- **Control group and treatment:** Concurrent vehicle.
- **Post exposure observation period:** None.
- **Duration of test:** Male; for 44 days
  Female; for 41-45 days
- **Statistical methods:** Dunnett's or Scheffe's test for continuous data and Chi square test for quantal data

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**

·***Age at study initiation*:** 9 week old for males, 8 week old for females
·***Weight at study initiation*:** 388-436g for males, 217-239g for females
·***No. of animals per sex per dose*:** 10 per sex per dose group

– **Study Design:**

·***Vehicle*:** Purified water
·***Satellite groups and reasons they were added*:** None
·***Clinical observations performed and frequency*:**
General condition was observed once a day and body wt. was determined on the first, the last day of the administration, the day sacrificed and once a week during the administration period. For pregnant females, body wt. was determined on the day 0, 14 and 20

of gestation and on day 0 and 4 of lactation. Food consumption was determined on the same day when body wt. was determined for 24hr. Haematology and biochemistry for males conducted only at time of necropsy after 44 days of chemical exposure. Urinalysis was done on day 40 of the administration for males.

·***Organs examined at necropsy:***

Organ weight: for both sexes, brain, pituitary gland, thyroid gland, heart, liver, kidney, spleen, adrenal, thymus, and in addition for males, testes and epididymis.

Microscopic: all animals in control and 1,000 mg/kg group, and unfertilized animals in other groups: brain, spinal cord, pituitary gland, eyeball, thyroid gland (including parathyroid gland), thymus, heart, trachea, lung, liver, kidney, adrenal, spleen, stomach, small intestine, large intestine, pancreas, urinary bladder, bone marrow, sciatic nerve, lymph node, testes, epididymis, prostate, seminal vesicle, ovary, uterus, vagina, mammary gland. All pregnant males and females in 100 and 300 mg/kg group: kidney and any organs, which might be expected to have histopathological changes at the higher doses.

RESULTS

- **NOAEL** Male: 1,000mg/kg/day
  Female: 1,000 mg/kg/day
- **LOAEL** Not determined under the conditions tested.

REMARKS FIELD FOR RESULTS.

– ***Body weight:*** For males at 1,000 mg/kg, a tendency for low body weight gain during administration period was observed and statistically significant difference from controls was noticed for body weight gain 1-15 days (Dunnets test $p \leq 0.01$). Low body weight gain during the premating period in females at 1,000 mg/kg was also observed (Dunnets test $p \leq 0.05$).

(Male)

Dose (mg/kg/day)	**Days of treatment**								
	1	**8**	**15**	**22**	**29**	**36**	**43**	**44**	**Gain 1-44**
0	407±13	445±15	475±18	499±24	526±29	555±36	578±36	580±35	174±26
100	406±10	445±16	478±18	502±17	531±21	559±27	577±30	576±31	171±24
300	406±13	442±23	472±26	497±32	525±33	553±36	571±38	574±38	157±27
1,000	405±10	441±15	468±16	484±21	506±19	527±23	542±24	543±26	138±21**

** Significantly different from control at $p \leq 0.01$.

(Female)

Dose (mg/kg/day)	**Days of premating**			
	1	**8**	**15**	**Gain 1-15**
0	227±6	248±10	260±8	33±10
100	227±7	249±9	265±11	38±10
300	227±6	249±8	264±9	37±9
1,000	227±6	240±8	248±9*	22±8*

* Significantly different from control at $p \leq 0.05$.

– ***Food/water consumption:***

For males at 1,000 mg/kg, a tendency for decrease in food consumption during administration period was observed and

statistically significant differences from controls were noticed on day 29(Dunnets test p≤ 0.05) and 36(Dunnets test p≤ 0.01) of the administration. For females, no statistically significant difference from controls was observed.

– ***Clinical signs :***

Males: No dose-related changes in general clinical signs.
Females: No dose-related changes in general clinical signs.

– ***Haematology :***

Males: No dose-related changes in haematology.

– ***Biochem:***

Males: Decrease in glucose (p<0.01) and inorganic phosphorus at 1,000 mg/kg (p<0.05).

Dose level (mg/kg/day)	**0**	**100**	**300**	**1,000**
No. of animals 10	10	10	10	
Glucose (mg/dL, Mean ± SD)	151 ± 12	146 ± 11	145 ± 12	134 ± 9
I.phosphorus (mg/dL, Mean ± SD)	6.5 ± 0.3	6.5 ± 0.4	6.5 ± 0.4	6.0 ± 0.4

– ***Urinalysis:*** ***Male:*** No dose-related changes in urinalysis.
– ***Ophthalmologic findings:*** Not examined.
– ***Mortality and time to death:*** No deaths were recorded in any treated and control groups.
– ***Gross pathology incidence and severity:***

No changes in gross pathology in both sexes.

– ***Organ weight changes:***

Male: Increase in adrenals weight at 1,000 mg/kg (relative) (p<0.05) and decrease in thymus weight at 300 mg/kg (absolute) (p<0.05), but with no dose-related change.
Female: No dose-related changes in organ weight.

	Males		
Dose level (mg/kg/day)	**0**	**300**	**1,000**
Absolute weight			
Thymus (mg, Mean ± SD)	0.42 ± 0.06	0.33 ± 0.06	0.37 ± 0.06
Relative weight			
Adrenal (mg, Mean ± SD)	13.52 ± 1.18	12.57 ± 1.82	15.32 ± 1.85

– ***Histopathology***

Tissue pathology revealed no alteration of tissues even in the highest dose groups for both sexes.

CONCLUSIONS

A dose of 1,000 mg/kg/day of PMA exerted some effects in both male and female rats. In males, depression of body weight gain was observed. Blood examination revealed decreases in glucose and inorganic phosphorus. An increase in relative weight of the adrenals was also noted. In females, body weight gain was lower than in the control during the premating period at the 1,000 mg/kg dose. Tissue pathology revealed no alteration of tissues even in the highest dose groups for both sexes. A NOAEL was established at 1,000 mg/kg bw/day for both sexes.

DATA QUALITY

- **Reliabilities:** Valid without restriction

Remarks field for Data Reliability

Well conducted study, carried out by Research Institute for Animal Science in Biochemistry and Toxicology (Japan).

REFERENCES

Ministry of Health and Welfare: Japan, Toxicity Testing Reports of Environmental Chemicals 6, 205-223 (1998)

GENERAL REMARKS

This study was conducted to examine both repeated dose toxicity and reproductive/developmental toxicity as an OECD screening combined study. Therefore, biochemical and haematological analysis, and urinalysis for females was 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.

(c) REPEATED DOSE TOXICITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Organic Chemicals, Dow Chemical USA, Purity > 98 %. The identity and composition of the test material was confirmed by gas chromatography and gas chromatography/mass spectrometry.

METHOD

- **Method/guideline:** Not specified.
- **Test type:** Short-term vapour inhalation toxicity
- **GLP:** Yes
- **Year:** Not specified.
- **Species:** Rat
- **Strain:** Fischer 344
- **Route of administration:** Inhalation
- **Doses/concentration levels:** 0, 300, 1,000 or 3,000 ppm (0, 1.62, 5.39 or 16.18 mg/L)
- **Sex:** Male & Female
- **Exposure period:** Two weeks.
- **Frequency of treatment:** Six hours per day on 5 consecutive days, followed by 4 additional consecutive days of exposure after a weekend interruption.
- **Control group and treatment:** Concurrent vehicle (room air).
- **Post exposure observation period:** None.
- **Duration of test:** Males and females; for two weeks.
- **Statistical methods:** Bartlett's test, ANOVA and Wilcoxon's test or Dunnett's test depending on whether or not the data were nonhomogeneous or homogeneous.

REMARKS FIELD FOR TEST CONDITIONS

–Test Subjects:

·***Age at study initiation*:** Not specified (purchased at 6-8 weeks old for males and females).
·***Weight at study initiation*:** Data not available.
·***No. of animals per sex per dose*:** 5 Rats per sex per dose group

–Study Design:

·***Vehicle*:** None
·***Satellite groups and reasons they were added*:** None
·***Clinical observations performed and frequency*:**
Body wt. was recorded immediately prior to the first exposure and again for each animal immediately prior to the third, sixth, and ninth exposures. The final body wt. of each animal was taken immediately prior to termination; rats were fasted overnight prior to termination.
Haematologic parameters were evaluated for each animal. Blood

samples for the haematologic determinations were taken from rats by orbital sinus puncture on the day prior to termination.
Clinical chemistry analyses were performed on serum samples from each animal. Blood samples for clinical chemistry analyses were collected from rats from severed cervical blood vessels at the time of necropsy. Urinalyses were performed for each rat. Urine samples were collected from each rat on the day prior to scheduled termination.

·***Organs examined at necropsy:***
Organ weight: liver, kidney, spleen, thymus, and testes (males) for each animal.
Microscopic: nasal tissues, lungs, liver, kidneys, thymus, and bone marrow from rats in the control and high-exposure groups.
Tissues from animals in the high-exposure group which were thought to have treatment-related effects were also examined for animals in the intermediate- and low-exposure groups.

RESULTS

- **NOAEL**

Male: 300 ppm (1.62 mg/L)
Female: 1,000 ppm (5.39 mg/L)

- **LOAEL**

Male: 1,000 ppm (5.39 mg/L) Slight renal change was noted in one of five male rats at the 1,000 ppm (5.39 mg/L).
Female: 3,000 ppm (16.18 mg/L) Slight–to-moderate degeneration of the olfactory epithelium in the nasal cavities and slightly reticulated kidneys were observed in the 3,000-ppm-exposure group.

REMARKS FIELD FOR RESULTS.

– ***Body weight:***
The mean body weight of treatment groups of rats for males and females not significantly different from controls at any time during the course of the study.
– ***Food/water consumption:*** Not specified.
– ***Clinical signs :***
No unusual clinical observations during the study.
Males: No dose-related changes in general clinical signs.
Females: No dose-related changes in general clinical signs.
– ***Haematology :***
Males and females: No dose-related significant changes in haematology.
– ***Biochem :***
Males and females: No dose-related significant adverse treatment-related effect in clinical chemistry.
– ***Urinalysis :***
For both male and female rats, the mean urinary specific gravity values in the 3,000-ppm group tended on the average to be slightly

lower than those for controls, but not statistically significant.

- ***Ophthalmologic findings:*** Not examined.
- ***Mortality and time to death:*** No deaths prior to scheduled termination.
- ***Gross pathology incidence and severity:*** No changes in gross pathology in both sexes.
- ***Organ weight changes:***

Male: No dose-related changes in the absolute and relative organ weight.

Female: No dose-related changes in the absolute and relative organ weight except that the mean relative liver weight of female rats in the 3,000-ppm group significantly higher than that of controls, but without any gross or histopathologic changes in the liver.

- ***Histopathology :***

Male: Kidneys of all male rats in the 3,000-ppm group appeared to be slightly reticulated (pale, honeycombed) at necropsy. Slight renal changes were observed in all five male rats in the 3,000-ppm exposure group and in one of five male rats at the 1,000 ppm. The change noted in these animals was a slight increase in the eosinophilic granularity of the proximal convoluted tubules of the kidneys. Only a segment of the nephrons was affected, and that segment is most abundant in the outer cortical region. The change noted was an increased number and prominence of this normally occurring granularity in the proximal convoluted tubules of male Fisher 344 rats. A second histopathlogically detectable effect in rats was slight–to-moderate degeneration of the olfactory epithelium in the nasal cavities of three of five males in the 3,000-ppm-exposure group. This change occurred primarily near the most anterior excursion of the olfactory epithelium in the dorsal meatus (at approximately the level of the incisive papilla) and was characterised by loss of cells in the neuron layer and flattening of the sustentacular cell layer, resulting in decreased thickness of the neuroepithelium at the affected sites. Urinary specific gravity values in the 3,000-ppm group tended on the average to be slightly lower than those for controls, although not statistically significant.

Female: Kidneys of two of five females in the 3,000-ppm group appeared to be slightly reticulated (pale, honeycombed) at necropsy. Slight–to-moderate degeneration of the olfactory epithelium in the nasal cavities was observed in one of five females in the 3,000-ppm-exposure group. Two of five females in the 3,000-ppm group slightly reticulated (pale, honeycombed) at necropsy.

CONCLUSIONS

Haematology and clinical chemistry analyses revealed no changes in diagnostic of an adverse treatment-related effect. However, the kidneys of all male rats and two of five females in the 3,000 ppm (16.18 mg/L)-exposure group appeared to be slightly reticulated at necropsy. Slight renal changes were also observed histologically in all five male rats in the 3,000 ppm (16.18 mg/L)-exposure group and in one of five male rats at the 1,000 ppm (5.39 mg/L). At most, observed changes suggest the possibility of a slight effect on renal function of rats in the 1,000 (5.39 mg/L) and 3,000 ppm (16.18 mg/L) group for male and female rats, respectively. A second histologically detectable effect in rats which appeared to be related to exposure to the test material

was slight-to-moderate degeneration of olfactory epithelium in the nasal cavities of three of five males and one of five females in the 3,000 ppm (16.18 mg/L)-exposure group. A NOAEL was established at 300 ppm (1.62 mg/L) for males and at 1,000 ppm (5.39 mg/L) for females.

DATA QUALITY

- **Reliabilities:** Valid with restriction because of unspecified test guideline.

Remarks field for Data Reliability

Well conducted study, carried out by Toxicology Research Laboratory, Health and Environmental Sciences, Dow Chemical USA, Midland, Michigan 48640.

REFERENCES

Miller et al. Toxicol. Appl. Pharm. 75 521-530 (1984)

GENERAL REMARKS

This study was conducted to examine metabolism in the rats, and short-term vapour inhalation toxicity studies of PMA in the rats and mice.

(d) REPEATED DOSE TOXICITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Organic Chemicals, Dow Chemical USA, Purity > 99%. The identity and composition of the test material was confirmed by gas chromatography and gas chromatography/mass spectrometry.

METHOD

- **Method/guideline:** Not specified.
- **Test type:** Short-term vapour inhalation toxicity
- **GLP:** Yes
- **Year:** Not specified.
- **Species:** Mice
- **Strain:** B6C3F1
- **Route of administration:** Inhalation
- **Doses/concentration levels:** 0, 300, 1,000 or 3,000 ppm (0, 1.62, 5.39 or 16.18 mg/L)
- **Sex:** Male & Female
- **Exposure period:** Two weeks.
- **Frequency of treatment:** Six hours per day on 5 consecutive days, followed by 4 additional consecutive days of exposure after a weekend interruption.
- **Control group and treatment:** Concurrent vehicle (room air)
- **Post exposure observation period:** None
- **Duration of test:** Males and females; for two weeks
- **Statistical methods:** Bartlett's test, ANOVA and Wilcoxon's test or Dunnett's test depending on whether or not the data were nonhomogeneous or homogeneous.

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**

·***Age at study initiation*:** Not specified (purchased at 6-8 weeks old for males and females).
·***Weight at study initiation*:** Not specified.
·***No. of animals per sex per dose*:** 5 Mice per sex per dose group

– **Study Design:**

·***Vehicle*:** None
·***Satellite groups and reasons they were added*:** None
·***Clinical observations performed and frequency*:**
Body wt. was recorded immediately prior to the first exposure and again for each animal immediately prior to the third, sixth, and ninth exposures. The final body wt. of each animal was taken immediately prior to termination.
Haematologic parameters were evaluated for each animal. Mouse blood samples for the haematologic determinations were taken by orbital sinus puncture immediately prior to termination.
Clinical chemistry analyses were performed on serum samples from

each animal.

·***Organs examined at necropsy:***
Organ weight: Liver, kidney, spleen, thymus, and testes (males) for each animal.
Microscopic: Nasal tissues, lungs, liver, kidneys, thymus, and bone marrow from mice in the control and high-exposure groups.
Tissues from animals in the high-exposure group which were thought to have treatment-related effects were also examined for animals in the intermediate- and low-exposure groups.

RESULTS

- **NOAEL**

Male: Not determined under the test conditions studied.
Female: Not determined under the test conditions studied

- **LOAEL**

Male and females: 300 ppm (1.62 mg/L). Degeneration of the olfactory epithelium to some degree in all male and female mice in the 300-, 1,000-, and 3,000-ppm (1.62, 5.39 or 16.18 mg/L) exposure groups.

REMARKS FIELD FOR RESULTS.

–***Body weight:***
The mean body weight of treatment groups of mice for males and females not significantly different from controls at any time during the course of the study. Growth of male and female mice not significantly altered by exposure to the test material.

–***Food/water consumption:*** Not specified.

–***Clinical signs :***
No unusual clinical observations during the study for mice.
Males: No dose-related changes in general clinical signs.
Females: No dose-related changes in general clinical signs.

–***Haematology :*** ***Males and females:*** No dose-related significant changes in haematology.

–***Biochem :*** ***Males and females:*** No dose-related significant adverse treatment-related effect in clinical chemistry.

–***Ophthalmologic findings:*** Not examined.

–***Mortality and time to death:*** No deaths prior to scheduled termination.

–***Gross pathology incidence and severity:*** No changes in gross pathology in both sexes.

–***Organ weight changes:***
Males and females: No dose-related changes in the absolute and relative organ weight.

–***Histopathology :*** The only histopathologic changes in mice attributable to exposure to vapours of PMA occurred in the nasal cavities for both sexes.
Male and females: Degeneration of the olfactory epithelium occurred to some degree in all male and female mice in the 300-, 1,000-, and 3,000-ppm (1.62, 5.39 or 16.18 mg/L) exposure groups.

This acute degenerative change occurred in a dose-related manner and generally more severe and more extensive in animals exposed to 3,000 ppm (16.18 mg/L). However, even at 300 ppm (1.62 mg/L), slight changes generated in the dorsomedial aspects of the ethmoid recess in addition to those in the more anterior portions of the olfactory epithelium in the nasal cavity proper. Most animals at the two higher concentrations and one of five female mice in the 300-ppm group having slight focal areas of respiratory metaplasia. An acute inflammatory exudate present in the lumen of the nasal cavities in the some animals of two higher doses.

CONCLUSIONS

Haematology and clinical chemistry analyses revealed no changes in diagnostic of an adverse treatment-related effect. The only histopathologic changes in mice, which were attributable to exposure to vapours of PMA, occurred in the nasal cavities. Degeneration of olfactory epithelium, similar to that described for rats, was present to some degree in all male and female mice in the 300, 1,000 and 3,000 ppm (16.18 mg/L) exposure group. This acute degenerative change occurred in a dose-related manner and was generally more severe and more extensive in animals exposed to 3,000 ppm (16.18 mg/L). A NOAEL not established and LOAEL estimated at 300 ppm (1.62 mg/L) for males and females.

DATA QUALITY

- **Reliabilities:** Valid with restriction because of unspecified test guideline.

Remarks field for Data Reliability

Well conducted study, carried out by Toxicology Research Laboratory, Health and Environmental Sciences, Dow Chemical USA, Midland, Michigan 48640.

REFERENCES

Miller et al. Toxicol. Appl. Pharm. 75 521-530 (1984)

GENERAL REMARKS

This study was conducted to examine metabolism in the rats, and short-term vapour inhalation toxicity studies of PMA in the rats and mice.

GENETIC TOXICITY IN VITRO (BACTERIAL TEST)

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Kyowa Yuka Co. Ltd., Purity > 99.9 %, Impurity: 1-Methoxy-2-methylethyl acetate; < 0.1 %. Stability during use confirmed by gas chromatography.

METHOD

- **Method/guideline**: Guideline for Screening Toxicity Testing of Chemicals (Japan) and OECD TG 471 and 472
- **Test type**: Reverse mutation assay
- **GLP**: Yes
- **Year**: 1997
- **Species/Strain:** *Salmonella typhimurium* TA100, TA1535, TA98, TA1537
  Escherichia coli WP2 *uvr*A
- **Metabolic activation:** With and without S9 from rat liver, induced with phenobarbital and 5,6-benzoflavone.
- **Statistical methods**: No statistical analysis was done.

REMARKS FIELD FOR TEST CONDITIONS

- **Study Design:**

·***Concentration*:**
-S9: 0, 313, 625, 1,250, 2,500, 5,000 ug/plate (five strains)
+S9: 0, 313, 625, 1,250, 2,500, 5,000 ug/plate (five strains)
·***Number of replicates*:** 2
·***Plates/test*:** 3
·***Procedure*:** Pre-incubation
·***Solvent*:** Distilled water
·***Positive controls*:**
-S9mix ; 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide (TA100, TA98, WP2 uvrA), sodium azide (TA1535) and 9-aminoacridine (TA1537)
+S9mix ; 2-aminoanthracene (five strains)

RESULTS

- **Cytotoxic concentration:** Toxicity was not observed up to 5,000ug/plate in five strains with and without metabolic activation (S9 mix).
- **Genotoxic effects:**

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

REMARKS FIELD FOR RESULTS.

CONCLUSIONS

Bacterial gene mutation is negative with and without metabolic activation.

DATA QUALITY

- **Reliabilities:** Valid without restriction.

Remarks field for Data Reliability

Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Hadano, Japan).

REFERENCES

Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals Vol. 6 205- 227 (1998).

GENERAL REMARKS

None.

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

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Kyowa Yuka Co. Ltd., Lot No. 118, Purity > 99.9 %, Impurity: 1-Methoxy-2-methylethyl acetate; < 0.1 %. Stability during use confirmed by gas chromatography. Kept at room temperature until use.

METHOD

- **Method/guideline**: OECD TG 473 and Guideline for Screening Toxicity Testing of Chemicals (Japan)
- **Test type**: Chromosomal aberration test
- **GLP***:* Yes
- **Year**: 1997-1998
- **Species/Strain:** CHL/IU cell
- **Metabolic activation:** With and without S9 from rat liver, induced with phenobarbital and 5,6-benzoflavone.
- **Statistical methods**: Fisher's exact 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 (continuous treatment): 0, 0.33, 0.65, 1.3 mg/ml
-S9 (short-term treatment): 0, 0.33, 0.65, 1.3 mg/ml
+S9 (short-term treatment): 0, 0.33, 0.65, 1.3 mg/ml
·***Plates/test*:** 2
·***Solvent*:** Distilled water
·***Positive controls*:**
Mitomycin C for continuous treatment
Cyclophosphamide for short-term treatment

RESULTS

- **Cytotoxic concentration:**

Toxicity was not observed up to 1.3 mg/mL in continuous and 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 1.3 mg/mL (10 mM) on continuous treatment, and with short-term treatment, with and without an exogenous metabolic activation system.

CONCLUSIONS

Chromosomal aberration in CHL/IU cells is negative with and without metabolic activation.

DATA QUALITY

- **Reliabilities:** Valid without restriction.

Remarks field for Data Reliability

Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Hadano, Japan).

REFERENCES

Ministry of Health & Welfare (Japan) Toxicity Testing Reports of Environmental Chemicals Vol. 6, 205- 227 (1998).

GENERAL REMARKS

None.

TOXICITY TO REPRODUCTION/DEVELOPMENT

(a) TOXICITY TO REPRODUCTION

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Kyowa Yuka Co. Ltd., Lot No. 118, Purity > 99.9%, Impurity: 1-Methoxy-2-methylethyl acetate; < 0.1 %. Stability during use confirmed by gas chromatography. Kept at 4°C until use.

METHOD

- **Method/guideline:** OECD TG 422
- **Test type:** OECD Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test
- **GLP:** Yes
- **Year:** 1997
- **Species:** Rat
- **Strain:** Crj:CD (SD)
- **Route of administration:** Oral (by gavage)
- **Doses/concentration levels:**
  0, 100, 300, 1,000 mg/kg/day (in purified water)
- **Sex:** Male & Female
- **Exposure period:**
  Male; for 44 days from 2 weeks prior to mating
  Female; for 41-45 days from 2 weeks prior to mating to day 3 postpartum throughout mating and pregnancy.
- **Frequency of treatment:** Once daily.
- **Control group and treatment:** Concurrent vehicle (purified water).
- **Post exposure observation period:** None.
- **Duration of test:** Male: for 44 days
  Female: for 41-45 days
- **Statistical methods:** Dunnett's or Scheffe's test for continuous data and Chi square test for quantal data

REMARKS FIELD FOR TEST CONDITIONS

- **Test Subjects:**
  ·***Age at study initiation*:** 9 week old for males, 8 week old for females
  ·***Weight at study initiation*:** 388-436 g for males, 217-239 g for females
  ·***No. of animals per sex per dose*:** 10 per sex per dose group
- **Study Design:**
  The animals were sacrificed on the day 4 of lactation for females. Females with no delivery were killed 4 days after the delivery expected date (1/10 in control and 1/10 in 300mg/kg group).

·***Vehicle*:** Purified water
·***Satellite groups and reasons they were added*:** None
·***Mating procedures*:** Male/female per cage; 1/1, length of cohabitation; at the most 3 days, until proof of pregnancy (formation of vaginal closing or sperm detection in vagina)
·***Clinical observations performed and frequency*:**
Parent: General appearance once a day
Foetus: General appearance once a day after birth
Haematology and biochemistry for males conducted only at time of necropsy after 44 days of chemical exposure. Urinalysis was done on day 40 of the administration for males.
·***Organs examined at necropsy*:**
Parent: organ weight: brain, pituitary gland, thyroid gland, heart, liver, kidney, spleen, adrenal, thymus and for males, testes and epididymis.
Microscopic: all animals in control and 1,000 mg/kg group, and unfertilised animals in other groups: brain, spinal cord, pituitary gland, eyeball, thyroid gland (including parathyroid gland), thymus, heart, trachea, lung, liver, kidney, adrenal, spleen, stomach, small intestine, large intestine, pancreas, urinary bladder, bone marrow, sciatic nerve, lymph node, testes, epididymis, prostate, seminal vesicle, ovary, uterus, vagina, mammary gland. All pregnant males and females in 100 and 300 mg/kg group: kidney and any organs, which might be expected to have histopathological changes at the higher doses.
Foetal: full macroscopic examinations on all of pups
·***Parameters assessed during study*:**
Body wt. (for males, once a week, and the first, the last day of the administration, the day sacrificed, and for pregnant females, the day 0, 14 and 20 of gestation and on day 0 and 4 of lactation), food/water consumption (once a week, and on the same day when body wt. determined), No. of pairs with successful copulation, copulation index (No. of pairs with successful copulation/No. of pairs mated x 100), pairing days until copulation, 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)

RESULTS

- **NOAEL and LOAEL maternal toxicity:**

NOAEL: 1,000 mg/kg/day

- **NOAEL and LOAEL 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 :**
  No effects related to chemical exposure were observed at 1,000 mg/kg, although there was a single unsuccessful copulation at this dose level which was not statistically significantly different from the control ($p<0.05$).
- **Foetal data with dose level :**
  At 1,000 mg/kg, no effects related to chemical exposure were observed, although there was 1 pup without tail in 1,000 mg/kg group.

REMARKS FIELD FOR RESULTS.

- ***Mortality and day of death :*** None.
- ***Body weight :*** Low body weight gain during the premating period in females at 1,000 mg/kg (Dunnets test $p\leq 0.05$).
- ***Food/water consumption:***
  For males, a tendency for decrease in food consumption during administration period was observed at 1,000 mg/kg, and statistical significant difference from controls was noticed on day 29(Dunnets test $p\leq 0.05$) and 36(Dunnets test $p\leq 0.01$) of the administration. For females, no statistical significant difference from controls was observed.
- ***Reproductive data :*** No statistical significant difference from controls.
- ***Fetal data :*** No statistical significant difference from controls.
- ***Grossly visible abnormalities, external, soft tissue and skeletal abnormalities :***
  No statistically significant effects were observed except 1 pup of no tail in 1,000 mg/kg group.

Reproduction results of rats treated orally with PMA

Dose level (mg/kg/day)	0	30	100	1,000
No. of pairs mated	10	10	10	10
No. of pairs mated with successful copulation	10	10	10	9
Copulation index (%)	100	100	100	90
No. of pregnant females	9	10	9	9
Fertility index (%)	90	100	90	100
Pairing days until copulation (Mean ± S.D.)	2.9±1.1	2.3±0.9	2.4±0.7	3.1±0.8
No. of corpora lutea (Mean ± SD)	18.2±3.6	16.8±2.0	18.9±3.8	17.4±1.3
No. of implantation sites (Mean ± S.D.)	17.0±1.9	16.2±1.9	17.7±1.7	17.1±0.9
Implantation index (%, Mean ± S.D.)	94.7±9.2	96.7±7.2	95.2±10.2	98.3±5.0
No. of pregnant females with parturition (Mean ± S.D.)	9	10	9	9
Gestation length (days, Mean ± SD)	22.6±0.5	22.6±0.5	22.4±0.5	22.8±0.4
No. of pregnant females with live pups on day 0	9	10	9	9
Gestation index (%)	100	100	100	100
No. of pregnant females with live pups on day 4	9	10	9	9

Copulation index (%)= (No. of pairs with successful copulation / No. of pairs mated)x100
Fertility index (%) =(No. of pregnant females / No. of pairs with successful copulation)x100
Gestation index (%)=(No. of females with live pups / No. of pregnant females)x100

Litter results of rats treated orally with PMA

Dose level (mg/kg/day)	0	30	100	1,000
No. of pups born	15.8±3.2	15.0±2.2	16.1±2.6	16.3±1.0
Delivery index (%)	91.9±12.0	92.4±5.7	91.0±9.4	95.5±3.9
No. of pups alive on day 0 of lactation				
Total	15.7±3.2	14.7±1.9	15.8±2.7	15.9±1.4
Male	6.7±1.4	7.5±2.0	7.9±2.1	7.3±1.9
Female	9.0±2.7	7.2±2.0	7.9±2.9	8.6±2.4
Live birth index (%)	99.4±1.9	98.3±2.8	97.9±4.5	97.2±4.5
Sex ratio (Male/Female)	0.73	1.05	1.01	0.86
No. of pups alive on day 4 of lactation				
Total	15.6±3.1	14.5±1.7	15.6±3.0	15.8±1.4
Male	6.7±1.4	7.4±2.1	7.8±2.2	7.3±1.9
Female	8.9±2.6	7.1±1.9	7.8±3.1	8.4±2.3
Viability index (%)	99.3±2.0	98.8±3.7	98.3±3.4	99.3±2.1
Body weight of live pups (g)				
(On day 0)				
Male	7.0±0.8	7.4±0.5	7.2±0.9	7.1±0.6
Female	6.7±0.8	7.0±0.4	6.6±0.8	6.6±0.5
(On day 4)				
Male	11.3±2.1	11.9±1.1	11.9±1.8	10.9±1.4
Female	11.0±2.1	11.3±0.9	11.2±1.6	10.3±1.3

Delivery index (%) = (No. of pups born/ No. of implantation sites)x100
Live birth index (%) =(No. of live pups on day 0 / No. of pups born)x100
Viability index (%) =(No. of live pups on day 4/ No. of live pups on day 0)x100
Sex ratio =Total No. of male pups/ Total No. of female pups
Values are expressed as Mean±S.D. Except sex ratio.

CONCLUSIONS

Reproductive/developmental toxicity in rats by oral administration is not observed at the highest dose. A NOAEL was established at 1,000 mg/kg bw/day.

DATA QUALITY

- **Reliabilities:** Valid without restriction

Remarks field for Data Reliability

Well conducted study, carried out by Research Institute for Animal Science in Biochemistry and Toxicology (Japan).

REFERENCES

Ministry of Health and Welfare: Japan, Toxicity Testing Reports of Environmental Chemicals 6, 205-223 (1998)

GENERAL REMARKS

This study was conducted to examine both repeated dose toxicity and reproductive/developmental toxicity as an OECD screening combined study. Oestrus cycle length and pattern, and anogenital distances were not performed because the test was conducted by the TG adopted in 1990.

(b) DEVELOPMENTAL TOXICITY / TERATOGENICITY

TEST SUBSTANCE

- **Identity:** 1-Methoxy-2-propanol acetate (CAS No. 108-65-6)
- **Remarks:** Source: Remarks: Source: Dow Chemical USA, Midland, MI 48674, Lot No. 870916, Purity : 97.3%, Impurity: 1-Methoxy-2-methylethyl acetate; 2.0 %.

METHOD

- **Method/guideline:** Not stated.
- **Test type:** Developmental Toxicity Test
- **GLP:** Yes
- **Year:** 1988
- **Species:** Rat
- **Strain:** Sprague-Dawley
- **Route of administration:** Inhalation.
- **Doses/concentration levels:**

  500, 2,000, 4,000 ppm (2,700, 10,800, 21,600 mg/m^3).
- **Sex:** Female
- **Exposure period:** Days 6 to 15 of gestation.
- **Frequency of treatment:** Once daily (6 hours/day)
- **Control group and treatment:** Concurrent vehicle (room air)
- **Post exposure observation period:** 5 Days.
- **Duration of test:** Female: for 21 days
- **Statistical methods:**

  Maternal food consumption as a percentage of body weight was analysed using a one-way analysis of variance followed by the Student-Newman-Keuls test. Maternal body weight, body weight gain, organ-to-body weight ratios and organ-to-brain weight gain, organ-to-body weight ratio and organ-to-brain weight ratio were analysed using a one-way analysis of variance followed by Duncan's test. Number of corpora lutea, implantations and live foetuses per litter were analysed using the t-test. Percent data, including percent

female (sex ratio), resorptions, malformations, variations and normal foetuses per litter, were transformed by the angular transformation and analysed with a t-test. The percent of litters with an effect containing a runt, resorption, dead foetus, malformation or variation was analysed using chi-square and the square root of chi-square. The percent of litters, which contained all normal foetuses, was analysed in the same way. Foetal body weights were analysed by a nested one-way analysis of variance.

REMARKS FIELD FOR TEST CONDITIONS

– **Test Subjects:**

·***Age at study initiation*:** 9-12 Weeks of age.
·***Weight at study initiation*:** 229-233 g at Day 0 of gestation.
·***No. of animals per dose*:** 23 Pregnant rats in all groups except the 4,000 ppm (21,600 mg/m^3) exposure group, which contained 20.

– **Study Design:**

The animals were sacrificed on Day 20 of gestation. In order to avoid large time differentials between groups, a single dam from each exposure group was removed sequentially and euthanized.

·***Vehicle*:** Room air
·***Satellite groups and reasons they were added*:** None
·***Mating procedures*:** Male/female per cage; 1/1, length of cohabitation; not specified, but until proof of pregnancy (sperm plug observed on the pad or sperm detection in vagina)
·***Clinical observations performed and frequency*:**
Females: Daily for changes in appearance and behaviour, gross structural abnormalities or pathological changes at necropsy.
Foetus: External and visceral abnormalities at necropsy.
Hematology, biochemistry and urinalysis: Not done.
·***Organs examined at necropsy*:**
Dam: Organ weight: Brain, liver, uterus
Foetal: Visceral abnormalities at necropsy,but not specified. Skeletons and heads after fixed and stained.
·***Parameters assessed during study*:**
Body wt. of dams (on gestation Days 0, 6, 10, 13, 16 and 20), fetal body wt. at necropsy, food/water consumption (daily), No. of pregnant females, fertility index = (pregnant animals/positively mated animals x 100), counts and location of corpora lutea, total implantations, resorptions, viable and nonviable foetuses, sex, gestation index = (viable litters/pregnant animals x 100), index of alive foetuses = (alive foetuses/total foetuses x 100), resorption index = (total No. of resorptions/total No. of implantations x 100), index of malformations = (total No. of foetuses with malformations/total No. of foetuses x 100), index of variations = (total No. of foetuses with variations/total No. of foetuses x 100), No. of runts.

RESULTS

- **NOAEL and LOAEL maternal toxicity:**

NOAEL: 500 ppm (2,700 mg/m^3, nominal and measured).
LOAEL: 2,000 ppm (10,800 mg/m^3, nominal) or 1,980 ppm (10,692 mg/m^3, measured). In the 2,000 ppm (10,800 mg/m^3) exposure group, one dam exhibited dyspnea, one had a ruffled pelt and two had red discharges from the eyes or mouth. No toxic signs were observed in the 500 ppm (2,700 mg/m^3) exposure group.

- **NOAEL and LOAEL foetal toxicity:**

NOAEL: 4,000 ppm (21,600 mg/m^3, nominal) or 4,160 ppm (22,464 mg/m^3, measured).
LOAEL: Not determined under the conditions tested.

- **Actual dose received by dose level by sex if available:**

500, 1,980, 4,160 ppm (2,700, 10,692, 22,464 mg/m^3 for the mean time weighted average concentrations) for dams.

- **Maternal data with dose level :**

Although there were some effects on food consumption, body weight gains for dams, there were no differences in relative organ weight (liver and uterus) between dams in the exposure and control group whether ratios were calculated for body weight or brain weights. NOAEL was determined as 500 ppm (2,700 mg/m^3) for dams.

- **Litter and Foetal data with dose level :**

No teratolgical or other developmental effects were seen in foetuses in all exposure groups tested (500, 2,000 and 4,000 ppm or 2,700, 10,800 and 21,600 mg/m^3, respectively). NOAEL was determined as 4,000 ppm (21,600 mg/m^3) for foetuses.

REMARKS FIELD FOR RESULTS.

–Toxic signs:

Nearly half of the 20 dams in the 4,000 ppm (21,600 mg/m^3) exposure group exhibited dyspnea at various times throughout the exposure period (Days 6 through 15). Breathing returned to normal soon after the dams were returned to their boxes. In the 4,000 ppm (21,600 mg/m^3) exposure group, half had red to reddish brown discharges from the nose and/or eyes on Days 8 and 10 through 15. Four dams were observed to have yellow staining in the fur of the urogenital area ranging from slight to marked on days 6, 8, 13 and 14. Reduced muscle tones was observed during handling in 15 dams on two separate occasions. In the 2,000 ppm (10,800 mg/m^3) exposure group, one dam exhibited dyspnea, one had a ruffled pelt and two had red discharges from the eyes or mouth. No toxic signs were observed in the 500 ppm (2,700 mg/m^3) exposure group.

–**Mortality and day of death:**

No mortalities were reported. On Day 20 of gestation, each female was euthanized. To avoid a large time differential between groups, one dam from each exposure or control was euthanized.

–**Body weight:**

Maternal body weights were lower in the 2,000 and 4,000 ppm (10,800 and 21,600 mg/m^3, respectively) exposure group on Day 16 only. Mean dam body weight gains in the 2,000 and 4,000 ppm (10,800 and 21,600 mg/m^3, respectively) exposure group were lower on Day 10 through Day 13 and Day 10 through Day 16, respectively (Duncan's test $p < 0.05$) and less overall. However, maternal body weight and weight gains in the 500 ppm (2,700 mg/m^3) exposure group were the same as control.

Mean dam body weight (g)

Exposure group	Day					
	+0	**+6**	**+10**	**+13**	**+16**	**+20**
Control	231	259	275	294	316	377
500 ppm	229	256	271	288	308	367
2,000 ppm	232	256	266	281	300*	360
4,000 ppm	233	263	264	277	291*	353

* Significant at $p \leq 0.05$.

Mean dam body weight gain (g)

Exposure group	Day					
	+6	**+10**	**+13**	**+16**	**+20**	**Total gain**
Control	28	17	18	22	61	146
500 ppm	27	15	17	20	58	138
2,000 ppm	24	10*	15*	18	60	128*
4,000 ppm	28	1*	13*	14*	62	118*

* Significant at $p \leq 0.05$

–***Food/water consumption:***

A reduction of food consumption as a percentage of maternal body weight was observed in all exposure group (500, 2,000, 4,000 ppm or 2,700, 10,800, 21,600 mg/m^3). (Student-Newman-Keuls test $p \leq 0.05$). In the 4,000 ppm (21,600 mg/m^3) exposure group, a reduction of food consumption as a percentage of maternal body weight coincided with exposure to PMA. A similar pattern was seen in the 2,000 ppm (10,800 mg/m^3) exposure group where food consumption was lower on Day 7, Days 11 through 13 and Days 15. In the 500 ppm (2,700 mg/m^3) exposure group, food consumption was lower on Days 7 and 11.

Mean maternal food consumption (g/100g body weight)

Exposure group	Day																			
	+0	**+1**	**+2**	**+3**	**+4**	**+5**	**+6**	**+7**	**+8**	**+9**	**+10**	**+11**	**+12**	**+13**	**+14**	**+15**	**+16**	**+17**	**+18**	**+19**
Control	7.0	8.8	9.0	9.5	9.6	9.6	8.0	8.6	8.1	8.3	8.3	9.2	9.6	8.8	9.2	9.6	8.3	8.7	8.3	7.3
500 ppm	7.9	9.4	9.0	9.7	9.7	9.0	8.0	7.2*	8.2	8.0	8.3	8.5*	8.5	8.8	9.0	9.1	8.3	8.7	8.0	8.1
2,000 ppm	6.6	8.4	8.8	8.8	9.0	9.0	6.7	6.9*	7.6	7.4*	7.6*	7.9*	7.8*	7.6*	8.2	8.2*	7.7	8.1	8.0	8.1
4,000 ppm	7.1	8.6	9.0	9.6	9.2	9.5	5.2*	5.6*	6.4*	6.8*	6.7*	7.1*	7.0*	6.8*	7.1*	7.6	7.6	8.3	8.2	8.1

* Significant at $p<0.05$.

– ***Maternal organ weight ratio*:**

There were no differences in relative liver or uterus weight between dams in control group and dams in any exposure group whether

ratios were calculated for body weight or brain weights.

Actual and relative maternal organ weights

Exposure group	Organ weights (g)		Organ-to-Body weight ratio (g/100g bw)		Organ-to-Brain weight ratios (g/g brain wt)	
	Liver	Uterus	Liver	Uterus	Liver	Uterus
Control	16.2	80.2	4.3	21.2	8.67	42.69
500 ppm	15.6	76.2	4.2	20.8	8.40	41.12
2,000 ppm	15.6	73.2	4.3	20.3	8.46	39.72
4,000 ppm	15.1	71.1	4.3	20.0	8.01	37.68

NOTES: No statistically significant differences between groups.

– ***Corpora lutea, implantation, litter size, resorption and foetal death:***
No statistically significant difference from controls. The number of corpora lutea, implantation sites and live foetuses per litter was the same in the exposed groups as controls. Both the percent of conceptuses resorbed per litter and the percent of conceptuses resorbed per litter and the percent of litters, which contained a resorption, were the same in the exposed groups as the controls. There were no dead foetuses in any litter.

– ***Foetal body weight and runts foetal data:***
No statistically significant difference from controls. There were no dose related differences in foetal body weights, The average foetal body weight in the 2,000 and 4,000 ppm (10,800 and 21,600 mg/m^3, respectively) exposure groups was approximately 5 percent lower than the low and controls. This difference was statistically significant in the 2,000 ppm (10,800 mg/m^3) exposure group, however, the 4,000 ppm (21,600 mg/m^3) exposure group was marginally non-significant. There were no differences in the percent of litters, which contained runts.

– ***Foetal sex ratio:*** No statistically significant difference from controls.

– ***Malformations and variations:***
There was no difference in the percent of foetuses per litter that were malformed, had variations or were normal. In addition, there were no differences in the percent of litters, which contained a malformation, a variation or contained all normal
foetuses.

Litter and foetal parameters

Dose level (ppm/6hr/day) (Days 6 to 15)	0 ppm	500 ppm	2,000 ppm	4,000 ppm
Corpora Lutea/litter	14.7	14.7	14.4	14.5
Implantation sites/litter	14.5	14.3	13.9	13.9
Live foetuses/litter	13.9	13.2	13.3	13.0
% of Conceptuses	4 %	8 %	4 %	6 %
% of Litters with Reabsorption	52 %	65 %	39 %	55 %
Dead foetuses/litter	0	0	0	0
Foetal Body Weight	3.9	3.9	3.6	3.6
% of Litters w/Runts	0 %	0 %	9 %	15 %
% Female/litter	48 %	53 %	50 %	47 %
% of Foetuses/litter w/Malformations	0 %	0.3 %	0.3 %	0 %
% of Foetuses/litter w/ Variations	5 %	6 %	5 %	4 %
% of Normal foetuses/litter	95 %	93 %	95 %	96 %
% of Litters w/ Malformations	0 %	4 %	4 %	0 %
% of Litters w/ Variations	39 %	57 %	30 %	30 %
% of Litters w/ All Normal Foetuses	61 %	39 %	65 %	70 %

NOTES: No statistically significant differences between groups.

CONCLUSIONS

No teratological or other developmental effects were seen in foetuses at concentrations as high as 4,160 ppm (22,464 mg/m^3, measured), in spite of slight effects in dams at all concentrations tested. A NOAEL was established at 500 ppm (2,700 mg/m^3, measured) for dams and 4,160 ppm (22,464 mg/m^3, measured) for foetuses.

DATA QUALITY

- **Reliabilities:** Valid with restriction because of unspecified test guideline.

Remarks field for Data Reliability

Well conducted study, carried out by United States Army Environmental Hygiene Agency.

REFERENCES

United States Army Environmental Hygiene Agency (1989). Report USA EHA-75-51-0753-90.

GENERAL REMARKS

This study was conducted to evaluate the potential maternal, embryonic and teratogenic parameters of PM Acetate in Sprague-Dawley rats following inhalation of vapours on Days 6 through 15 of gestation.

The studies were conducted in accordance with (1) Standing Operational Procedures developed by the Toxicology Division, USAEHA. (2) Title 21, Code of Federal Regulations (CFR), 1986 rev, Part 58, Good Laboratory Practices for Nonclinical Studies. (3) Title 40, CFR, 1987 rev, Part 798, Toxic Substances Control Act Test Guidelines.

Appendix : Parameters used in calculation of distribution by Mackay level III fugacity model.

Physico-chemical parameter

Chemical		PMA	
Molecular weight		132.18	measured
Melting point [℃]		-10	measured
Vapour pressure [Pa]		3.73E+02	measured
Water solubility [g/m3]		100000	measured
log Kow		0.36	measured
Half life [h]	In air	150	estimated
	In water	360	estimated
	In soil	12	estimated
	In sediment	360	estimated

Temp. [℃]	25

Intermedia Transport Parameter [m/h]

air side air-water MTC	5
water side air-water MTC	0.05
rain rate	1E-04
aerosol deposition	6E-10
soil air phase diffusion MTC	0.02
soil water phase diffusion MTC	1E-05
soil air boundary layer MTC	5
sediment-water MTC	1E-04
sediment deposition	5E-07
sediment resuspension	2E-07
soil water runoff	5E-05
soil solid runoff	1E-08

Environmental parameter

		volume [m^3]	depth [m]	area [m^2]	organic carbon content [-]	lipid content [-]	density [kg/m^3]	residence time [h]
bulk air	air	1E+13					1.2	100
	particles	2E+03						
	total	1E+13	1000	1E+10				
bulk water	water	2E+10					1000	1000
	particles	1E+06			0.04		1500	
	fish	2E+05				0.05	1000	
	total	2E+10	10	2E+09				
bulk soil	air	3.2E+08					1.2	
	water	4.8E+08					1000	
	solid	8E+08			0.04		2400	
	total	1.6E+09	0.2	8E+09				
bulk sediment	water	8E+07					1000	
	solid	2E+07			0.06		2400	50000
	total	1E+08	0.05	2E+09				

Theoretical distribution of PMA

scenario	emission rate [kg/h]			fugasity [Pa]				conc. [g/m^3]			
case	b. air E_1	b. w.E_2	b. soilE_3	b.air f_1	b,w. f_2	b.soil f_3	b.sed. f_4	b.airC_1	b.w. C_2	b.soilC_3	b.sed.C_4
1	1000	0	0	1.2E-04	4.2E-06	3.3E-06	2.3E-06	6.2E-06	1.1E-03	3.0E-04	5.1E-04
2	0	1000	0	3.7E-06	6.2E-05	1.1E-07	3.4E-05	2.0E-07	1.7E-02	9.7E-06	7.6E-03
3	0	0	1000	4.4E-07	7.8E-07	1.2E-04	4.3E-07	2.4E-08	2.1E-04	1.1E-02	9.5E-05
4	600	300	100	7.1E-05	2.1E-05	1.4E-05	1.2E-05	3.8E-06	5.7E-03	1.2E-03	2.6E-03

scenario	amount [kg]	amount			total	trasformation rate by reaction [kg/h]				trasformation rate by advection [kg/h]		
case	b. air m_1	b. w. m_2	b. soil m_3	b.sed. m_4	[kg]	b. air R_1	b. w. R_2	b.soil R_3	b.sed. R_4	b. air A_1	b. w. A_2	b.sed. A_4
1	6.2E+04	2.2E+04	4.8E+02	5.1E+01	8.5E+04	2.9E+02	4.3E+01	2.8E+01	9.8E-02	6.2E+02	2.2E+01	1.0E-03
2	2.0E+03	3.3E+05	1.6E+01	7.6E+02	3.3E+05	9.2E+00	6.4E+02	9.0E-01	1.5E+00	2.0E+01	3.3E+02	1.5E-02
3	2.4E+02	4.2E+03	1.7E+04	9.5E+00	2.1E+04	1.1E+00	8.0E+00	9.8E+02	1.8E-02	2.4E+00	4.2E+00	1.9E-04
4	3.8E+04	1.1E+05	2.0E+03	2.6E+02	1.5E+05	1.7E+02	2.2E+02	1.2E+02	5.0E-01	3.8E+02	1.1E+02	5.2E-03

scenario	amount [kg]	amount			total	% to total			
case	b. air m_1	b. w. m_2	b. soil m_3	b.sed. m_4	[kg]	b. air	b. w.	b. soil	b.sed.
1	6.2E+04	2.2E+04	4.8E+02	5.1E+01	8.5E+04	73.30	26.31	0.57	0.06
2	2.0E+03	3.3E+05	1.6E+01	7.6E+02	3.3E+05	0.60	99.90	0.00	0.23
3	2.4E+02	4.2E+03	1.7E+04	9.5E+00	2.1E+04	1.10	19.41	79.49	0.04
4	3.8E+04	1.1E+05	2.0E+03	2.6E+02	1.5E+05	24.84	74.24	1.31	0.17

scenario	transport rate between spheres [kg/h]						
case	air→ water	water→ air	air→ soil	soil→ air	soil→ water	water→ sed.	sed.→ water
1	6.7E+01	2.2E+00	2.8E+01	9.7E-02	3.5E-01	2.2E-01	1.2E-01
2	2.2E+00	3.2E+01	9.1E-01	3.1E-03	1.1E-02	3.3E+00	1.8E+00
3	2.5E-01	4.1E-01	1.1E-01	3.4E+00	1.2E+01	4.2E-02	2.3E-02
4	4.1E+01	1.1E+01	1.7E+01	4.0E-01	1.4E+00	1.1E+00	6.3E-01