

[FOREWORD](#)

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2-PROPANOL
CAS N°: 67-63-0

SIDS INITIAL ASSESSMENT PROFILE

| | |
|--------------------|--|
| CAS NO. | 67-63-0 |
| CHEMICAL NAME | Isopropanol |
| STRUCTURAL FORMULA | $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_3 \\ \\ \text{OH} \end{array}$ |

RECOMMENDATION OF THE SPONSOR COUNTRY

- currently of low priority for further work
 currently of low priority for further work, but avoid exposure to man and the environment
 requiring further information to assess identified concerns
 candidate for in-depth risk assessment with a view to possible risk reduction activities

SHORT SUMMARY OF THE REASONS WHICH SUPPORT THE RECOMMENDATION

Isopropanol is a high production volume chemical which is used as an industrial solvent, a component of industrial and consumer products and as a disinfectant. There is considerable potential for both occupational and consumer exposure.

There are estimates of significant fugitive emissions. Biodegradation in aquatic and terrestrial habitats, an physical degradation in the troposphere occur rapidly, indicating that isopropanol will not persist in the environment.

The mammalian/human toxicological properties of isopropanol have been well characterized in multiple animal species and humans for a variety of exposure routes, exposure durations and toxicity endpoints. High quality studies have been conducted that evaluate acute toxicity, skin and eye irritation, skin sensitization, subchronic and chronic toxicity, reproductive toxicity, developmental and developmental neurotoxicity, acute and subchronic neurotoxicity, genotoxicity and cancer. In addition, studies are available that characterize the disposition of isopropanol in mammals.

The information obtained from this database allows for the characterization of toxicity hazard of isopropanol for both human/mammalian and environmental effects. Taken together, these considerations support the conclusion that isopropanol is a low priority for further work.

FULL SIDS SUMMARY

| CAS NO: 67-63-0 | | SPECIES | PROTOCOL | RESULTS |
|---------------------------------------|---|---------|------------------------------------|--|
| PHYSICAL-CHEMICAL | | | | |
| 2.1 | Melting point | | ASTM D97 | 90 °C |
| 2.2 | Boiling point | | ASTM D1078 | 82 - 83 °C (at 1012 hPa) |
| 2.3 | Density | | ASTM D4052 | 0.785 - 0.786 g/cm ³ |
| 2.4 | Vapor pressure | | not known | 43 hPa at 20 °C |
| 2.5 | Partition coefficient (Log Pow) | | not known | 0.05 at 25 °C |
| 2.6 | Water solubility | | not known | 100 vol% at 20 °C (miscible) |
| | pH | | | at °C |
| | pKa | | | |
| 2.7 | Flash Point | | IP 170 | 12°C (closed cup) |
| 2.8 | Auto Flammability | | ASTM D2155 | 425°C |
| 2.9 | Flammability | | 84/449/EEC, A.10 | Highly flammable |
| 2.10 | Explosive properties | | | Explosive |
| 2.11 | Oxidizing properties | | | No oxidizing properties |
| 2.12 | Adsorption coefficient (Log Koc) | | Calculated | 0.03 |
| 2.13 | Henry's Law constant | | calculated | 7.52 x 10 ⁻⁶ atm •m ³ /mole 0.76 Pa •m ³ /mole |
| ENVIRONMENTAL FATE AND PATHWAY | | | | |
| 3.1.1 | Photodegradation | | | not subject to photolysis |
| | Atmospheric degradation (OH radical attack) | | Various | in air T1/2 = 18 to 25 hours |
| 3.1.2 | Stability in water | | | not subject to hydrolysis |
| 3.2 | Monitoring data | | | In air = mg/ m ³ In surface water = ug/l In soil/sediment = ug/g In biota = ug/g |
| 3.3 | Transport and Distribution | | Calculated (Fugacity Level 1 type) | In air 22.3 % In water 77.7% In sediment 0.0 % In soil 0.0 % |

| | | | | |
|----------------------|---|---|--|---|
| 3.5 | Biodegradation | aerobic | (Mackay) (local exposure) APHA-219 | In biota 0.0 % 49 % after 5 days at 20 °C |
| ECOTOXICOLOGY | | | | |
| 4.1 | Acute/Prolonged Toxicity to Fish | Pimephales promelas | Veith et al, 1983 | LC50 (96 hr) = 9640 mg/l |
| 4.2 | Acute Toxicity to Aquatic Invertebrates | Daphnia Magna Crangon Crangon | Bringmann & Kuehn, 1977 | EC50 (24 hr) > 10,000 mg/l LC50 (48 hr) = 1400 mg/L |
| 4.3 | Toxicity to Aquatic Plants e.g. Algae | Scenedesmus Quadricuada | Bringmann & Kuehn, 1980 | Toxicity Threshold = 1800 mg/l |
| 4.4 | Toxicity to Microorganisms e.g. Bacteria | Pseudomonas putida Entosiphon Sulcatum Microcystis Aeruginosa Chilomonas paramecium (Protozoa) | | Toxicity Threshold = 1050 mg/L Toxicity Threshold = 4930 mg/L Toxicity Threshold = 1000 mg/L Toxicity Threshold = 104 mg/L |
| 4.5.2 | Chronic Toxicity to Aquatic Invertebrates (Daphnia) | | | NOEC (16 day) = 141 mg/L (Growth) NOEC (21 day) = 30 mg/L |
| 4.6.1 | Toxicity to Soil Dwelling Organisms | | | LC50 (d) = mg/kg NOEL (d) = mg/l |
| 4.6.2 | Toxicity to Terrestrial Plants | Lactuca Sativa | Reynolds, 1977 | EC50 (3 d) = 2100 mg/l (inhibition of seed germination) |
| 4.6.3 | Toxicity to Other Non-Mammalian Terrestrial Species (including Birds) | Drosophila | David & Bocquet, 1976 | LC50 (48 hr) = 10200 - 13340 ppm |
| | Bioconcentration factor | | calculated | 1.0 |
| TOXICOLOGY | | | | |
| 5.1.1 | Acute Oral Toxicity | Rat Mouse Rabbit | see Dossier Guseinov, 1985 | LD50 range = 4710 - 5840 mg/kg LD50 = 4475 mg/kg LD50 = 5030 mg/kg |

| | | | | | |
|-------|---------------------------|------------------------|-----------------------------|---|--|
| 5.1.2 | Acute Inhalation Toxicity | Dog | Lehman, 1944 | LD50 = 4830 mg/kg | |
| | | Rat | Lehman, 1944 | LC50 (4 hr) = 72.6 mg/l | |
| | | Rat | Guseinov, 1985 | LC50 (8 hr) = 51 mg/l | |
| 5.1.3 | Acute Dermal Toxicity | Mouse | Laham, 1979 | LC50 (2 hr) = 53 mg/l | |
| 5.2.1 | Skin Irritation | Rabbit | Guseinov, 1985 | LD50 = 12,870 mg/kg | |
| 5.2.2 | Eye Irritation | Rabbit | Smyth, 1948 | Not Irritating | |
| 5.3 | Sensitization | Guinea Pig | Nixon, 1975 | Irritating | |
| 5.4 | Repeated Dose Toxicity | Rat and Mouse, Inhl. | Draize Test | Not Sensitizing | |
| | | Rat, Oral | P&G unpubl. | NOEL = 500 ppm (13 weeks) LOEL = 1500 ppm | |
| 5.5 | Genetic Toxicity in Vitro | Salmonella typhimurium | EPA TSCA | NOEL=1% (870 mg/kg/day) (12weeks) LOEL = 2% (1280 mg/kg/day) | |
| | | | Pilegaard & Ladefogel, 1993 | | |
| | | | Bacterial Test | | negative (with and without metabolic activation) |
| | | | Non-Bacterial Test | see Dossier | negative (with and without metabolic activation) |
| 5.6 | Genetic Toxicity in vivo | CHO (HGPRT) | V79 (SCE) | negative (with and without metabolic activation) | |
| | | | EPA TSCA | negative (with and without metabolic activation) | |
| | | | SA7/SHE | see Dossier | negative (without metabolic activation) |
| | | | Neurospora Crassa | see Dossier | negative (without metabolic activation) |
| 5.7 | Carcinogenicity | Mouse (Micronucleus) | see Dossier | negative (without metabolic activation) | |
| 5.8 | Toxicity to Reproduction | Rat and Mouse, Inhl. | see Dossier | negative | |
| 5.9 | Toxicity to Reproduction | Rats, 2-gen Oral | EPA TSCA | negative | |
| | | | EPA | NOEL Parental = <500 mg/kg/day (BMDL10 =407 mg/kg/day) (Reproductive Effects) NOEL F1 Offspring = <500 mg/kg/day (BMDL5 = 449 mg/kg/day) NOEL F2 Offspring = <500 | |

| | | | | |
|------|--|--------|---------------------------------|---|
| 5.11 | <p>Developmental Toxicity/Teratogenicity</p> <p>Experience with Human Exposure</p> | Rabbit | <p>EPA TSCA</p> <p>EPA TSCA</p> | <p>mg/kg/day (BMDL5 = 418 mg/kg/day)</p> <p>NOEL = 400 mg/kg/day (Maternal)</p> <p>NOEL=400 mg/kg/day (Developmental)</p> <p>NOEL = 1200 mg/kg/day (Developmental neurotoxicity)</p> <p>NOEL = 240 mg/kg/day (Maternal)</p> <p>NOEL=480 mg/kg/day (Developmental)</p> <p>Accidental Exposure Information</p> <p>Voluntary Study Information</p> <p>Epidemiology Information</p> |
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Exposure Assessment

1.1 Production Volumes

Worldwide production of isopropanol in 1995 was reported to be 1.8 million metric tons, with the largest producing regions being North America (771 thousand tons), Western Europe (619 thousand tons), and Asia (280 thousand tons). (World Petrochemicals, SRI International, 1996). US production was 1.4 billion pounds in 1994. (Chem Eng. News, June, 1995).

1.2 Major Uses

Most isopropanol goes into the solvent market either directly or via conversion to acetone or one of acetone's derivatives -- methyl isobutyl ketone, methyl isobutyl carbinol, diacetone alcohol, or isophorone. Isopropanol's major solvent uses include inks, coatings, cosmetics and pharmaceuticals. Small percentages are used for esters and as rubbing alcohol. In Western Europe, some production of the acetone derivatives proceeds directly from isopropanol to the ultimate derivative, without separation of the acetone intermediate. IPA is used as a flavoring agent, foam inhibitor and a deicing agent for windshields in automobiles. IPA is used in the production of acetone, isopropyl acetate, isopropylamine, diisopropyl ether, isopropyl xanthate, herbicidal esters and aluminum isopropoxide. In contrast, Japan does not use isopropanol to produce acetone. The most important uses for isopropanol in Japan are as solvents in surface coatings and in inks. (World Petrochemicals, SRI International, 1996)

1.3 Manufacturing Process

Since the 1940s the dominant manufacturing process is the weak acid process in which propene gas is absorbed in, and reacted with, 60% sulfuric acid and the resulting sulfates hydrolyzed in a single step process. IPA is stripped and refined from the condensate which contains diisopropyl ether, acetone, and polymer oils of low molecular mass. Another major current manufacturing process is catalytic hydration of propene with water. Hydration can be gas-phase with a phosphoric acid catalyst, mixed phase with a cation-exchange resin catalyst or liquid phase using a tungsten catalyst.

1.4 Distribution

Tank cars and tank trucks are used for domestic clients. In plant distribution is via pipeline and tank truck.

1.5 Fugitive Emissions

It was estimated that 1.5% of the total US production in 1976 was lost to the environment (Dorigan et al., 1976). Emission registration data from the Netherlands from 1974-1979 indicated that 3.3% of the production volume was lost to the air and 0.2% was lost to water (IPCS, 2-Propanol, 1990). Approximately 0.6% of the 1985 worldwide production of IPA was estimated to be released to the environment. (DGEP, 1987).

1.6 Workplace Monitoring

Personnel exposures in isopropanol manufacturing facilities are very low because the process, storage and handling operations are enclosed. One Texas manufacturer reported personnel

exposures to be well below 10 ppm based on 1990-95 monitoring data. Workplace monitoring data, gathered from a Louisiana manufacturing facility between 1988-1994, showed most mean exposures to be below 5 ppm with peak part-time exposures below 20 ppm.

Less is known about customer workplace exposures, but they are expected to be higher due to evaporation of isopropanol in the various industrial and consumer product applications. OSHA and ACGIH have established workplace exposure limits for isopropanol of 400 ppm TWA-8hr and 500 ppm STEL.

2.0 Summary of Environmental Fate and Effects

2.1 Environmental Fate

Based on calculated results from a level 1 fugacity model, isopropanol (IPA) is expected to partition primarily to the aquatic compartment (77.7%) with the remainder to the air (22.3%). IPA has been shown to biodegrade rapidly in aerobic, aqueous biodegradation tests and therefore, would not be expected to persist in aquatic habitats. IPA is also not expected to persist in surface soils due to rapid evaporation to the air. In the air, physical degradation will occur rapidly due to hydroxy radical (OH) attack. Overall, IPA presents a low potential hazard to aquatic or terrestrial biota.

IPA is expected to volatilize slowly from water based on a calculated Henry's Law constant of $7.52 \times 10^{-6} \text{ atm}\cdot\text{m}^3/\text{mole}$. The calculated half-life for the volatilization from surface water (1 meter depth) is predicted to range from 4 days (from a river) to 31 days (from a lake). Hydrolysis is not considered a significant degradation process for IPA. However, aerobic biodegradation of IPA has been shown to occur rapidly under non-acclimated conditions, based on a result of 49% biodegradation from a 5 day BOD test. Additional biodegradation data developed using standardized test methods show that IPA is readily biodegradable in both freshwater and saltwater media (72 to 78% biodegradation in 20 days).

IPA will evaporate quickly from soil due to its high vapor pressure (43 hPa at 20°C), and is not expected to partition to the soil based on a calculated soil adsorption coefficient ($\log K_{oc}$) of 0.03. IPA has the potential to leach through the soil due to its low soil adsorption.

In the air, isopropanol is subject to oxidation predominantly by hydroxy radical attack. The room temperature rate constants determined by several investigators are in good agreement for the reaction of IPA with hydroxy radicals. The atmospheric half-life is expected to be 10 to 25 hours, based on measured degradation rates ranging from 5.1 to $7.1 \times 10^{-12} \text{ cm}^3/\text{molecule}\cdot\text{sec}$, and an OH concentration of $1.5 \times 10^6 \text{ molecule}/\text{cm}^3$, which is a commonly used default value for calculating atmospheric half-lives. Using OH concentrations representative of polluted (3×10^6) and pristine (3×10^5) air, the atmospheric half-life of IPA would range from 9 to 126 hours, respectively. Direct photolysis is not expected to be an important transformation process for the degradation of IPA.

2.2 Toxicity to Aquatic Organisms

IPA has been shown to have a low order of acute aquatic toxicity. Results from 24- to 96-hour LC50 studies range from 1,400 to more than 10,000 mg/L for freshwater and saltwater fish and invertebrates. In addition, 16-hour to 8-day toxicity threshold levels (equivalent to 3% inhibition in

cell growth) ranging from 104 to 4,930 mg/L have been demonstrated for various microorganisms. Chronic aquatic toxicity has also been shown to be of low concern, based on 16- to 21-day NOEC values of 141 to 30 mg/L, respectively, for a freshwater invertebrate. Bioconcentration of IPA in aquatic organisms is not expected to occur based on a measured log octanol/water partition coefficient ($\log K_{ow}$) of 0.05, a calculated bioconcentration factor of 1 for a freshwater fish, and the unlikelihood of constant, long-term exposures.

2.3 Toxicity to Plants

Toxicity of IPA to plants is expected to be low, based on a 7-day toxicity threshold value of 1,800 mg/L for a freshwater algae, and an EC50 value of 2,100 mg/L from a lettuce seed germination test.

3.0 Summary of Health Effects

3.1 Acute Toxicity and Primary Irritancy

Isopropanol has a low order of acute toxicity. It is irritating to the eyes, but not to the skin. Very high vapor concentrations are irritating to the eyes, nose, and throat, and prolonged exposure may produce central nervous system depression and narcosis. Human volunteers reported that exposure to 400 ppm isopropanol vapors for 3 to 5 min. caused mild irritation of the eyes, nose and throat. Although isopropanol produced little irritation when tested on the skin of human volunteers, there have been reports of isolated cases of dermal irritation and/or sensitization. The use of isopropanol as a sponge treatment for the control of fever has resulted in cases of intoxication, probably the result of both dermal absorption and inhalation. There have been a number of cases of poisoning reported due to the intentional ingestion of isopropanol, particularly among alcoholics or suicide victims. These ingestions typically result in a comatose condition. Pulmonary difficulty, nausea, vomiting, and headache accompanied by various degrees of central nervous system depression are typical. In the absence of shock, recovery usually occurred.

3.2 Effects Resulting from Repeated Exposure

The systemic (non-cancer) toxicity of repeated exposure to isopropanol has been evaluated in rats and mice by the inhalation and oral routes. The only adverse effects-in addition to clinical signs-identified from these studies were to the kidney. Rats exhibited an accumulation in hyaline (protein) droplets in kidney proximal tubule cells (males only, subchronic exposure) and an exacerbation of chronic progressive nephropathy, a spontaneous disease of unknown etiology common in aged rats (males and females, chronic exposure). In the mouse, minimal to mild effects to the kidney including renal tubular proteinosis and tubular dilation were observed following chronic exposure. The incidence of renal tubular proteinosis was generally significantly increased for all male and female treatment groups relative to controls; however, the majority of affected animals showed minimal degrees of tubular proteinosis (i.e., only a few tubules affected), there was no concentration-related gradient in either the frequency or severity of this change, and there was no corresponding evidence of alterations to the glomeruli. Mild to moderate degrees of tubular dilation were observed in a small number of females in the 2500 and 5000 ppm groups (significantly increased only for the 5000 ppm group). This finding, however, was not duplicated in male mice (a

significant increase was only seen for the 500 ppm group) nor was it accompanied by evidence of tubular cell degeneration or urinary outflow obstruction.

3.3 Effects on Reproductive Capabilities

A recent two-generation reproductive study characterized the reproductive hazard for isopropanol associated with oral gavage exposure. This study found that the only reproductive parameter apparently affected by isopropanol exposure was a statistically significant decrease in male mating index of the F₁ males. It is possible that the change in this reproductive parameter was treatment-related and significant, although the mechanism of this effect could not be discerned from the results of the study. However, the lack of a significant effect of the female mating index in either generation, the absence of any adverse effect on litter size, and the lack of histopathological findings of the testes of the high-dose males suggest that the observed reduction in male mating index may not be biologically meaningful. Additional support for this conclusion is provided by the fact that most of the females became pregnant. Furthermore, male and female fertility, and female fecundity indices of rats dosed with isopropanol were not different from those of controls by statistical analysis and were within, or relatively close to, historical control values. No reproductive effects were noted in other studies in which rats were dosed up to 2% in the drinking water. Exposure to 1000 mg/kg/day and to a lesser extent 500 mg/kg/day did result in a reduction in postnatal survival in both F₁ and F₂ litters. Derivation of an appropriate NOAEL for offspring effects was made difficult because of conflicting interpretations of the reductions in postnatal survival for the 500 mg/kg/day treatment group. The U.S. EPA (1992) and Tyl (1996) concluded the reductions were treatment- and dose-related, a conservative interpretation that supports a NOAEL of 100 mg/kg/day. Alternatively, Bevan *et al.* (1995) and Harris (1995) deemed the observations not to be biologically significant and concluded the NOAEL to be 500 mg/kg/day. In order to clarify this issue a benchmark dose (BMD) assessment was conducted for the study's developmental and reproductive findings (Shipp *et al.*, 1996). For the offspring developmental effects, BMD dosages (BMDL₅) of 449 and 418 mg/kg/day were estimated for the F₁ and F₂ generations, respectively. Based upon the decrease in male mating index observations in the P₂ males, a BMDL₁₀ of 407 mg/kg/day was estimated for reproductive effects.

3.4 Effects on Developmental Toxicity

The developmental toxicity of isopropanol has been characterized in rat and rabbit developmental toxicity studies and in a rat developmental neurotoxicity study. The rats were dosed by oral gavage at 400, 800 or 1200 mg/kg from gestational days 6 through 15. The rabbits were dosed by oral gavage at 120, 240 or 480 mg/kg from gestational days 6 through 18. These studies indicate that isopropanol is not a selective developmental hazard. Isopropanol produced developmental toxicity in rats, but not in rabbits. In the rat, the developmental toxicity occurred only at maternally toxic doses and consisted of decreased fetal body weights, but no teratogenicity. These data suggest the developmental NOAEL is 400 mg/kg/day for rats and 480 mg/kg/day for rabbits.

Isopropanol has also been tested for developmental toxicity in rats via oral gavage. The rats were dosed at 200, 700 and 1200 mg/kg from gestational days 6 through 21. No exposure-related effects were noted on motor activity, weights of the four regions of the brain, developmental landmarks, or morphological changes to the tissues of the central nervous tissue. These data suggest the developmental neurotoxicity NOAEL for rats is 1200 mg/kg.

3.5 Genotoxic Effects

All genotoxicity assays reported for isopropanol have been negative. Characterization of the genotoxicity hazard for isopropanol is provided by both in vitro and in vivo mutation/chromosomal studies. Isopropanol was found to be negative in an in vitro CHO/HGPRT assay, was negative in vitro for aneuploidy in *Neurospora crassa*, and did not increase micronuclei in an in vivo micronuclei assay in mice. Mutagenicity studies also showed that isopropanol was not mutagenic in various Ames assays both in the presence or absence of an S9 metabolic activation system. In vitro sister chromatic exchange (SCE) assays on isopropanol using cultured V79 cells both with and without S9 activation, were also negative. Isopropanol did not induce transformation in Syrian hamster embryos infected with Simian SA7 virus. These studies demonstrate that isopropanol is not a hazard for genotoxic effects.

3.6 Carcinogenicity

Two recent chronic exposure, rodent inhalation studies were conducted to evaluate isopropanol for cancer potential. One study was performed exposing Fischer 344 rats to 500, 2500 and 5000 ppm of IPA for 6 hours/day, 5 days/week for 24 months. The only tumor rate increase seen was for interstitial (Leydig) cell tumors in the male rats. Interstitial cell tumors of the testis is typically the most frequently observed spontaneous tumor in aged male Fischer 344 rats (Haseman et al., 1990). Nearly all male Fischer rats will develop these proliferative tumors if they are allowed to complete their lifespan (Boorman et al., 1990). A mouse inhalation study was performed exposing CD-1 mice to 500, 2500 and 5000 ppm of IPA for 6 hours/day, 5 days/week for 18 months. There was no increased frequency of neoplastic lesions in any of the treated groups. These studies demonstrate that isopropanol does not exhibit carcinogenic potential relevant to humans. Furthermore, there was no evidence from this study to indicate the development of carcinomas of the testes in the male rat, nor has isopropanol been found to be genotoxic. Thus, the testicular tumors seen in the isopropanol-exposed male rats are considered of no significance in terms of human cancer risk assessment.

4.0

Conclusions

Isopropanol (IPA) is a high production volume chemical which has wide use as an industrial solvent and as a component in numerous industrial and consumer products. It has a potential for widespread exposure to both workers and consumers.

Based upon physical and chemical properties, isopropanol is not expected to persist in the environment. Aerobic biodegradation of isopropanol occurs rapidly. IPA is not expected to persist in soil due to low soil adsorption and rapid evaporation to air. In the air, isopropanol is subject to rapid oxidation by hydroxyl radical attack. IPA has a low order of toxicity to aquatic organisms and plants, and bioconcentration in aquatic organisms is not expected to occur.

The mammalian/human toxicological properties of IPA have been well characterized in multiple animal species and humans for a variety of exposure routes, exposure durations and toxicity endpoints. High quality studies have been conducted that evaluate acute toxicity, skin and eye irritation, skin sensitization, subchronic and chronic toxicity, reproductive toxicity, developmental and developmental neurotoxicity, acute and subchronic neurotoxicity, genotoxicity and cancer. In addition, studies are available that characterize the disposition of IPA in mammals.

The information obtained from this database allows for the characterization of toxicity hazard of IPA for both human/mammalian and environmental effects. Taken together, these considerations support the conclusion that IPA is a low priority for further work.

5.0

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SIDS DOSSIER
ON THE HPV CHEMICAL
ISOPROPANOL

CAS. No. 67-63-0

DATE OF LAST UPDATE: March 1997

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1. GENERAL INFORMATION**1.01 Substance Identification**

CAS-No.: 67-63-0
 EINECS-No.: 200-661-7
 IUPAC-Name: Propan -2- ol
 Molecular Formula: C3H8O
 Molecular Weight: 60
 Smiles Code: CC(OH)C

1.02 OECD Information

Sponsor Country: United States
 Lead Organization: Environmental Protection Agency
 Contact Person: Mr. Charles Auer
 Name of Responder: Chemical Manufacturers Association
 Name: Ms. Marion K. Stanley
 Address: 1300 Wilson Boulevard
 Arlington, VA 22209

1.1 General Substance Information

| <u>Substance Type</u> | <u>Physical Status</u> | <u>Purity</u> |
|-----------------------|------------------------|---------------|
| organic | liquid | >99.7 % w/w |

1.2 Synonyms

IPA
 Isopropyl Alcohol
 Isopropanol
 2-propanol

1.3 Impurities

| <u>CAS-No.</u> | <u>EINECS-No.</u> | <u>IUPAC-Name</u> | <u>Value</u> |
|----------------|-------------------|-------------------|--------------|
| | | water | < 0.15 % w/w |

1.4 Additives

| <u>CAS-No.</u> | <u>EINECS-No.</u> | <u>IUPAC-Name</u> | <u>Value</u> |
|----------------|-------------------|-------------------|--------------|
| | | none | |

1.5 Quantity

Production: 1.8 million metric tons: North America: 771 metric tons, Western Europe: 619 metric tons, Asia: 280 metric tons
 Reference: World Petrochemicals, 1996

1.7 Use Pattern

| <u>Category</u> | <u>Type of Use</u> |
|-----------------------------------|--|
| Industrial Sectors/General Use | adhesive automotive construction cosmetics electrical products leather industry metalurgical mining ceramics/glass industrial organic chemicals paints photography pigments and dyes plating and surface finishing printing and publishing petroleum refining soap production textiles water and waste treatment |
| Medical | disinfectant |

1.8 Occupational Exposure Limit Values

| | |
|---------------------------|---|
| Type of Limit | TLV (US) |
| Value | 983 mg/m ³ |
| Short Term Exposure Limit | |
| Value | 1230 mg/m ³ |
| Time Schedule | |
| Frequency | 15 minute |
| Reference | 1995-1996 Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs). American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, OH (1995). |

1.9 Sources of Exposure

| | |
|-----------|--|
| Remark | Primary production process is the weak acid process in which propene gas is absorbed in, and reacted with, 60% sulfuric acid and the resulting sulfates hydrolyzed in a single step process. IPA is stripped and refined from the condensate which contains diisopropyl ether, acetone and polymer oils of low molecular mass. |
| Reference | US NIOSH Criteria for a recommended standard: occupational exposure to isopropyl alcohol, Cincinnati, OH. US NIOSH, US Dept of Health Education and Welfare, Public Health Service, Center for Disease Control (DHEW Publication No. NIOSH 76-142). |

| | |
|-----------|--|
| Remark | Emission registration data from the Netherlands from 1974-1979 indicated that 3.3% of the production volume was lost to the air and 0.2% was lost to water |
| Reference | IPCS, 2-Propanol WHO (1990) |
| Remark | Approximately 0.6% of the 1985 worldwide production of IPA was estimated to be released to the environment. |
| Reference | DGEP (1987). |

2 PHYSICO-CHEMICAL DATA

2.1 Melting Point

| | |
|----------------|---|
| Value | = -90 degree C |
| Decomposition | |
| Sublimation | |
| Method | other |
| Year | |
| GLP | no |
| Test condition | Method is ASTM D 97 |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.2 Boiling Point

| | |
|----------------|---|
| Value | ca. 82 - 83 degree C |
| Pressure | 1012 hPa |
| Decomposition | no |
| Method | other |
| Year | |
| GLP | no |
| Test condition | ASTM D1078, standard method for distillation range |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.3 Density

| | |
|----------------|---|
| Type | density |
| Value | ca. 0.785 - 0.786 g/cm ³ |
| Temperature | 20 degree C |
| Method | other |
| Year | |
| GLP | no |
| Test condition | ASTM D4052, Standard method for density |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.4 Vapor Pressure

| | |
|-------------|-------------|
| Value | = 43 hPa |
| Temperature | 20 degree C |

| | |
|-----------|---|
| Method | other |
| Year | |
| GLP | |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.5 Partition Coefficient

| | |
|-------------|---|
| log Pow | = 0.05 |
| Temperature | 25 degree C |
| Method | other (measured) |
| Year | 1973 |
| GLP | no data |
| Reference | Dillingham, E.O. et al., J.Pharm.Sci., 62, 1973, 22. In Pomona Data File on Log P and related parameters. |

2.6 Water Solubility

| | |
|-----------|---|
| Value | = 100 vol% at 20 degree C |
| pH | Concentration at degree C |
| pKa | at 25 degree C |
| Descr. | miscible |
| Method | other |
| Year | |
| GLP | |
| Reference | Shell Chemicals Data sheet IS 3.2.4 dated June 1992 |

2.7 Flash Point

| | |
|----------------|---|
| Value | = 12 degrees C |
| Type | closed cup |
| Method | other |
| Year | |
| GLP | no |
| Test condition | IP 170, Standard method for flash point |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.8 Auto Flammability

| | |
|----------------|---|
| Value | = 425 degree C |
| Pressure | |
| Method | other |
| Year | |
| GLP | no |
| Test condition | ASTM D2155, Standard method for autoignition |
| Reference | Shell Chemicals data sheet IS 3.2.4 dated June 1992 |

2.9 Flammability

| | |
|--------|----------------------------|
| Result | highly flammable |
| Method | Directive 84/449/EEC, A.10 |

Year
 GLP no
 Reference Shell Chemicals data sheet IS 3.2.4 dated June 1992

2.10 Explosive Properties

Result explosive
 Method
 Year
 GLP
 Remark Vapor can form an explosive mixture with air at room temperature
 Reference Shell Chemicals data sheet IS 3.2.4 dated June 1992

2.11 Oxidizing Properties

Result no oxidizing properties
 Method
 Year
 GLP
 Reference Shell Chemicals Data sheet IS 3.2.4 dated June 1992

3 ENVIRONMENTAL FATE AND PATHWAYS

3.1.1 Photodegradation

Type air
 Light Source Sun light
 Light Spect. ca. 290 - 900 nm
 Rel. Intens. = 100 based on Intensity of Sunlight
 Spectrum of Substance
 lambda (max) [$>295\text{nm}$] nm epsilon (max)
 epsilon (295)
 Conc. of Substance Temperature _____ degree C _____

===== DIRECT PHOTOLYSIS =====

Half-life $t_{1/2}$
 Degradation % after
 Quantum yield

===== INDIRECT PHOTOLYSIS =====

Type air
 Indirect photolysis
 Sensitizer NO₃
 Rate Constant $\leq .0000000000000023 \text{ cm}^3/(\text{molecule} \cdot \text{sec})$
 Method other (measured): Flash-Photolysis- Visible Absorption
 Year 1987

| | |
|---------------------|--|
| GLP | no data |
| Testsubstance | other TS: >= 99% pure |
| Remark | Estimated troposphere half-life of 2-propanol for a "clean" troposphere with 10 ppt (approximately 2.4×10^8 radicals/cm ³ of NO ₃ radicals during night-time hours, $t_{1/2} \geq 14.5$ d. |
| Test condition | 25 degrees C, total pressure of 133.3 hPa of NO ₂ diluent |
| Reference | Wallington, T.J. et al. (1987): Int J Chem Kinet 19, 243-249. |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .0000000000051 cm ³ /(molecule*sec) |
| Method | OECD Guide-line draft "Photochemical Oxidative Degradation in the |
| Year | 1987 |
| GLP | no data |
| Testsubstance | no data |
| Remark | Estimated tropospheric half-life of 2-propanol with an average tropospheric OH radical concentration of 5×10^5 radicals/cm ³ , $t_{1/2} = 3.1$ d. |
| Test condition | smog-chamber: 27 degrees C, 0.105 - 0.110 Mpa, UV-A lamps (1.5 m long, 65 W Hg low pressure lamps, TL 65-80 W/05), maximum volume-averaged UV intensity (k_1 of NO ₂ photolysis amounted to about $k_1 = 0.9$ min ⁻¹) corresponding to twice the solar UV intensity at sea level and midlatitudes, OH source: HONO photolysis. |
| Reference | Kloepffer, W. et al. (1988): Ecotoxicol Environ Safety 15, 298-319. |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .00000000000521 cm ³ /(molecule*sec) |
| Method | other (measured): Photodegradation by Indirect Photolysis |
| Year | 1990 |
| GLP | no data |
| Testsubstance | no data |
| Remark | Estimated tropospheric half-life of 2-propanol, with an OH radical concentration of 5×10^5 radicals/cm ³ , $t_{1/2} = 3.1$ d. |
| Test condition | 25 degrees C |
| Reference | Atkinson, R. (1990): J Phys Chem Ref Data (1992), 21(6):1125-1568 |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Conc. of Sensitizer | 500000 molecules/cm ³ |
| Rate constant | = .00000000000521 cm ³ /(molecule*sec) |
| Degradation | = 50% after 6.2 days |
| Method | other (measured): AOP Computer Program, Vers. 1.53, Syracuse Research Center (based upon reference). |
| Year | 1994 |
| GLP | no data |
| Testsubstance | no data |

| | |
|---------------------|---|
| Remark | Half-life refers to 12 hour-days |
| Reference | Atkinson, R.: A structure-activity relationship for the estimation of rate constants for the gas-phase reactions of OH radicals with organic compounds. Int J Chem Kinet 19, 799-828 (1987) |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .00000000000532 cm ³ /(molecule*sec) |
| Method | other (calculated): Prediction of the OH reaction rate constant by correlation of the negative logarithm of OH reaction rate constants with the first vertical ionisation energy of organic compounds in the gas phase. |
| Year | 1984 |
| GLP | no data |
| Testsubstance | no data |
| Remark | The correlation of the negative logarithm of OH reaction rate constants with the first vertical ionisation energy of organic compounds in the gas phase enables the prediction of kOH with a probability of about 90%; estimated tropospheric half-life of 2 propanol, assessing a global diurnal mean of OH radical concentration of 5*10E5 radicals/cm ³ , t1/2 = 3.0 d. |
| Test condition | 27 degrees C |
| Reference | Guesten, H. et al. (1984): J Atmos Chem 2, 83-93. |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .00000000000548 cm ³ /(molecule*sec) |
| Method | other (measured): Flash-Photolysis Resonance-Asorption Technique |
| Year | 1978 |
| GLP | no data |
| Testsubstance | no data |
| Remark | Estimated tropospheric half-life of 2 propanol, with an OH radical concentration of 5*10E5 radicals/cm ³ , t1/2 = 2.9 d. |
| Test condition | 23 degrees C, 200 hPa |
| Reference | Overend, R., Paraskevopoulos, G. (1978): J Phys Chem 82, 1329-1333. |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .0000000000062 cm ³ /(molecule*sec) |
| Method | other (measured): Photodegradation by Indirect Photolysis |
| Year | 1985 |
| GLP | no data |
| Test substance | no data |
| Remark | Estimated tropospheric half-life of 2-propanol, with an OH radical concentration of 5*10E5 radicals /cm ³ , t1/2 = 2.6 d. |
| Test condition | room temperature |

| | |
|---------------------|--|
| Reference | Atkinson, R. (1985): Chem Rev 85, pp. 69-75, 135-153, 182-201. |
| Type | air |
| Indirect photolysis | |
| Sensitizer | OH |
| Rate constant | = .0000000000071 cm ³ /(molecule*sec) |
| Method | other (measured): Environmental Chamber Photooxidation Study |
| Year | 1976 |
| GLP | no data |
| Testsubstance | no data |
| Remark | Estimated atmospheric half-life of 2 propanol, with an average ambient OH radical concentration of 5/10E6 radicals/cm ³ , t _{1/2} - 5.4 h. |
| Test condition | Smog-chamber: ca. 32 degrees C, 1013 hPa, OH source: HONO photolysis and the reaction of NO ₂ with NO. |
| Reference | Lloyd, A.C. et al. (1976): Chem Phys Lett. 42, 205-209. |

3.1.2 Stability in Water

| | |
|-----------|---|
| Type | abiotic |
| Remark | Propan-2-ol is not susceptible to hydrolysis. |
| Reference | P.H. Howard, Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Lewis Publishers Inc., Chelsea Michigan USA, 1990, p.304 -309. |

| | |
|----------------------|--|
| Type | biotic |
| t _{1/2} pH4 | at degree C |
| t _{1/2} pH7 | = 5 days at 20 degree C |
| t _{1/2} pH9 | at degree C |
| t _{1/2} pH | at degree C |
| Degradation pH 7 | at 20 degree C: = 50 % after 5 days |
| Method | other |
| Year | 1979 |
| GLP | no data |
| Test substance | as prescribed by 1.1 - 1.4 |
| Test condition | APHA-219 (1971) at 20 degree C. |
| Reference | Bridie, A.L., Wolff, C.J.M. & Winter, M., Water Research, 13, 1979, 627 - 630. |

3.3.1 Transport between Environ. Compart.

| | |
|-----------|--|
| Type | volatility |
| Media | water - air |
| Method | other |
| Year | 1982 |
| Result | The evaporation half-life of propan-2-ol in a model river with a depth of 1 m and a current of 1 m/s at a wind velocity of 3 m/s is calculated to be 85.2 hours. |
| Reference | Lyman, W.J. et al., Chemical Property Estimation Methods. |

Environmental behavior of organic compounds. McGraw-Hill Book Company, New York (USA), 1982, Chpt 15.

Type volatility
 Media soil - air
 Method other
 Year 1990
 Result Propan-2-ol is relatively volatile and would therefore readily evaporate from dry soil and surfaces.
 Reference Howard, P.H., Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Vol. 2. Lewis Publishers, Inc. Chelsea, Michigan (USA), 1990, p. 304-309.

Method OECD Guide-line draft
 Year 1990
 GLP no data
 Test substance as prescribed by 1.1 - 1.4

Type volatility
 Medium other: domestic waste - air
 Method other: Evaporation Study
 Year 1978
 GLP no data
 Remark The rate of evaporation of diluted (1:1 v/v mixture with water) and undiluted 2-propanol from pulverized domestic waste (0.5 m deep, 1 m²) over the first 10 min was 1.90 and 3.22 kg/m² per h, and from 200-440 min 0.65 and 0.15 kg/m² per h respectively

Test condition 2-Propanol (1:1 v/v mixture with water):
 initial weight of 2-propanol 7.2 kg, initial weight of water 10 kg, weight of waste 174 kg, waste surface temperature 24-37 degrees C, ambient air temperature ca. 22 degrees C, mean wind speed ca. 4.5 m/sec
 2-Propanol (undiluted):
 initial weight of 2-propanol 19.5 kg, weight of waste 177 kg, waste surface temperature ca. 18 degrees C, ambient air temperature ca. 12 degrees C, mean wind speed ca. 0.5 m/sec

Test substance technical grade
 Reference Jones, C.J. McGugan, P.J. (1977/78): J Hazard Mater. 2, 235-251.

Type volatility
 Medium water-air
 Method other: Evaporation Study
 Year 1978
 GLP no data
 Remark The rate of evaporation of diluted (1:1 v/v mixture with water) and undiluted 2-propanol from a shallow pool (1 m²) was 1.5 and 1.1 kg/m² per h, respectively.

Test condition 2-Propanol (1:1 v/v mixture with water):
 initial weight of 2-propanol 7.2 kg, initial weight of water 10 kg, pool temperature ca. 20 degrees C, ambient air temperature ca. 22 degrees C, mean wind speed ca. 4.5 m/sec.

2-Propanol (undiluted):
 initial weight of 2-propanol 18.25 kg, pool temperature ca. 13 degrees C, ambient air temperature ca. 12 degrees C, mean wind speed ca. 0.5 m/sec.
 Test substance technical grade
 Reference Jones, C.J. McGugan, P.J. (1977/78): J Hazard Mater. 2, 235-2513.3.2

3.2.2 Distribution

Media air - biota - sediment(s) - soil - water
 Method Calculation according Mackay, Level I
 Year 1981
 Result Air 22.3 %m;
 Water 77.7 %m;
 Soil 0.0 %m;
 Sediment 0.0 %m;
 Biota 0.0 %m.
 Reference Mackay, D. & Paterson, S., Calculating Fugacity, Environm. Sci. Technol., 15(9), 1981, 1006 -1014.

3.4 Mode of Degradation in Actual Use

1 10/05/94 RS:1 RE:1
 Result In air propan-2-ol will be rapidly transformed through reaction with OH-radicals.
 Reference P.H. Howard, Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Lewis Publishers Inc., Chelsea Michigan USA, 1990, p 304 - 309

2 10/05/94 RS:1 RE:1
 Result In water propan-2-ol will be lost by biodegradation.
 Reference P.H. Howard, Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Lewis Publishers Inc., Chelsea Michigan USA, 1990, p. 304 - 309.

3.5 Biodegradation

Type aerobic
 Inoculum predominantly domestic sewage, non-adapted
 Concentration 1.5 mg/l related to Test substance
 Degradation = 49 % after 5 day
 Results readily biodegradable
 Kinetic
 Method other
 Year 1979
 GLP no data
 Testsubstance as prescribed by 1.1 - 1.4
 Test condition APHA-219 (1971) at 20 degree C.

| | |
|----------------|---|
| Reference | A) Bridie, A.L., Wolff, C.J.M., & Winter, M. BOD and COD of some Petrochemicals, Water Research, 13, 1979, p. 627 -630. B) Idem, Shell Group Research Report, AMGR.0224.74 |
| Type | aerobic |
| Inoculum | domestic sewage, non-adapted |
| Concentration | 3, 7 and 10 mg/l related to Test substance |
| Degradation | = 77 % after 10 day |
| Results | readily biodegradable |
| Kinetic | 5 day = 28 10 day = 77 15 day = 80 20 day = 78 |
| Method | other |
| Year | 1974 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. |
| Reference | Price, K.S. Waggy, G.T. & Conway, R.A., Brine Shrimp Bioassay and Seawater BOD of Petrochemicals, J. Water Pollut. Contr. Fed., 46,1974, 63 - 77. |
| Type | aerobic |
| Inoculum | domestic sewage, non-adapted |
| Concentration | 3, 7 and 10 mg/l related to Test substance |
| Degradation | = 42 % after 10 day |
| Results | |
| Kinetic | 5 day = 13 10 day = 42 15 day = 60 20 day = 72 |
| Method | other |
| Year | 1974 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. The test medium is artificial seawater. |
| Reference | Price, K.S., Waggy, G.T. & Conway, R.A., Brine Shrimp Bioassay and Seawater BOD of Petrochemicals, J. Water Pollut. Contr. Fed., 46, 1974, 63 - 77. |

4. ECOTOXICITY

4.1 Acute/Prolonged Toxicity to Fish

| | |
|-----------------|---------------------|
| Type | flow through |
| Species | Pimephales promelas |
| Unit | mg/l |
| Exposure Period | 96 hour |
| NOEC | |
| LC0 | |

| | |
|--------------------|---|
| LC50 | = 9640 |
| LC100 | |
| Analyt. Monitoring | yes |
| Method | other |
| Year | 1983 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. |
| Reference | Veith, G.D., Call, D.J. & Brooke, L.T., Estimating the Acute Toxicity of Narcotic Industrial Chemicals to Fathead Minnows. In: Bishop, W.E., Cardwell, R.D. & Heidolph, B.B. Eds. Aquatic Toxicology and Hazard Assessment: 6th Symp., ASTM STP 802, Philadelphia (USA), 1983, 90 - 97. |

4.2 Acute Tox. to Aquatic Invertebrates

| | |
|--------------------|---|
| Species | Daphnia magna |
| Unit | mg/l |
| Exposure Period | 24 hour |
| NOEC | |
| EC0 | |
| EC50 | > 10000 |
| EC100 | |
| Analyt. Monitoring | no |
| Method | other |
| Year | 1977 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. |
| Reference | Bringmann, G. & Kuehn, R., Results of the Damaging Effect of Water Pollutants on Daphnia magna, Z. Wasser Abwasser Forsch., 10(5), 1977, 161 - 166. |

| | |
|--------------------|--|
| Species | Crangon crangon |
| Unit | mg/l |
| Exposure Period | 48 hour |
| NOEC | |
| EC0 | |
| EC50 | |
| EC100 | |
| LC50 | = 1400 |
| Analyt. Monitoring | no |
| Method | other |
| Year | 1974 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The species is a marine invertebrate. |
| Test condition | As described in reference. Renewal. |

Reference Blackman, R.A.A., Toxicity of Oil-Sinking Agents, Mar. Pollut. Bull., 5, 1974, 116 - 118.

4.3 Toxicity to Aquatic Plants e.g. Algae

| | |
|--------------------|---|
| Species | Scenedesmus quadricauda |
| Endpoint | growth rate |
| Unit | mg/l |
| Exposure Period | 7 day |
| NOEC | |
| LOEC | |
| EC0 | |
| EC10 | |
| EC50 | |
| Analyt. Monitoring | no |
| Method | other |
| Year | 1980 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. |
| Remark | Toxicity threshold concentration = 1800 mg/l. |
| Reference | Bringmann, G. & Kuehn, R., Comparison of the Toxicity Thresholds of Water Pollutants to Bacteria, Algae and Protozoa in the Cell Multiplication Inhibition Test, Water Research, 14, 1980, 231 - 241. |

4.4 Tox. to Microorganisms e.g. Bacteria

| | |
|--------------------|--|
| Type | aquatic |
| Species | Pseudomonas putida |
| Unit | mg/l |
| Exposure Period | 16 hour |
| EC0 | |
| EC10 | |
| EC50 | |
| LOEC | |
| Analyt. Monitoring | no |
| Method | other |
| Year | 1980 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Test condition | As described in reference. |
| Remark | Toxicity threshold concentration = 1050 mg/l. |
| Reference | Bringmann, G. & Kuehn, R. Water Research, 14, 1980, 231 - 241. |

| | |
|-----------------|---------------------|
| Type | aquatic |
| Species | Entosiphon sulcatum |
| Unit | mg/l |
| Exposure Period | 72 hour |
| EC0 | |
| EC10 | |
| EC50 | |

LOEC
 Analyt. Monitoring no
 Method other
 Year 1980
 GLP no data
 Testsubstance as prescribed by 1.1 - 1.4
 Test condition As described in reference.
 Remark Toxicity threshold concentration = 4930 mg/l.
 Reference Bringmann, G. & Kuehn, R., Water Research, 14, 1980, 231 - 241.

Type aquatic
 Species *Microcystis aeruginosa*
 Unit mg/l
 Exposure Period 8 day
 EC0
 EC10
 EC50
 LOEC

Analyt. Monitoring
 Method other
 Year 1978
 GLP no data
 Testsubstance as prescribed by 1.1 - 1.4
 Test condition As described in reference.
 Remark Toxicity threshold concentration = 1000 mg/l.
 Reference Bringmann, G. & Kuehn, R., Grenzwerte der Schadwirkung wassergefaehdender Stoffe gegen Blaualgen (*Microcystis aeruginosa*) und Gruenalgen (*Scenedesmus quadricauda*) im Zellvermehrungshemmtest, Vom Wasser, 50, 1978, 45 - 60.

Type aquatic
 Species *Chilomonas paramecium* (Protozoa)
 Exposure period 48 h
 Unit mg/l
 Analytical monitoring no
 TT: = 104
 Method other: Cell Multiplication Inhibition Test
 Year 1980
 GLP no data
 Testsubstance no data
 Remark TT = toxicity threshold
 Test condition pH 6.9; 20 degrees C
 Reference Bringmann, G. et al. (1980): Z. Wasser Abwasser Forsch. 13, 170-173.

4.5.2 Chronic Toxicity to Aquatic Invertebrates (Daphnia)

Species *Daphnia magna* (Crustacea)
 Exposure period 16 day
 Unit mg/l
 Analyt. monitoring yes

| | |
|--------------------|--|
| NOEC | = 141 |
| Method | other: Prolonged Toxicity Test |
| Year | 1985 |
| GLP | no data |
| Testsubstance | no data |
| Remark | NOEC on growth: highest concentration which did not result in a significant reduction in growth at $p < 0.001$. |
| Reference | Hermens, J. et al (1985): Aquatic Toxicol. 6, 209-217. |
| Species | Daphnia magna (Crustacea) |
| Exposure period | 21 day |
| Unit | mg/l |
| Analyt. Monitoring | no |
| NOEC | = 30 |
| EC50 | > 100 |
| EC29 | = 100 |
| Method | other: UBA-Verfahrensvorschlag: Verlaengerter Toxizitaetstest bei Daphnia magna |
| Year | 1984 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Huel-Bericht DL 106, 1988 (unveroeffentlicht) |

4.6.2 Toxicity to Terrestrial Plants

| | |
|-----------------|--|
| Species | Lactuca sativa |
| Endpoint | other |
| Unit | mg/l |
| Exposure Period | 3 day |
| NOEC | |
| EC50 | = 2100 |
| LC50 | |
| Method | other |
| Year | 1977 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The effect parameter reported is inhibition of seed germination. |
| Test condition | As described in reference. |
| Reference | Reynolds, T. An Anomalous Effect of Isopropanol on lettuce germination. Plant Sci. Lett., 15, 1977, 25 - 28. |

4.6.3 Tox. to Other Non-mamm. Terr. Species

| | |
|-----------------|---------------|
| Species | other |
| Endpoint | mortality |
| Unit | ppm |
| Exposure Period | 48 hour |
| NOEC | |
| LC0 | |
| LC50 | 10200 - 13340 |
| LC100 | |

| | |
|----------------|---|
| Method | other |
| Year | 1976 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The insects are exposed to the propan-2-ol in nutrient medium. |
| Remark | The test species reported are <i>Drosophila simulans</i> and <i>Drosophila melanogaster</i> |
| Test condition | As described in reference. |
| Reference | David, J. & Bocquet, C. Compared Toxicities of Different Alcohols for Two <i>Drosophila</i> Sibling Species. <i>Comp. Biochem. Physiol.</i> , 54C, 1976, 71 - 74. |

5. TOXICITY

5.1.1 Acute Oral Toxicity

| | |
|---------------|---|
| Type | LD50 |
| Species | rat |
| Value | = 5280 mg/kg |
| Method | other |
| Year | 1944 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Lehman, A. J., Chase, H.F., (1944) <i>J. Lab. Clin. Med.</i> 29: 561 - 567. |

| | |
|---------------|--|
| Type | LD50 |
| Species | rat |
| Value | = 5840 mg/kg |
| Method | other |
| Year | 1948 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Smyth, H.F., Carpenter, C.P., (1948), <i>J. Ind. Hyg. Toxicol.</i> ,30: 63-70. |

| | |
|---------------|--|
| Type | LD50 |
| Species | rat |
| Value | = 4710 mg/kg |
| Method | other |
| Year | 1971 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Three LD50 values presented: 5.6, 6.0 and 6.8 ml/kg for neonates, young adult and old rats respectively. Quoted value is a mean of the three as presented in IPCS EHC document on 2-propanol (1990). |
| Reference | Kimura, E.T., Ebert, D.M., Dodge, P.W., (1971), <i>Toxicol. Appl. Pharmacol.</i> , 19: 699 -703. |

| | |
|---------|------|
| Type | LD50 |
| Species | rat |

Value = 5500 mg/kg
 Method other
 Year 1985
 GLP no
 Testsubstance as prescribed by 1.1 - 1.4
 Reference Guseinov, V.G., (1985), Gig. Tr. Prof. Zabol. (7): 60-62.

Type LD50
 Species mouse
 Value = 4475 mg/kg
 Method other
 Year 1985
 GLP no
 Testsubstance as prescribed by 1.1 - 1.4
 Reference Guseinov, V.G., (1985), Gig. Tr. Prof. Zabol., (7): 60-62.

Type LD50
 Species rabbit
 Value = 5030 mg/kg
 Method other
 Year 1944
 GLP no
 Testsubstance as prescribed by 1.1 - 1.4
 Reference Lehman, A.J., Chase, H.F. (1944), J. Lab. Clin. Med., 29: 561 - 567.

Type LD50
 Species rabbit
 Value = 7990 mg/kg
 Method other
 Year 1972
 GLP no
 Testsubstance as prescribed by 1.1 - 1.4
 Reference Munch, J.C., (1972), Ind. Med. 41: 31 - 33.

Type LD50
 Species dog
 Value = 4830 mg/kg
 Method other
 Year 1944
 GLP no
 Testsubstance as prescribed by 1.1 - 1.4
 Reference Lehman, A.J., Chase, H.F., (1944), J. Lab. Clin. Med., 29: 561 - 567.

5.1.2 Acute Inhalation Toxicity

Type LC50
 Species rat
 Exposure Time 4 hour
 Value = 72.6 mg/l
 Method other
 Year 1985

| | |
|---------------|---|
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Guseinov, V.G., (1985), Gig. Tr. Prof. Zabol. (7): 60 - 62. |
| Type | LC50 |
| Species | rat |
| Exposure Time | 8 hour |
| Value | = 51.045 mg/l |
| Method | other |
| Year | 1979 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Laham, S., Potvin, M., Schrader, K., Marino, I. (1979), Drug. Chem. Toxicol. 3: 343 -360. |
| Type | LC50 |
| Species | mouse |
| Exposure Time | 2 hour |
| Value | = 53 mg/l |
| Method | other |
| Year | 1985 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Guseinov, V.G., (1985), Gig. Tr. Prof. Zabol, (7), 60-62. |

5.1.3 Acute Dermal Toxicity

| | |
|---------------|---|
| Type | LD50 |
| Species | rabbit |
| Value | = 12870 mg/kg |
| Method | other |
| Year | 1948 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Smyth, H.F., Carpenter, C.P., (1948), J. Ind. Hyg. Toxicol.,30: 63 -70. |

5.1.4 Acute Toxicity, Other Routes

| | |
|-------------------------|---|
| Type | LC50 |
| Species | rat |
| Route of Administration | i.v. |
| Exposure Time | |
| Value | = 1088 mg/kg |
| Method | other |
| Year | 1985 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Tichy, M., Trcka, V., Roth, Z., Krivucova, M., (1985), Environ. Health. Perspect., 61: 321 328. |

| | |
|-------------------------|---|
| Type | LC50 |
| Species | rat |
| Route of Administration | i.p. |
| Exposure Time Value | = 2830 mg/kg |
| Method | other |
| Year | 1985 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Tichy, M., Trcka, V., Roth, Z., Krivocova, M., (1985), Environ. Health. Perspect., 61: 321-328. |

5.2.1 Skin Irritation

| | |
|----------------|---|
| Species | rabbit |
| Result | not irritating |
| Classification | not irritating |
| Method | other |
| Year | 1975 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Nixon, G.A., Tyson, C.A., Wertz, W.C., (1975), Toxicol. Appl. Pharmacol. 31: 481-490. |

5.2.2 Eye Irritation

| | |
|----------------|---|
| Species | rabbit |
| Result | irritating |
| Classification | irritating |
| Method | Draize-Test |
| Year | 1973 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Marzulli, F.N., Ruggles, D.I., (1973), J. Assoc. Off. Anal. Chem., 56: 905 - 914. |

| | |
|----------------|--|
| Species | rabbit |
| Result | moderately irritating |
| Classification | irritating |
| Method | Draize-Test |
| Year | 1980 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Griffith, J.F., Nixon, G.A., Bruce, R.D., Reer, P.J., Bannan, E.A., (1980), Toxicol. Appl. Pharmacol. 55: 501 - 513. |

| | |
|---------|------------|
| Species | rabbit |
| Result | irritating |

| | |
|----------------|---|
| Classification | R36 |
| Method | Draize-Test |
| Year | 1986 |
| GLP | Yes |
| Testsubstance | as prescribed by 1.1-1.4 |
| Reference | Exxon Biomedical Sciences Inc. (1986) Ocular Irritation Study in Rabbits (Isopropanol). EBSI Document No. 86MRL272. |
| Species | rabbit |
| Result | moderate irritating |
| Classification | irritating |
| Method | Draize-Test |
| Year | 1987 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Study gives maximum Draize score of 37 (out of 110) and provided conflicting data from 2 tests, one moderate and the other severely irritating. |
| Reference | Morgan, R.L., Sorenson, S.S., Castles, T.R., (1987), Food. Chem. Toxicol., 25: 609 -613. |

5.3 Sensitization

| | |
|----------------|--|
| Type | Buehler-Test |
| Species | guinea pig |
| Result | not sensitizing |
| Classification | not sensitizing |
| Method | other |
| Year | 1980 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Result given as "No sensitisation (0/20)". No other data on sensitisation have been found. |
| Reference | P & G, Unpublished data. |

5.4 Repeated Dose Toxicity

| | |
|-------------------------|-------------------------------------|
| Species | rat |
| Strain | Fischer 344 |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 13 weeks |
| Frequency of Treatment | 6 hours/day, 5 days/week |
| Post Exposure | |
| Observ. Period | none |
| Doses | 0, 100, 500, 1500 and 5000 ppm |
| Control Group | yes |
| NOEL | 500 |
| LOEL | 1500 |
| Method | other (US EPA TCSA Test Guidelines) |

| | |
|-------------------------|--|
| Year | 1994 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | No exposure-related mortalities occurred. Narcotic effects were noted during exposures to 1500 and 5000 ppm. Ataxia was observed following exposure to 5000 ppm. Decreases in body weight were also observed at the end of the first week of exposure to 5000 ppm. The only microscopic change observed was hyaline droplets within the kidneys of all male rats (including controls). The size and frequency of these droplets were increased in the exposed groups. Thus, repeated exposures produced toxic effects only at the highest concentration (5000 ppm) and a kidney change in male rats of unknown biological significance. |
| Reference | Burleigh-Flayer, H.D., et al. (1994). <i>Fundam. Appl. Toxicol.</i> 23, 421-428. |
| Species | rat |
| Strain | Wistar |
| Sex | male |
| Route of Administration | inhalation |
| Exposure Period | 13 or 20 weeks |
| Frequency of Treatment | 4 hours/day, 5 days/week. |
| Post Exposure | |
| Observ. Period | none |
| Doses | 400, 1000, 4000, 8000 ppm for 12 weeks; 1000 and 8000 ppm for 20 weeks |
| Control Group | yes |
| NOEL | = 400 ppm |
| LOEL | = 1000 ppm |
| Method | other |
| Year | 1991 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | No significant differences appeared between the groups exposed to 400 ppm and the control group in body weight and in hematological and serum chemistry tests. There was inhibition of body weight and marked local irritation in groups given 1000 ppm or more, decrease in erythrocyte and hemoglobin values in groups given 4000 ppm or more, and increases in serum GOT and GPT, and total cholesterol in the 8000 ppm group. Nakaseko et al. also exposed rats to 1000 and 8000 ppm isopropanol for 20 weeks for nerve conduction studies, which was reported separately (see also section 5.10). |
| Reference | Nakaseko, H., Teramoto, K., Horiguchi, S., Wakitani, F., Yamamoto, T., Adachi, M., Tanaka, H., Hozu, S., <i>Jpn. J. Ind. Hlth.</i> 33(3): 200-201, 1991. |
| Species | rat |
| Strain | F-344 |
| Sex | female |
| Route of Administration | Inhalation |
| Exposure period | 90 days or 63 days |

| | |
|-------------------------|---|
| Ferquency of exposure | 1/2 6 hours/day for 5 days /week for 13 weeks 1/2 6 hours/day for 5 days /week for 9 weeks |
| Post exposure | |
| observation period | 2 weeks post exposure |
| Doses | 5000 ppm |
| Control group | yes |
| NOEL | NA |
| LOEL | 5000 ppm |
| Method | other |
| Year | 1994 |
| GLP | yes |
| Testsubstance | as prescribed in 1.1-1.4 |
| Remark | Increases in motor activity were seen following exposure to 5000 ppm of isopropanol. After 9 weeks of exposure, complete recovery was noted two days post exposure. After 13 weeks of exposure, complete reversibility was noted at 2 weeks post exposure. |
| Reference | Gill, M., Burleigh-Flayer, H., Bevan. C., Gardiner, T., Kapp, R., Isopropanol Ninety-Day Vapor Inhalation Neurotoxicity Study in Female F-344 Rats. (Abstract) The Toxicologist, Vol. 14 (1), 1994. |
| Species | rat |
| Strain | no data |
| Sex | male/female |
| Route of Administration | drinking water |
| Exposure Period | 27 weeks |
| Frequency of Treatment | continuous |
| Post Exposure | |
| Observ. Period | none |
| Doses | 600 & 2300 mg/kg for males, 1000 & 3900 mg/kg for females |
| Control Group | yes |
| NOEL | = 600 - 1000 mg/kg bw d |
| LOEL | = 2300 - 3900 mg/kg bw d |
| Method | other |
| Year | 1944 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The male rats showed some decreased body weight gains during the first thirteen weeks of the study, and then increased body weight gain for the remainder of the study. The female rats showed decreased body weight gain throughout the study. No gross or microscopic abnormalities were noted. |
| Reference | Lehman, A.J., Chase, H.F., (1944), J. Lab. Clin. Med. 29: 561 - 567. |
| Species | rat |
| Strain | no data |
| Sex | male |
| Route of Administration | drinking water |
| Exposure Period | 12 weeks |
| Frequency of Treatment | continuous |
| Post Exposure | |
| Observ. Period | none |

| | |
|-------------------------|---|
| Doses | 1,2,3 and 5 percent |
| Control Group | yes |
| NOEL | = 1% (870 mg/kg/day) |
| LOEL | = 2% (1280 mg/kg/day) |
| Method | other |
| Year | 1993 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The relative organ weights of liver, kidneys, and adrenals were significantly increased in a dosedependent manner. No histological alterations could be attributed to the dosing, apart from a dose-dependent increase in formation of hyaline casts and droplets in the proximal tubules of the kidneys. Dorsal hippocampal glial fibrillary acidic protein (GFAP) was unaffected after treatment. |
| Reference | Pilegaard, K. and Ladefoged, O. (1993) <i>In Vivo</i> 7:325-330 |
| Species | mouse |
| Strain | CD-1 |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 13 weeks |
| Frequency of Treatment | 6 hours/day, 5 days/week |
| Post Exposure | |
| Observ. Period | none |
| Doses | 0, 100, 500, 1500 and 5000 ppm |
| Control Group | yes |
| NOEL | = 500 ppm |
| LOEL | = 1500 ppm |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1994 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | No exposure-related mortalities occurred. Narcotic effects were noted during exposures to 1500 and 5000 ppm. No exposure-related effects were noted on body weight of the male mice, but increased body weight and body weight gain were observed for the 5000 ppm female mice. No treatmentrelated effects were noted at gross necropsy or at histopathologic examination. |
| Reference | Burleigh-Flayer, H.D., et al. (1994). <i>Fundam. Appl. Toxicol.</i> 23, 421-428. |
| Species | rat |
| Strain | Fischer 344 |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 13 weeks |
| Frequency of Treatment | 6 hours/day, 5 days/week |
| Post Exposure | |
| Observ. Period | none |
| Doses | 0, 500, 1500 and 5000 ppm |
| Control Group | yes |

| | |
|---------------|--|
| NOEL | = 1500 |
| LOEL | = 5000 |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1994 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Neurobehavioral evaluations included a functional observation battery (FOB), motor activity, and neuropathology. There were no changes in FOB, but increased motor activity was noted in female rats of the 5000 ppm group at week 9 and 13. Neuropathological examination revealed no exposure-related lesions in the nervous system. |
| Reference | Burleigh-Flayer, H.D., et al. (1994). <i>Fundam. Appl. Toxicol.</i> 23, 421-428. |

5.5 Genetic Toxicity in Vitro

| | |
|----------------------|---|
| Type | Salmonella typhimurium reverse mutation assay |
| System of Testing | TA 98, 100, 1535, 1537 |
| Concentr. | 180 mmol/plate |
| Metabolic Activation | with and without |
| Result | negative |
| Method | other |
| Year | 1980 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | A report on screening of many chemicals which could be constituents of tobacco smoke. |
| Reference | Florin, I., Rutberg, L., Curvall, M., and Enzell, O.R. <i>Toxicology</i> 15:219-232, 1980 |

| | |
|----------------------|--|
| Type | Sister chromatid exchange assay |
| System of Testing | Chinese hamster V79 fibroblasts |
| Concentr. | 3.3, 10, 33.3 and 100 mmol/l |
| Metabolic Activation | with and without |
| Result | negative |
| Method | other |
| Year | 1987 |
| GLP | no data |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Von der Hude, W., Scheutwinkel, M., Gramlich, U., Fissler, B., Busler, A., <i>In Vitro Environ. Mutagen.</i> , (1987), 9: 401 - 410. |

| | |
|----------------------|---|
| Type | Salmonella typhimurium reverse mutation assay |
| System of Testing | TA 97, 98, 100, 102, 104, 1535, 1537, 1538 |
| Concentr. | 100 mmol/plate |
| Metabolic Activation | with and without |
| Result | negative |
| Method | other |
| Year | 1992 |
| GLP | Yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |

| | |
|----------------------|---|
| Reference | Zeiger, E. et al, <i>Env. Mol. Mut.</i> , 19 (Suppl.21): 2 - 141, 1992. |
| Type | HGPRT assay |
| System of Testing | Chinese hamster ovary |
| Concentr. | 0.5 - 5.0 mg/ml |
| Metabolic Activation | with and without |
| Result | negative |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1993 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Kapp, R.W. et al. (1993). <i>Environ. Mol. Mutagen.</i> , 22: 93-100. |
| Type | Meiotic nondisjunction |
| System of Testing | <i>Neurospora crassa</i> (Strain I x I) |
| Concentr. | no data |
| Metabolic Activation | without |
| Result | negative |
| Method | other |
| Year | 1980 |
| GLP | no data |
| Test substance | as prescribed by 1.1 - 1.4 |
| Remark | |
| Reference | Griffiths A.J.F. (1980). NIEHS 263-77-C0604CC, Progress Report. (Cited In: Brockman H.E., de Serres F.J., Ong T-M., DeMarini D.M., Katz A.J., Griffiths A.J.F. and Stafford R.S. (1984). Mutation tests in <i>Neurospora crassa</i> . A report of the U.S. Environmental Protection Agency Gene-Tox Program. <i>Mutat. Res.</i> 133:87-134.) |
| Type | Cell transformation |
| System of Testing | SA7/Syrian Hamster Embryo |
| Concentr. | 62 - 1000 µg/ml |
| Metabolic Activation | without |
| Result | negative |
| Method | other |
| Year | 1978 |
| GLP | no data |
| Test substance | as prescribed by 1.1 - 1.4 |
| Remark | |
| Reference | Casto B.C. and Hatch G.G. (1978). Progress Report NIH-NCI-N01-CP-45615. pp. 62-75. (Cited In: Heidelberger C., Freeman A.E., Pienta R.J., Sivak A., Bertram J.S., Casto B.C., Dunkel V.C., Francis M.W., Kakunaga T., Little J.B. and Schechtman L.M. (1983). Cell transformation by chemical agents - a review and analysis of the literature. A report of the U.S. Environmental Protection Agency Gene-Tox Program. <i>Mutat. Res.</i> 114:283-385.) |

5.6 Genetic Toxicity in Vivo

| | |
|---------|--------------------|
| Type | Micronucleus Assay |
| Species | mouse |

| | |
|-------------------------|---|
| Strain | ICR random bred |
| Sex | male/female |
| Route of Administration | i.p. |
| Exposure Period | once, bone marrow examined after 24, 48 and 72 hours. |
| Doses | 350, 1173, 2500 mg/kg |
| Result | negative |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1993 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Reference | Kapp, R.W. et al. (1993). Environ. Mol. Mutagen., 22: 93-100. |

5.7 Carcinogenicity

| | |
|-------------------------|---|
| Species | mouse |
| Strain | C3H |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 5 - 8 months |
| Frequency of Treatment | 3 - 7 hours/day, 5 days/week. |
| Post Exposure | |
| Observ. Period | none |
| Doses | 7700 mg/m ³ |
| Control Group | yes |
| Method | other |
| Year | 1952 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Two other strains used as well, ABC and C57/BL. |
| Result | No excess of lung tumors noted among treated mice. |
| Reference | Weil, C.S., Smyth, H.F., Nale, T.W., Arch. Ind. Hyg. Occup. Med. (1952), 5: 535 -547. |

| | |
|-------------------------|---|
| Species | mouse |
| Strain | other |
| Sex | no data |
| Route of Administration | dermal |
| Exposure Period | 52 weeks |
| Frequency of Treatment | 3 times/week. |
| Post Exposure | |
| Observ. Period | none |
| Doses | as supplied |
| Control Group | yes |
| Method | other |
| Year | 1976 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Result | No treatment related skin tumors reported. |
| Reference | US NIOSH (1976), Cincinnati, Ohio, US National Institute of Occupational Safety and Health, US Dept. of Health, Education and |

Welfare, Public Health Services, Centre for Disease Control (DHEW publication no. (NIOSH)76-142).

| | |
|-------------------------|---|
| Species | mouse |
| Strain | C3H |
| Sex | male |
| Route of Administration | s.c. |
| Exposure Period | 20 - 40 weeks. |
| Frequency of Treatment | once/week |
| Post Exposure | |
| Observ. Period | none |
| Doses | 20 mg |
| Control Group | yes |
| Method | other |
| Year | 1952 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Two other strains used as well, ABC and C57/BL. |
| Result | No excessive incidence of lung tumors was noted in treated groups, although incidence of lung tumours in control groups was high. |
| Reference | Weil, C.S., Smyth, H.F., Nale, T.W., Arch. Ind. Hyg. Occup. Med. (1952), 5: 535 -547. |

| | |
|-------------------------|--|
| Species | rat |
| Strain | Fischer 344 |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 24 months |
| Frequency of Treatment | 6 hours/day, 5 days/week |
| Post Exposure | |
| Observ. Period | none |
| Doses | 500, 2500, 5000 ppm |
| Control Group | yes |
| NOEL(onco) | >5000 ppm for oncogenetic effects |
| NOEL(toxicity) | 500 ppm |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1995 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | The main cause of death for the 5000 ppm rats (both sexes) was chronic renal disease. Chronic renal disease also accounted for much of the mortality of the 2500 ppm male rats. In contrast, the main cause of death for the control animals was large granular lymphocyte leukemia. During exposure, some male and female rats at 5000 ppm showed signs of hypoactivity, lack of startle reflex, and narcosis. Hypoactivity was also observed in some animals at 2500 ppm. Body weight and body weight gain were increased for animals in the 2500 and 5000 ppm groups. Urine chemistry changes indicative of impaired kidney function were noted in the 2500 (males) and 5000 (males and females) ppm groups. In the 2500 and 5000 ppm males and/or females, liver weights were increased, probably as a result of a |

metabolic response (enzyme induction), although there was no histopathological changes noted. There was also a concentration-related increase in absolute and relative testes weight seen in males. An exacerbation of chronic renal disease was observed in the IPA-exposed rats. Observations included mineralization, tubular dilation, glomerulosclerosis, interstitial nephritis and fibrosis, hydronephrosis, and transitional cell hyperplasia. These changes are common in aging rats. An increased incidence of interstitial cell adenomas occurred in the testes of male rats. The frequency of interstitial (Leydig) cell tumors of the testis was also increased in a concentration-related pattern for male rats in the study. The incidence of these tumors in IPA exposed groups was similar to that reported for unexposed rats in the National Toxicology Program and previous studies at this laboratory, while the incidence of these tumors in unexposed rats in this study was well below historical levels. There were no increases in the incidence of other tumor types in the exposed animals compared to the controls.

Reference Garman, R. Bevan, C., Burleigh-Flayer, H., Gardiner, T., Kapp, R., Neptun, D., Tyler, T. and Wright, G. Isopropanol (IPA) Vapor Inhalation Oncogenicity Study in Fisher 344 Rats.(Abstract No. 979) The Toxicologist, Vol. 15 (1), 1995.

| | |
|-------------------------|---|
| Species | mouse |
| Strain | CD-1 |
| Sex | male/female |
| Route of Administration | inhalation |
| Exposure Period | 18 months |
| Frequency of Treatment | 6 hours/day, 5 day/week |
| Post Exposure | |
| Observ. Period | None |
| Doses | 500, 2500, 5000 ppm |
| Control Group | yes |
| NOEL(onco) | > 5000 ppm for oncogenetic effects |
| NOEL(toxicity) | 500 ppm (see remarks) |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Narcosis was observed during exposure in the 2500 and 5000 ppm groups, and following exposure in the 5000 ppm groups. There was no differences in mortality rate or mean survival time between IPA-exposed and control animals. Clinical signs were observed for some male and female mice during exposures to 2500 and 5000 ppm and included hypoactivity, lack of a startle reflex, narcosis, ataxia (5000 ppm only), and prostration (5000 ppm only). Ataxia was the only exposure-related clinical sign that was noted for the 5000 ppm male and female animals following exposure. Increased body weight and/or body weight gain were observed for both sexes in the 2500 and 5000 ppm groups. The 2500 and 5000 ppm male mice from the recovery group continued to increase body weight and body weight gain to study termination even in the absence of IPA exposure. Absolute and |

relative liver weights were increased in both male and female mice; relative testes weights were decreased in all IPA-exposed male mice; and absolute and relative brain weights were decreased in the 5000 ppm females. The only organ weight change noted for the recovery animals was a concentration-related absolute and relative increase in liver weight for the male mice. Hematologic parameters were unaffected by IPA exposure. The only gross lesion noted at study termination was seminal vesicle enlargement in the 5000 ppm males. However, microscopic evaluation showed increased incidence of dilation of the seminal vesicles in both the 2500 and 5000 ppm male mice. These effects were not present in the recovery group males. Since the seminal vesicles did not have any associated inflammatory or degenerative changes, the enlargement may have been a result of hormonal imbalance. It is not known whether the narcotic effects of isopropanol could have affected the secretion of the seminal vesicles. Minimal to mild effects to the kidney including renal tubular proteinosis and tubular dilation were observed following 78 weeks of exposure. The incidence of renal tubular proteinosis was generally significantly increased for all male and female treatment groups relative to controls; however the majority of affected animals showed minimal degrees of tubular proteinosis (i.e., only a few tubules affected), there was no concentration-related gradient in either the frequency of severity of this change, and there was no corresponding evidence of alterations to the glomeruli. Mild to moderate degrees of tubular dilation were observed in a small number of females in the 2500 and 5000 ppm groups (significantly increased only for the 5000 ppm group). This finding, however, was not duplicated in male mice (a significant increase was only seen for the 500 ppm group) nor was it accompanied by evidence of tubular cell degeneration or urinary outflow obstruction. The increased incidence of kidney effects was not increased in animals in the recovery group. There was no increased frequency of neoplastic lesions in any of the IPA exposed groups, indicating a lack of carcinogenic activity by IPA. Thus, while the kidney findings may be considered treatment-related effects (female mice), their toxicological significance is unclear at this time. The uncertainty about kidney effects, in particular male mice, led to a NOEL of 500 ppm, and a LOEL of 2500 ppm (clinical signs), for non-cancer effects for this study.

Reference

Burleigh-Flayer, H., Bevan, C., Gardiner, T., Garman, R., Kapp, R., Neptun, D., Tyler, T. and Wright, G. Isopropanol Vapor Inhalation Oncogenicity Study in CD-1 Mice. (Abstract No. 1219) *The Toxicologist*, Vol. 14 (1), 1994.

5.8 Toxicity to Reproduction

| | |
|-------------------------|----------------------|
| Type | One generation study |
| Species | rat |
| Strain | Wistar |
| Sex | male/female |
| Route of Administration | drinking water |

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| Exposure Period | To weaning (day 21 after birth). |
| Frequency of Treatment | continuous |
| Premating Exposure Period | |
| male | 70 days |
| female | 21 days |
| Duration of Test | To weaning |
| Doses | 0.5, 1.0 and 2.0% |
| Control Group | yes |
| NOEL Parental | = 1 % |
| NOEL F1 Offspring | = 1 % |
| NOEL F2 Offspring | |
| Method | other |
| Year | 1986 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Parental rats dosed with 2% isoproanol had decreased body weight gain and corresponding reduced pup weight gain and decreased survival compared with controls. There was also a dose-related increase in relative liver weights of the F1 animals. There was no effect on reproductive parameters. There was no macroscopic or histopathological changes associated with isoproanol treatment. The reproductive NOEL of 1% corresponds to 825 and 625 mg/kg/day for females and males respectively. A further study by Lehman et al (J. Exp. Pharmacol. Expt. Therapy, 85, 61-69, 1945) studied the effects of IPA in drinking water. No effects were found at 2.5% but the reported data are scant. |
| Reference | British Industrial Biological Research Assoc., Report 0570/3/86. |
| Type | Two generation study |
| Species | rat |
| Strain | Sprague-Dawley |
| Sex | male/female |
| Route of Administration | gavage |
| Exposure Period | Prior to mating and to lactation and weaning of F1 and F2 generations. |
| Frequency of Treatment | daily |
| Premating Exposure Period | |
| male | 10 weeks |
| female | 10 weeks |
| Duration of Test | to lactation and weaning |
| Doses | 100, 500 and 1000 mg/kg/day |
| Control Group | yes |
| NOEL Parental | < 500 mg/kg bw/day (BMDL10 = 407 mg/kg/day)(see remarks below) |
| Reproduction | |
| NOEL F1 Offspring | < 500 mg/kg bw/day(BMDL5 = 449 mg/kg/day)(See remarks below) |
| NOEL F2 Offspring | < 500 mg/kg bw/day (BMDL5 = 418 mg/kg/day)(See remarks below) |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1995 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |

- Remark Thirty rats of each sex per group (P1) were dosed once daily by oral gavage with 0, 100, 500 or 1000 mg of isopropanol kg-1 for at least 10 weeks prior to mating. Findings in the parental animals included increased lactation body weight gain in the 500 and 1000 mg/kg females, increased liver and kidney weights in the 500 and 1000 mg/kg groups of both sexes, and centrilobular hepatocyte hypertrophy in some P2 males. There was microscopic findings in the kidneys from the mid- and high-dose P1 males and from all treated groups of the P2 males. Exposure to 1000 mg/kg day and to a lesser extent 500 mg/kg day resulted in a reduction in postnatal survival in both F1 and F2 litters. In addition, offspring body weight was reduced during the early postnatal period in the 1000 mg/kg F1 males and in the 1000 mg/kg F2 pups of both sexes. In the 1000 mg/kg group 18/70 F1 weanlings or were euthanized prior to P2 selection. No treatment-related postmortem findings were observed in the offspring from either generation. A statistically significant reduction was observed in the male mating index of the 1000 mg/kg P2 males compared to controls. However, no treatment-related microscopic changes in reproductive tissues or biologically meaningful differences in other reproductive parameters were noted.
- Remark The study-derived NOELs for the F1 and F2 offspring are contingent upon the biological significance ascribed to the effects observed for the 500 mg/kg /day treatment group. There are two perspectives on the interpretation of these observations. A conservative perspective is that the reductions in postnatal survival are treatment- and dose-related effects (U.S. EPA, 1992 U.S. EPA, 1996; Tyl, 1996). Consequently, the NOEL based on this interpretation would be set at 100 mg/kg/day. On the other hand, the NOEL may be set at 500 mg/kg/day if these observations are not deemed biologically significant (Bevan *et al.*, 1995; Harris, 1995). A benchmark dose (BMD) assessment was conducted as a way of clarifying issues surrounding the derivation of effect levels for this study. As described below, this assessment resulted in calculated BMD dosages of 449 and 418 mg/kg low/day for the F1 and F2, respectively as appropriate descriptors for this endpoint. (See Benchmark study below.).
- Reference Bevan, C., Tyler, T.R., Gardiner, T.H., Kapp, R.W., Jr., Andrews, L. and Beyer, B.K. Journal of Applied Toxicology, Vol. 15(2) pp. 117-123 (1995).
- Harris S.B. (1995). A review of the EPA comments regarding the study entitled "Multi-generation rat reproduction study with isopropanol". Report prepared for the Chemical Manufacturers Association Isopropanol Panel.
- Tyl R. W. (1996) February 12, 1996 Letter to the Chemical Manufacturers Association Isopropanol Panel.
- US EPA (1992). Review of Section 4 Data - A Two Generatio Reproductive Toxicity Study in Rats with Isopropanol.

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|---------------------------|---|
| | US EPA, Draft Final RM1 Risk Assessment of Isopropanol, OPPT, 1996. TSCA Public Docket Number AR-141. |
| Remark | Quantitative Dose-Response Analysis -- Application of the Benchmark Method to the Multi-Generation Rat Reproduction Study for Isopropanol. |
| Remark | Chemical Manufacturers Association Isopropanol Panel conducted a quantitative dose-response analysis of the bioassay data from the multi-generation rat reproduction study noted above using the benchmark dose method to identify the relevant dosage to derive a toxicity value that may contribute in part to safety assessment decisions for isopropanol. |
| Remark | The reproductive/developmental effects were reported to have NOAEL between 100 mg/kg/day (USEPA 1992) and 500 mg/kg/day (Bevan et al., 1995). Based upon decrease in mating index observed in the P2 males, a BMDL10 of 407 mg/kg/day was estimated for reproductive effects. A BMDL5 of 418 mg/kg/day was estimated for developmental effects based upon the F2 generation 4-day survival. For the F1 generation 4-day survival, 449 mg/kg bw/day was estimated as BMDL5. The corresponding MLE dosages were 786 (Polynomial model) and 771 mg/kg bw/day (Weibell model) for the reproductive effects, 656 mg/kg bw/day for the F1 postnatal effects, and 804 mg/kg bw/day for the F2 postnatal effects. |
| Reference | Shipp, A.M., Allen, B.C., Van Landingham, C., Gentry, P.R. and Crump, K.S., Quantitative Dose-Response Analysis -- Application of the Benchmark Method to the Multi-Generation Rat Reproduction Study for Isopropanol. Final Report prepared by ICF Kaiser, KS Crump Division, 602, East Georgia Avenue, Ruston, Louisiana for Chemical Manufacturers Association Isopropanol Panel, April 1996. |
| Type | One generation study |
| Species | rat |
| Strain | Wistar |
| Sex | male/female |
| Route of Administration | drinking water |
| Exposure Period | prior to mating and to lactation and weaning of F1 and generation |
| Frequency of Treatment | continuous |
| Premating Exposure Period | |
| male | 8 weeks |
| female | 8 weeks |
| Duration of Test | |
| Doses | 2 and 3% isopropanol in drinking water |
| Control Group | yes |
| NOEL Parental | = 2% |
| NOEL F1 Offspring | = 2% |
| NOEL F2 Offspring | |
| Method | other |
| Year | 1977 |
| GLP | no |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Isopropanol was administered as a 3% solution in the drinking water. Reduced parental body weight gain, food and water consumption |

were observed in the isopropanol-treated animals compared with controls. In addition, fertility, litter size, and pup weights at postnatal days 4 and 21 were reduced in the 3% treatment group compared with the controls. The dose was dropped to 2% isopropanol and the parental animals were re-mated to provide litters for a developmental toxicity evaluation. No parental toxicity or reproductive toxicity was noted.

Reference Gallo, M.A., Oser, B.I., Cox, G.E., and Bailey, D.E. (1977) Toxicol. Appl. Pharmacol. 41:35

5.9 Developmental Toxicity/Teratogenicity

| | |
|-------------------------|--|
| Species | rat |
| Strain | Wistar |
| Sex | female |
| Route of Administration | drinking water |
| Exposure Period | Days 6 - 16 of pregnancy. |
| Frequency of Treatment | continuous |
| Duration of Test | To day 20 of pregnancy. |
| Doses | 0.5, 1.25, 2.5% |
| Control Group | yes |
| NOEL Maternal Toxicity | = 0.5 % |
| NOEL Teratogenicity | = 0.5 % |
| Method | other |
| Year | 1986 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | Maternal body weights were significantly decreased from gestational days 7-16. Animals in the 1.25% and 2.5% dose groups exhibited reduced food and water consumption during the treatment period. In the 1.25% and 2.5% dose groups, fetal body weights were reduced on a per fetus basis, but not on a per litter basis. No teratogenic effects were observed; but, delayed ossification of the skeleton was noted in the 1.25% and 2.5% dose groups, consistent with retarded development as a result of maternal toxicity. |
| Reference | British Industrial Biological Research Assoc., Report no. 0570/2/86. |

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|------------------------------|-------------------------------------|
| Species | rat |
| Strain | Sprague-Dawley |
| Sex | female |
| Route of Administration | gavage |
| Exposure Period | 6 - 15 of gestation |
| Frequency of Treatment | daily |
| Duration of Test | To day 20 of pregnancy |
| Doses | 0, 400, 800 and 1200 mg/kg/day |
| Control Group | yes |
| NOAEL Maternal Toxicity | = 400 mg/kg bw/day |
| NOAEL Developmental Toxicity | = 400 mg/kg bw/day |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1994 |

GLP yes
 Testsubstance as prescribed by 1.1 - 1.4
 Remark No dams aborted or delivered early. Two dams died at 1200 mg/kg and one dam died at 800 mg/kg. Reduced maternal gestational weight gain on gestational days 0 to 20 associated with significantly reduced gravid uterine weights were noted in the high-dose animals. All gestational parameters were equivalent across groups. Fetal body weights per liter were significantly reduced at the two highest doses. There were no adverse maternal or developmental effects at 400 mg/kg. No evidence of increased teratogenicity was observed at any dose tested. Therefore, isopropanol was not teratogenic to CD rats.
 Reference Tyl, R.W., Masten, L.W., Marr, M.C., Myers, C.B., Slauter, R.W., Gardiner, T.H., Strother, D.E., McKee, R.H., and Tyler, T.R. (1994) Fundam. Appl. Toxicol. 22:139- 151.

Species rabbit
 Strain New Zealand white
 Sex female
 Route of Administration gavage
 Exposure Period Days 6 - 18 of pregnancy
 Frequency of Treatment daily
 Duration of Test to day 28 of pregnancy
 Doses 120, 240 and 480 mg/kg/day
 Control Group yes
 NOAEL Maternal Toxicity = 240 mg/kg bw/day
 NOAEL Developmental Toxicity = 480 mg/kg bw/day
 Method other (US EPA TCSA Test Guidelines)
 Year 1994
 GLP yes
 Testsubstance as prescribed by 1.1 - 1.4
 Remark No does aborted or delivered early. Four does died at 480 mg/kg. Maternal body weights were significantly reduced during treatment and clinical signs of toxicity were observed at 480 mg/kg. No adverse maternal effects were noted at 120 or 240 mg/kg. All gestational parameters were equivalent across groups. No evidence of increased teratogenicity was observed at any dose tested. Therefore, isopropanol was not teratogenic to NZW rabbits.
 Reference Tyl, R.W., Masten, L.W., Marr, M.C., Myers, C.B., Slauter, R.W., Gardiner, T.H., Strother, D.E., McKee, R.H., and Tyler, T.R. (1994) Fundam. Appl. Toxicol. 22:139- 151.

Species rat
 Strain Sprague-Dawley
 Sex female
 Route of Administration gavage
 Exposure Period day 6 of pregnancy to day 21 postnatal.
 Frequency of Treatment daily
 Duration of Test Day 68 post natal.
 Doses 200, 700 and 1200 mg/kg/day
 Control Group yes
 NOEL Maternal Toxicity = 700 mg/kg bw/day

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| NOEL Developmental Neurotoxicity = 1200 mg/kg bw/day | |
| Method | other (US EPA TCSA Test Guidelines) |
| Year | 1994 |
| GLP | yes |
| Testsubstance | as prescribed by 1.1 - 1.4 |
| Remark | This study was specifically designed to investigate developmental neurotoxicity. One high-dose dam died on postnatal day 15, but there were no other clinical observations or effects on maternal weight, food consumption, or gestation length. Pup survival, weight, sex ratio, and sexual maturation were unaffected. There were no biologically significant findings in the behavioral tests, no changes in organ weights, and no pathological findings that could be attributed to isopropanol exposure. |
| Reference | Bates, H.K., McKee, R.H., Bieler, G.S., Gardiner, T.H., Gill, M.W., Strother, D.E., and Masten, L.W. (1994) <i>Fundam. Appl. Toxicol.</i> 22:152-158. |
| Species | rat |
| Strain | Sprague-Dawley |
| Route of Administration | inhalation |
| Exposure Period | gestational days 1-19 |
| Frequency of Treatment | 7 hours/day |
| Duration of Test | gestational day 20 |
| Doses | 3500, 7000 and 10000 ppm |
| Control Group | yes |
| NOEL Maternal Toxicity | = 3500 ppm |
| NOEL Teratogenicity | < 3500 ppm |
| Method | not specified |
| GLP | yes |
| Remark | The animals showed unsteady gait and narcotization during initial exposures in the mid- and high-dose groups; reduced food consumption and reduced weight gain were also noted in both the mid- and high-dose groups. Fetal body weights per litter were reduced in all dose groups. Exposure to 10000 ppm also resulted in failure of implantation, fully resorbed litters, increased resorptions per litter and increased incidence of cervical ribs. |
| Reference | Nelson, B.K., Brightwell, W.S., MacKenzie-Taylor, D.R., Khan, A., Burg, J.R., and Weigel, W.W. (1988) <i>Fd. Chem. Toxicol.</i> 26: 247-254. |

5.10 Other Relevant Information

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| Type | METABOLISM |
| Remark | Numerous studies on the absorption, distribution, metabolism and excretion of IPA have been performed. These indicate that IPA is readily absorbed in animals and man through the lungs, skin and GI tract. There is evidence for a delay in absorption through the GI tract at high dose levels and an extension in half life suggesting limited metabolic capability. IPA is rapidly distributed throughout the body and has been shown to cross the blood/brain barrier. Elimination from |

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| | the blood follows first order kinetics. Approximately 64 - 84% of an intravenous dose has been shown to be oxidised to acetone in rabbit. Elimination of IPA is retarded by ethanol and it has been shown that IPA is a poorer substrate for alcohol dehydrogenase than ethanol. Excretion occurs mainly through the expired air either as unchanged IPA or as acetone. Quantities of acetone and IPA are excreted in the urine together with the glucuronide conjugate of IPA. There is evidence in man that sulphonation may occur. |
| Reference | World Health Organisation, Environmental Health Criteria 103, 2-Propanol, WHO, Geneva, 1990. |
| Remark | In rats, a similar relationship was established for excretion of acetone and IPA in expired air following a single IP injection of 0.1 ml IPA. 2% of the administered dose was excreted in the expired air as IPA and 38.8% as acetone. |
| Reference | Teramoto, K., Horiguchi, S., Adachi, M., Wakitani, F., Fukui, M., Osaka City Med. J., 33 (2): 153 - 160, 1987. |
| Remark | IPA has been shown to be readily absorbed and distributed through rat tissue following intravenous, gavage or inhalation routes of exposure. IPA is mainly metabolised to acetone by a saturable pathway. The main route of excretion is via the expired air as acetone, CO ₂ and unchanged IPA. Over 80% of a radiolabel was excreted in expired air following these routes of exposure. There were no substantial differences between males and females. |
| Reference | Slauter, R. W. et al. Disposition and Pharmacokinetics of Isopropanol in F-344 Rats and B6C3F1 Mice. (Abstract 809) The Toxicologist Vol 12 (1) 1992. |
| Remark | "The absorption, metabolism, disposition, and excretion of isopropanol (IPA) were studied in male and female rats and mice. Animals were exposed by i.v. (300 mg/kg) and inhalation (500 and 5000 ppm for 6 hours) routes; additionally IPA was given by gavage to rats only in single and multiple 300 and 3000 mg/kg doses. In the rat approximately 81-89% of the administered dose was exhaled (as acetone, CO ₂ , and unmetabolized IPA); approximately 76% of the dose in mice was exhaled after iv bolus but 92% was exhaled following inhalation. Approximately 3-8% of the administered dose was excreted in urine as IPA, acetone, and a metabolite tentatively identified as isopropyl glucuronic acid. Small amounts of radiolabel were found in feces and in the carcass. There were no major differences in the rates or routes of excretion observed either between sexes or between routes of administration. Additionally, repeated exposure had no effect on excretion. However, both the route of administration and the exposure or dose level influenced the form in which material was exhaled. Following exposure to 5000 ppm, a greater percentage of unmetabolized IPA was recovered in the expired air than following exposure to 500 ppm, implying saturation of metabolism". |
| Reference | Slauter, R.W. et al, (1994). Fundam. Appl. Toxicol. 23, 407-420. |
| Type | PHARMACOKINETICS |
| Remark | Male and female rats and mice were exposed to 300 mg/kg isopropanol intravenously, and to 500 and 5000 ppm isopropanol by |

inhalation for 6 hours. Additionally, isopropanol was given to rats by gavage (300 and 3000 mg/kg) in single and multiple doses. Exhalation was the major route of excretion with acetone as the major metabolite along with unmetabolized isopropanol and CO₂. Urinary excretion accounted for 5-8% of the administered dose which included isopropanol, acetone, and the glucuronide conjugate of isopropanol. A small amount was excreted in the feces. Excretion and distribution patterns were similar by all routes of administration. High doses exceeded the metabolic threshold as evidenced by greater proportion of isopropanol excretion. There was no bioaccumulation, and distribution was similar for single and repeated administration. No major differences in absorption, distribution, metabolism, and excretion between species were observed.

Reference Slauter, R.W., Coleman, D.P., Gaudette, N.F., McKee, R.H., Masten, L.W., Gardiner, T.H., Marino, D.J., Tyler, T.R., and Jeffcoat, A.R. (1992) *Toxicologist* 12: 219.

Remark Following inhalation exposure of rats to isopropanol for 4 hours, blood levels of isopropanol and its metabolite acetone were directly related to airborne concentrations in the range of 500 and 8000 ppm. Following inhalation, the acetone/isopropanol ratio in blood decreased indicating saturation of the oxidative metabolic pathway above 4000 ppm.

Reference Laham, S., Potvin, M., Schrader, K., and Marino, I. (1980) *Drug Chem. Toxicol.* 3: 343-360.

Type NEUROTOXICITY

Remark Groups of male and female rats (Fischer 344) received a single inhalation exposure of IPA at dose levels of 0, 500, 1500, 5000 or 10000 ppm for 6 hours. A spectrum of behavioral effects indicative of narcosis, defined as a generalized loss of neuromotor and reflex function, was observed in animals of the 10000 ppm group, and to a lesser extent in the 5000 ppm animals. Recovery from these effects was observed by 24 hours for the 10000 ppm animals, and by 6 hours for the 5000 ppm animals. A concentration-dependent decrease in motor activity was observed for males exposed to > 1500 ppm and for females exposed to > 5000 ppm. The results showed that exposure of rats to isopropanol vapor produces transient, concentration-related narcosis and/or CNS sedation. A NOEL for clinical signs of intoxication (narcosis and neurobehavioural function) was 1500 ppm. A NOEL for neurobehavioural effects was 500 ppm.

Reference (1) Gill, M.W., Burleigh-Flayer, H.D., Marino, D.J., Masten, L.W., McKee, R.H., Tyler, T.R. and Gardiner, T. Isopropanol Single Exposure Vapor Unhalation Neurotoxicity Study in Rats. (Abstract 862) *The Toxicologist* Vol. 12 (1), 1992.

(2) Gill, M.W., Burleigh-Flayer, H.D., Strother, D.E., Masten, L.W., McKee, R.H., Tyler, T.R. and Gardiner, T.H. Isopropanol: Acute Vapor Inhalation neurotoxicity Study in Rats. *J. Appl. Toxicol.* 15 (2) 77-84, 1995.

Remark A vapor inhalation study was performed on isopropanol on F-344 rats and CD-1® Mice. Exposures were 0, 100, 500, 1500, or 5000 ppm for

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| | 6 hours/day, 5 days per week, for 13 weeks. Effects of narcosis were observed only during exposure to 5000 ppm. Neurobehavioural evaluations indicated no changes in the functional observation battery; however, increased motor activity was noted in female rats of the 5000 ppm group at Weeks 9 and 13. Neuropathological examination revealed no exposure-related lesions in the nervous system. |
| Reference | Burleigh-Flayer, H.D., Gill, M.W., Marino, D.J., Masten, L.W., McKee, R.H., Tyler, T.R., and Gardiner, T.H. (Abstract No. 1057) Toxicologist Vol. 12 (1) 1992. |
| Remark | See M. Gill's review of case studies for an overview of neurotoxicity testing of isopropanol. |
| Reference | Gill, M.W., "Case Studies in Industrial Neurotoxicology" In Neurobehavioral Toxicity: Analysis and Interpretation, B. Weiss and J. O'Donoghue (Eds.) Raven Press, New York, 1994. |
| Remark | See Section 5.4 for details of 12 week study in rats receiving isopropanol in drinking water. No indication of neurotoxicity, as assayed as GFAP in the dorsal hippocampal region, was detected. |
| Remark | Jcl-Wistar rats were exposed to 1000 and 8000 ppm isopropanol 8 hours/day, 5 days/week for 20 weeks. Sensory nerve conduction velocity was reported to have been affected in the 8000 ppm dose group. |
| Reference | Teramoto, K., Wakitani, F., Horiguchi, S., Jo, T., Yamamoto, T., Misutake, H., and Nakaseko, H. (1993) Environ.Res 62:148 |
| Type | NERVE CONDUCTION STUDY |
| Remark | Jcl-Wistar rats were exposed to 1000 and 8000 ppm isopropanol 8 hours/day, 5 days/week for 20 weeks. Sensory nerve conduction velocity was reported to have been affected in the 8000 ppm dose group. |
| Reference | Teramoto, K., Wakitani, F., Horiguchi, S., Jo, T., Yamamoto, T., Mitsutake, H., and Nakaseko, H. (1993) Environ. Res. 62: 148. |
| Type | IMMUNOTOXICITY |
| Remark | It has been suggested that IPA may interfere with the normal inflammatory response. Inhibition of histamine induced increase in vascular permeability has been demonstrated as has experimentally induced plasma exudation into the pleural cavity. Administration of antiinflammatory drugs however increased the pleural inflammatory reaction. |
| Reference | Kasuga, F., Inoue, S., Asano, T., Kumagi, S., Fd. Cos. Tox. 30 (7): 631-634, 1992. |
| Type | IMMUNOHISTOCHEMISTRY |
| Remark | Kidney section prepared from paraffin blocks of kidney tissues obtained following a 9- day vapor inhalation study were examined for immunohistochemical staining with alpha2u-globulin. The section examined included 5/sex from the control and 5000 ppm exposure groups and 5 males from a 10,000 ppm exposure group. There were no substantive differences noted between the exposure groups for the male rats in either intensity or distribution of the alpha2u-globulin |

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| | reactivity. The females did not have any alpha _{2u} -globulin positive reaction in the kidney sections. |
| Reference | Fowler, E.H. and Martin, C. Immunohistochemical Evaluation of Alpha _{2u} -Globulin in Kidneys of Fischer 344 Rats from the Isopropanol Nine-Day Vapor Inhalation Study. BRRC Report No. 93N1229 dated April 29, 1994. |
| Type | SENSORY IRRITATION |
| Remark | Isopropanol produced sensory irritation in mice, with RD50 values of 5000 ppm and 17693 ppm. |
| Reference | (1) DeCeuriz et al, 1981. (2) Kane et al, 1980. |
| Remark | Guinea pigs exposed by inhalation to 400 ppm isopropanol for 24 hours showed epithelial changes in the respiratory mucosa and a decline in tracheal ciliary activity which returned to normal within 2 weeks following exposure. Recovery did not occur within 2 weeks in animals exposed to 5500 ppm for 24 hours. |
| Reference | (1) Ohashi et al, 1987a. (2) Ohashi et al, 1987b. |
| Type | DERMAL ABSORPTION |
| Remark | Dermal absorption and Pharmacokinetics of Isopropanol in the Male and Female F-344 Rat. |
| Remark | Chemical Manufacturers Association Isopropanol Panel conducted a dermal absorption study in which the rats were exposed dermally for a period of 4 hours. First order elimination half-lives for IPA was 0.8 hours and 2.6 hours for acetone. ¹⁴ C-IPA studies showed excellent agreement with dermal absorption rates found via the analytical method. The study showed that IPA is rapidly absorbed through rat skin when applied under occlusion. |
| Reference | Boatman, R.J., Perry, L.G., Fiorica, L.A., English, J.C., Kapp, R.W., Jr., Bevan, C., Tyler, T.R., Banton, M.I. and Wright, G.A.. Dermal Absorption and Pharmacokinetics of Isopropanol in the Male and Female F-344 Rats. <i>The Toxicologist (Abstract)</i> Vol 30, No.1, (2) No. 210 (1996). |
| Type | HAZARD IDENTIFICATION |
| Remark | US EPA, Draft Final RM1 Risk Assessment of Isopropanol, OPPT, 1996. TSCA Public Docket Number AR-141. |
| Type | OTHER |
| Remark | Deaths occurred in 6 of 10 rats following aspiration of 0.2 ml of 100% isopropanol and in 1 of 10 rats following aspiration of 70% isopropanol. |
| Reference | Gerarde, H.W., and Ahlstrom, D.B. (1986) <i>Arch. Environ. Health</i> 13: 457-461. |
| Remark | Acute or chronic treatment of rats with isopropanol caused a significant increase in hepatic and renal cytochrome P450 content. |
| Reference | (1) Uneng, T.H., Moore, L., Elves, R.G., and Alvares, A.P. (1983) <i>Toxicol. Appl. Pharmacol.</i> 71: 204-214. |

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| | (2) Zahlse, K., Aasted, K., and Nilsen, O.G. (1985) Toxicology 34: 57-66. |
| Remark | Acute oral pretreatment of rats with isopropanol resulted in a dose-related potentiation of carbon tetrachloride hepatotoxicity. |
| Reference | Plaa, G.L., Hewitt, W.R., du Souich, R., Caille, G., and Lock, S. (1982) J. Toxicol. Environ. Health 9: 235-250. |
| Remark | The cutaneous penetration of IPA was evaluated using excised, full-thickness skin from male and female F-344 rats, B6C3F1 mice and female humans in a flow-through in vitro skin penetration apparatus. Steady state penetration rates were 1.3, 1.88 and 1.65 mg/cm ² for rat, mouse and human, respectively. Permeability constants were similar among the three tissue types while over a 6 hour treatment period, more IPA penetrated the mouse skin (11.6%) than through rat (6.4%) or through human (7.1%). The rat skin was determined to be a good human skin model while the mouse skin was found to be the most permeable. |
| Reference | Morris, E.M., Sun, J.D., Frantz, S.W., Beskitt, J.L., Bevan, C., Gardiner, T., Kapp, R., Tyler, T. and Wright, G. (Abstract No. 1727) The Toxicologist Vol. 15 (1), 1995. |

5.11 Experience with Human Exposure

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| Type | ODOR THRESHOLD |
| Remark | The air odor threshold for isopropanol has been reported as 22 ppm. |
| Reference | Amoore, J.E., and Hautala, E. (1983) J. Appl. Toxicol. 3: 272-290. |
| Type | ACCIDENTAL EXPOSURE |
| Remark | Intoxications have been reported following ingestion, rectal administration and, in children, following inhalation and skin absorption. Signs of intoxication are CNS depression, leading to coma, respiratory arrest and death. GI effects and hypothermia may occur. Cardiac effects include severe hypotension, shock and cardiac arrest with tachycardia as a secondary effect. The lowest dose reported to be life threatening was 170 ml in an 18 month old child. Acetone can be detected in the blood, breath and urine after intoxication with IPA, but acidosis does not usually occur. Occasional reports of allergic reaction to IPA have appeared in the literature. |
| Reference | World Health Organisation, Environmental Health Criteria 103, 2-Propanol WHO, Geneva, 1990. |
| Type | VOLUNTEER STUDIES |
| Remark | 2.6 or 6.4 mg/kg/day IPA for 6 weeks was well tolerated by human male volunteers, there being no adverse effects on hematology, blood chemistry, urinalysis or ophthalmoscopy. Application of 0.5 ml undiluted IPA in an open patch test did not result in skin irritation. 10 minute covered patches produced transient erythema following immersion in water. Premature infants however were found to be particularly susceptible. |
| Reference | World Health Organisation, Environmental Health Criteria 103, 2-Propanol, WHO, Geneva, 1990. |

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| Remark | Although isopropanol was found to produce little irritation when tested on the skin of six human subjects, there have been reports of dermal irritation and/or skin sensitization. With the exception of three reports, the positive reactions were observed on patch testing of patients with a contact dermatitis due to ethanol. These patients also had a positive reaction to ethanol. |
| Reference | Lington, A.W., and Bevan, C. (1994) <i>Patty's Industrial Hygiene and Toxicology</i> , 4th Edition. |
| Remark | Exposure to 400 ppm isopropanol vapors for 3 to 5 min caused mild irritation of the eyes, nose and throat of human volunteers. At 800 ppm, the effects were not severe but the majority felt the atmosphere was unsuitable. |
| Reference | Nelson, K.W., Ege, J.F., Jr., Ross, M., Woodman, L.E., and Silverman, L. (1943) <i>J. Ind. Hyg. Toxicol.</i> 9:93-97 |
| Remark | The production of acetone following IPA ingestion in man was demonstrated in a study involving three human volunteers. There was a correlation between blood levels of IPA and acetone with the initial peak of IPA recorded half an hour after dosing and reducing as the acetone levels increased over a 24 hour period. |
| Reference | Lacouture, P.G., Heldreth, D.D., <i>Vet. Hum. Toxicol.</i> , 29 (6): 486, 1987. |
| Type | EPIDEMIOLOGY |
| Remark | There is epidemiological evidence indicating that the manufacture of isopropanol by the strong-acid process is associated with an excess of upper respiratory tract cancer in workers. IARC has concluded that there is sufficient evidence for carcinogenicity to humans in the manufacture of isopropanol by this process. Although the use of this strong-acid process has raised carcinogenicity concerns, these are related to sulfuric acid and to by-products such as dialkyl sulfates that are formed during this manufacturing process, not to isopropanol itself. |
| Reference | (1) World Health Organisation, <i>Environmental Health Criteria 103, 2-Propanol</i> , WHO, Geneva, 1990. (2) International Agency for Research on Cancer, <i>Monographs on the evaluation of carcinogenic risk to man</i> , No. 15, IARC, Lyon, France, 1977 and update, 1987. (3) Weil, C.S., Smyth, H.F., Jr., and Nale, T.W. (1952) <i>Arch. Ind. Hyg. Occup. Med.</i> 5:535-547. (4) Lynch, J., Hannis, N.M., Bird, M.G., Murray, K.J., and Walsh, J.P. (1979) <i>J. Occup. Med.</i> 21:333-341. (5) Soskolne, C.L., Zeighami, E.A., Hanis, N.M., Kupper, L.L., Herrman, N., Amsel, J., Mausner, J.S., and Stellman, J.S. (1984) <i>Am. J. Epidemiol.</i> 120:358-369 |
| Remark | A single study was reported showing that IPA was associated with a higher risk of breast cancer. However, there was a combined exposure with freon and solder flux and aspects of lifestyle (such as smoking habits and alcohol consumption) were not taken into account. |
| Reference | Spiritas, R., Stewart, P.A., Lee, J.S., Marano, D.E., Forbes, C.D., Grauman, D.J., Pettigrew, H.M., Blair, A., Hoover, R.N., Cohen, J.L., <i>Brit. J. Ind. Med.</i> , 48: 515 - 530, 1991. |

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| Remark | In a population based referent study, the occupational experience of 86 men with oral or oropharyngeal cancer and 373 referents was analyzed with respect to employment and exposure to 16 chemicals, including IPA, as estimated by a job exposure matrix. There was no evidence of association between IPA exposure and oral or oropharyngeal exposure in this study. |
| Reference | Merletti, F., Boffetta, P., Ferro, G., Pisani, P., Terrachini, B., Scand. J. Work. Env. Hlth., 17: 248 - 254, 1991. |
| Remark | The lung uptake was studied in 12 printing workers exposed to workplace levels in the range of 8 to 647 mg/m ³ (3.3 to 264 ppm) isopropanol. The alveolar isopropanol concentration was highly correlated with the exposure level at any time of exposure. Acetone, but not isopropanol, was detected in the blood or urine. The acetone concentration ranged between 0.76 and 15.6 mg/liter in the blood and between 3 and 93 mg/m ³ in the alveolar air. The acetone levels in the alveolar air and blood increased with the increasing exposure period and were linearly related to the alveolar isopropanol levels. Elimination of acetone was mainly via the lungs, varying from 10.7 to 39.8% of the uptake, and was inversely related to the exposure level. |
| Reference | Brugnone, F., Perbellini, L., Apostoli, P., Bellomi, M., and Caretta, D. (1983) Br. J. Ind. Med. 40:160-168. |

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EXTRACT FROM IRPTC LEGAL FILES

File: 17.01 LEGAL rn : 6729
 systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : AUS type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | TLV |

TWA: 980MG/M3 (400PPM) STEL: 1225MG/M3 (500PPM)
 entry date: MCH 1985

original : ILO , , , , ,
 amendment: AOHGN*, APPROVED OCCUPATIONAL HEALTH GUIDE THRESHOLD LIMIT
 VALUES, , , , 1983

File: 17.01 LEGAL rn : 15004
 systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : BEL type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | TLV |

TWA: 980MG/M3 (400PPM); STEL: 1225MG/M3 (500 PPM). SKIN ABSORPTION.
 entry date: JUL 1987

original : ILO , , , , ,
 amendment: TLVBE*, THRESHOLD LIMIT VALUES (TOLERABLE LIMIT VALUES), , , ,
 1984

File: 17.01 LEGAL rn : 15640
 systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : FIN type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MPC |

TWA: 500MG/M3 (200PPM) STEL: 625MG/M3 (250PPM) (SKIN) (APPLIES TO ALL
 ISOMERS)
 entry date: MAY 1989

original : ILO , , , , ,
 amendment: APWFI*, HTP-ARVOT (LIST OF LIMIT VALUES FOR CONCENTRATIONS OF
 TOXIC SUBSTANCES KNOWN TO BE HARMFUL TO HEALTH), 25 , , 10 ,

1988

File: 17.01 LEGAL rn : 16325

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : ITA type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | TLV |

500MG/M3 (200PPM) (SKIN ABSORPTION)
 entry date: MCH 1985

original : ILO , , , , ,
 amendment: TLVIT*, VALORI LIMITE PONDERATI (APPRAISED LIMIT VALUES) , , ,

File: 17.01 LEGAL rn : 16707

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : NLD type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MXL |

TWA: 980MG/M3 (400PPM) (SKIN ABSORPTION)
 entry date: JUN 1987

original : ILO , , , , ,
 amendment: NMACN*, NATIONALE MAC-LIST (NATIONAL MAC-LIST) , , , , 1986

File: 17.01 LEGAL rn : 17374

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : ROM type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MPC |

TWA: 400MG/M3; CLV: 600MG/M3
 entry date: MCH 1985

original : ILO , , , , ,
 amendment: OMHRO*, ORDINANCE OF THE MINISTRY OF HEALTH, 60 , , , 1975

File: 17.01 LEGAL rn : 17824

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : CHE type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   | OCC     | MAK   |
|-----+-----+-----|
    
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TWA: 980MG/M3 (400PPM)
 entry date: DEC 1987

original : ILO , , , , ,
 amendment: ZWACH*, ZULAESSIGE WERTE AM ARBEITSPLATZ (PERMITTED VALUES IN THE WORKPLACE), , , , 1987

File: 17.01 LEGAL rn : 18341

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : YUG type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   | OCC     | MAC   |
|-----+-----+-----|
    
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TWA: 980MG/M3 (400PPM)
 entry date: MCH 1985

original : ILO , , , , ,
 amendment: ORYUG*, ORDINANCE, 24-3698/1 , , , 1971

File: 17.01 LEGAL rn : 50882

systematic name:2-Propanol
 common name :2-propanol
 reported name :2-Propanol
 cas no :67-63-0 rtecs no :NT8050000
 area : IMO type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AQ    | EMI     | PRMT  |
| AQ    | MARIN  | PRMT  |
|-----+-----+-----|
    
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This substance is presently considered to present no harm to human health, marine resources, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning or deballasting operations (applies to n-propyl alcohol)
entry date: APR 1993

original : IMODC*, , , , , 1992

File: 17.01 LEGAL rn : 100030

systematic name:2-Propanol
common name :2-propanol
reported name :ISOPROPYL ALCOHOL
cas no :67-63-0 rtecs no :NT8050000
area : ARG type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MPC |

8H-TWA: 980MG/M3 (400PPM); 15MIN-STEL: 1225MG/M3 (500PPM) (MAXIMUM 4 TIMES/DAY WITH INTERVALS OF AT LEAST 60 MINUTES).
entry date: OCT 1991 effective date: 29MAY1991

title: LIMIT VALUES FOR CHEMICAL SUBSTANCES IN THE WORKING ENVIRONMENT-RESOLUTION NO. 444/1991 OF THE MINISTRY OF WORK AND SOCIAL SECURITY (AMENDING REGULATION DECREE NO. 351/1979 UNDER LAW NO. 19587/1972: HYGIENE AND SAFETY AT WORK)
original : ARGOB*, Boletin Oficial de la Republica Argentina (Argentinian Official Bulletin), 24170 , I , 1 , 1979
amendment: ARGOB*, Boletin Oficial de la Republica Argentina (Argentinian Official Bulletin), 27145 , I , 4 , 1991

File: 17.01 LEGAL rn : 300124

systematic name:2-Propanol
common name :2-propanol
reported name :ISOPROPYL ALCOHOL
cas no :67-63-0 rtecs no :NT8050000
area : CAN type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | TLV |

TWA: 400 PPM, 980 MG/M3; STEL: 500 PPM, 1,225 MG/M3. PRESCRIBED BY THE CANADA OCCUPATIONAL SAFETY AND HEALTH REGULATIONS, UNDER THE CANADA LABOUR CODE (ADMINISTERED BY THE DEPARTMENT OF LABOUR). THE REGULATIONS STATE THAT NO EMPLOYEE SHALL BE EXPOSED TO A CONCENTRATION OF AN AIRBORNE CHEMICAL AGENT IN EXCESS OF THE VALUE FOR THAT CHEMICAL AGENT ADOPTED BY ACGIH (AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS) IN ITS PUBLICATION ENTITLED: "THRESHOLD LIMIT VALUE AND BIOLOGICAL EXPOSURE INDICES FOR 1985-86".
entry date: MCH 1991 effective date: 13MCH1986

amendment: CAGGAK, , 120 , 6 , 1105 ,

File: 17.01 LEGAL rn : 300832

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : CAN type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| PACK | AGRIC | CLASS |
| LABEL | PESTI | |
| USE | | |

HISTORICAL STATUS. DATE OF LAST OCCURRENCE: 1988. CODE IAL. THE PEST CONTROL PRODUCTS ACT AND REGULATIONS ARE ADMINISTERED BY THE DEPARTMENT OF AGRICULTURE. THEY ESTABLISH A REGISTRATION, CLASSIFICATION, PACKAGING AND LABELLING SYSTEM FOR PEST CONTROL PRODUCTS. ONLY PEST CONTROL PRODUCTS THAT ARE CURRENTLY REGISTERED WITH THE DEPARTMENT OF AGRICULTURE AND PRODUCTS THAT HAVE BEEN REMOVED FROM THAT LIST SINCE 1983 ARE INCLUDED; OTHER HISTORICAL RECORDS ARE NOT.

entry date: JUN 1991 effective date: 11AUG1988

amendment: CAGAAK, Canada Gazette Part II, 122 , 18 , 3601 ,

File: 17.01 LEGAL rn : 302142

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000
 area : CAN type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| TRNSP | | CLASS |
| LABEL | | RQR |
| PACK | | |

PIN (PRODUCT IDENTIFICATION NO.): UN1219. CLASS (3.2): FLAMMABLE LIQUID. PACKING GROUP II, (I=GREAT DANGER, III=MINOR DANGER). MAXIMUM AMOUNT PER PACKAGE THAT MAY BE TRANSPORTED ON A PASSENGER AIRCRAFT OR VEHICLE: 5 L. MAXIMUM AMOUNT PER PACKAGE THAT MAY BE TRANSPORTED ON A CARGO AIRCRAFT: 60 L. PRESCRIBED BY THE TRANSPORTATION OF DANGEROUS GOODS REGULATIONS, UNDER THE TRANSPORTATION OF DANGEROUS GOODS ACT (ADMINISTERED BY THE DEPARTMENT OF TRANSPORT). THE ACT AND REGULATIONS ARE INTENDED TO PROMOTE SAFETY IN THE TRANSPORTATION OF DANGEROUS GOODS IN CANADA, AS WELL AS PROVIDE ONE COMPREHENSIVE SET OF RULES APPLICABLE TO ALL MODES OF TRANSPORT ACROSS CANADA. THESE ARE BASED ON UNITED NATIONS RECOMMENDATIONS. THE ACT AND REGULATIONS SHOULD BE CONSULTED FOR DETAILS. RECORDS ARE ENTERED UNDER THE PROPER SHIPPING NAME FOUND IN THE REGULATIONS; THIS MAY INCLUDE VERY GENERAL GROUPS OF CHEMICAL SUBSTANCES.

entry date: OCT 1991 effective date: 06DEC1990

amendment: CAGAAK, Canada Gazette Part II, 124 , 26 , ,

File: 17.01 LEGAL rn : 303389
 systematic name: 2-Propanol
 common name : 2-propanol
 reported name : ISOPROPANOL
 cas no : 67-63-0 rtecs no : NT8050000
 area : CAN type : REG

| subject | specification | descriptor |
|-----------------------|---------------|------------|
| USE STORE LABEL | OCC | RQR |

INGREDIENT DISCLOSURE LIST CONCENTRATION 1% WEIGHT/WEIGHT. THE WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) IS A NATIONAL SYSTEM TO PROVIDE INFORMATION ON HAZARDOUS MATERIALS USED IN THE WORKPLACE. WHMIS IS IMPLEMENTED BY THE HAZARDOUS PRODUCTS ACT AND THE CONTROLLED PRODUCTS REGULATIONS (ADMINISTERED BY THE DEPARTMENT OF CONSUMER AND CORPORATE AFFAIRS). THE REGULATIONS IMPOSE STANDARDS ON EMPLOYERS FOR THE USE, STORAGE AND HANDLING OF CONTROLLED PRODUCTS AND ADDRESS LABELLING AND IDENTIFICATION, EMPLOYEE INSTRUCTION AND TRAINING, AS WELL AS THE UPKEEP OF A MATERIALS SAFETY DATA SHEET (MSDS). THE PRESENCE IN A CONTROLLED PRODUCT OF AN INGREDIENT IN A CONCENTRATION EQUAL TO OR GREATER THAN SPECIFIED IN THE INGREDIENT DISCLOSURE LIST MUST BE DISCLOSED IN THE SAFETY DATA SHEET.

entry date: APR 1991 effective date: 31DEC1987

amendment: CAGAAK, Canada Gazette Part II, 122 , 2 , 551 ,

File: 17.01 LEGAL rn : 401113
 systematic name: 2-Propanol
 common name : 2-propanol
 reported name : ISOPROPYL ALCOHOL
 cas no : 67-63-0 rtecs no : NT8050000
 area : CSK type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| FOOD | | MPC |

LIMIT OF ADDITIVE PRESENT DUE TO PRODUCTION, PACKING, TRANSPORT AND STORAGE OF FOOD PRODUCTS: 5G/KG.

entry date: DEC 1991 effective date: 1JUL1986

title: DIRECTIVE NO. 50/1978 ON FOREIGN SUBSTANCES IN FOODSTUFFS
 original : HPMZC*, HYGIENICKE PREDPISY MINISTERSTVA ZDRAVOTNICTVI
 CSR (HYGIENIC REGULATIONS OF MINISTRY OF HEALTH OF CSR), 43 ,
 , , 1978

amendment: HPMZC*, HYGIENICKE PREDPISY MINISTERSTVA ZDRAVOTNICTVI
 CSR (HYGIENIC REGULATIONS OF MINISTRY OF HEALTH OF CSR), 61 ,
 , , 1986

File: 17.01 LEGAL

rn : 402145

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000
 area : CSK type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| MANUF | OCC | CLASS |
| | | RQR |
| | | RSTR |

PRODUCTION OF ISOPROPANOL BY SULFONATION IS CLASSIFIED AS PROCESS WITH OCCUPATIONAL CARCINOGENIC RISK. REQUIREMENTS AND RESTRICTIONS ON THE PROCESS ARE GIVEN.

entry date: DEC 1991

effective date: 1APR1985

title: DIRECTIVE NO. 4/1985 ON HYGIENIC PRINCIPLES FOR WORK WITH CHEMICAL CARCINOGENS

original : VMZSR*, Directive no 4/1985 on hygiene principles for work with chemicalcarcinogens, , 3 , , 1985

amendment: VMZSR*, Directive no 4/1985 on hygiene principles for work with chemicalcarcinogens, , 10 , 98 , 1990

File: 17.01 LEGAL

rn : 500482

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000
 area : DEU type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AQ | | CLASS |
| USE | INDST | RQR |

THIS SUBSTANCE IS CLASSIFIED AS SLIGHTLY HAZARDOUS TO WATER (WATER-HAZARD CLASS: WGK 1). (THE DIFFERENT CLASSES ARE: WGK 3 = VERY HAZARDOUS; WGK 2 = HAZARDOUS; WGK 1 = SLIGHTLY HAZARDOUS; WGK 0 = IN GENERAL NOT HAZARDOUS.) THE CLASSIFICATION FORMS THE BASIS FOR WATER-PROTECTION REQUIREMENTS FOR INDUSTRIAL PLANTS IN WHICH WATER-HAZARDOUS SUBSTANCES ARE HANDLED.

entry date: DEC 1991

title: ADMINISTRATIVE RULES CONCERNING WATER-HAZARDOUS SUBSTANCES (VERWALTUNGSVORSCHRIFT WASSERGEFAEHRDENDE STOFFE)

original : GMSMA6, Gemeinsames Ministerialblatt. Joint Ministerial Papers, , 8 , 114 , 1990

File: 17.01 LEGAL

rn : 502805

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000

area : DEU type : REC

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   | OCC     | MAK   |
|-----+-----+-----|
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8H-TWA: 400 ML/M3 (PPM); 980 MG/M3 (20C, 101.3 KPA). SUBSTANCE WITH SYSTEMIC EFFECTS. ONSET OF EFFECT <= 2H. HALF-LIFE < 2H. 30MIN-STEL: 800 ML/M3 (PPM); 1960 MG/M3; AVERAGE VALUE; 4X/SHIFT. PREGNANCY GROUP D: AVAILABLE DATA ARE NOT SUFFICIENT FOR A FINAL EVALUATION WITH REGARD TO EMBRYOTOXIC AND/OR FETOTOXIC EFFECTS. VAPOUR PRESSURE: 4.0 KPA AT 20C.
entry date: JAN 1992

title: MAXIMUM CONCENTRATIONS AT THE WORKPLACE AND BIOLOGICAL TOLERANCE VALUES FOR WORKING MATERIALS (MAXIMALE ARBEITSPLATZKONZENTRATIONEN UND BIOLOGISCHE ARBEITSSTOFFTOLERANZWERTE)
original : MPGFDF, MITTEILUNG DER SENATSKOMMISSION ZUR PRUEFUNG GESUNDHEITSSCHAEDLICHER ARBEITSSTOFFE (DEUTSCHE FORSCHUNGSGEMEINSCHAFT), XXVII , , 17 , 1991

File: 17.01 LEGAL rn : 503265

systematic name:2-Propanol
common name :2-propanol
reported name :ISOPROPYL ALCOHOL
cas no :67-63-0 rtecs no :NT8050000
area : DEU type : REC

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   | OCC     | BAT   |
|-----+-----+-----|
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BLOOD: 50 MG/L, AS ACETONE. URINE: 50 MG/L, AS ACETONE. SAMPLING TIME: END OF EXPOSURE OR END OF SHIFT.
entry date: FEB 1992

title: MAXIMUM CONCENTRATIONS AT THE WORKPLACE AND BIOLOGICAL TOLERANCE VALUES FOR WORKING MATERIALS (MAXIMALE ARBEITSPLATZKONZENTRATIONEN UND BIOLOGISCHE ARBEITSSTOFFTOLERANZWERTE)
original : MPGFDF, MITTEILUNG DER SENATSKOMMISSION ZUR PRUEFUNG GESUNDHEITSSCHAEDLICHER ARBEITSSTOFFE (DEUTSCHE FORSCHUNGSGEMEINSCHAFT), XXVII , , 99 , 1991

File: 17.01 LEGAL rn : 613032

systematic name:2-Propanol
common name :2-propanol
reported name :ISOPROPANOL
cas no :67-63-0 rtecs no :NT8050000
area : GBR type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| TRNSP |          | CLASS |
| LABEL |          | RQR   |
|-----+-----+-----|
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LABELLING OF ROAD TANKERS: FLAMMABLE LIQUID. EMERGENCY ACTION CODE:
2(S)E

entry date: JAN 1983

effective date: 28MCH1979

title: HAZARDOUS SUBSTANCES (LABELLING OF ROAD TANKERS) REGULATIONS 1978
original : GBR SI*, STATUTORY INSTRUMENTS, 1702 , , , 1978

File: 17.01 LEGAL

rn : 650703

systematic name: 2-Propanol

common name : 2-propanol

reported name : ISOPROPYL ALCOHOL

cas no : 67-63-0

rtecs no : NT8050000

area : GBR

type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| TRNSP | MARIN | RQR |
| AQ | MARIN | RQR |
| AQ | EMI | RQR |

CLASSIFIED AS A NON-POLLUTING LIQUID SUBSTANCE. DOCUMENTARY EVIDENCE OF ASSESSMENT AND APPROVAL REQUIRED BY A CARRIER. DISCHARGE INTO THE SEA IS NOT PROHIBITED.

entry date: 1992

effective date: 06APR1987

title: THE MERCHANT SHIPPING (CONTROL OF POLLUTION BY NOXIOUS LIQUID SUBSTANCES IN BULK) REGULATIONS 1987, SCHEDULE 2

original : GBR SI*, STATUTORY INSTRUMENTS, 551 , , 15 , 1987

amendment: GBR SI*, STATUTORY INSTRUMENTS, 2604 , , 2 , 1990

File: 17.01 LEGAL

rn : 800152

systematic name: 2-Propanol

common name : 2-propanol

reported name : ISOPROPYL ALCOHOL

cas no : 67-63-0

rtecs no : NT8050000

area : JPN

type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MAC |

CLV: 980MG/M3 (400PPM). TENTATIVE VALUE.

entry date: DEC 1991

title: MAXIMUM ALLOWABLE CONCENTRATIONS RECOMMENDED BY THE JAPANESE ASSOCIATION OF INDUSTRIAL HEALTH.

original : SAIGBL, Sangyo Igaku (Japanese Journal of Industrial Health),
33 , 4 , 277-287 , 1991

File: 17.01 LEGAL

rn : 911959

systematic name: 2-Propanol

common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : KEN type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| FOOD  |   ADDIT   |   PRMT   |
|-----+-----+-----|
  
```

FOOD ADDITIVE PERMITTED FOR EXTRACTING MOISTURE, FAT AND OTHER SOLUBLE COMPONENTS FROM FISH. FOOD PRODUCTS IN OR UPON WHICH IT IS PERMITTED AND MAXIMUM LEVELS OF USE ARE LISTED
 entry date: SEP 1982

title: THE FOOD, DRUGS AND CHEMICAL SUBSTANCES (FOOD LABELLING, ADDITIVES AND STANDARDS) REGULATIONS, 1978
 original : GSKEN*, KENYA GAZETTE SUPPLEMENT NO. 40, SPECIAL ISSUE (LEGISLATIVE SUPPLEMENT NO. 27), 40 , , 363 , 1978

File: 17.01 LEGAL rn : 1010068

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : MEX type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   |   OCC   |   MXL   |
|-----+-----+-----|
  
```

AT ANY WORKPLACE WHERE THIS SUBSTANCE IS PRODUCED, STORED OR HANDLED A MAXIMUM PERMISSIBLE LEVEL OF 980MG/M3 (400PPM) MUST BE OBSERVED FOR A PERIOD OF 8 HOURS OR 1225MG/M3 (500PPM) FOR 15 MINUTES FOUR TIMES A DAY WITH INTERVALS OF A LEAST 1 HOUR.
 entry date: DEC 1991 effective date: 28MAY1984

title: INSTRUCTION NO.10 RELATED TO SECURITY AND HYGIENIC CONDITIONS AT WORKPLACES. (INSTRUCTIVO NO. 10, RELATIVO A LAS CONDICIONES DE SEGURIDAD E HIGIENE DE LOS CENTROS DE TRABAJO).
 original : DOMEX*, Diario Oficial, , , , 1984
 amendment: DOMEX*, Diario Oficial, , , , 1989

File: 17.01 LEGAL rn : 1122015

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : RUS type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   |   AMBI   |   MAC   |
|-----+-----+-----|
  
```

0.6MG/M3 1X/D, 0.6MG/M3 AV/D.
 entry date: SEP 1985 effective date: AUG1984

amendment: PDKAV*, PREDELNO DOPUSTIMYE KONTSENTRATSII (PDK)
 ZAGRYAZNYAYUSHCHIKH VESHCHESTV V ATMOSFERNOM VOZDUKHE
 NASELENNYKH MEST (MAXIMUM ALLOWABLE CONCENTRATIONS (MAC) OF
 CONTAMINANTS IN THE AMBIENT AIR OF RESIDENTIAL AREAS),
 3086-84 , , , 1984

File: 17.01 LEGAL rn : 1122514

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : RUS type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | MAC |
| | | CLASS |

CLV: 10.0MG/M3 (VAPOUR) HAZARD CLASS: III
 entry date: MAY 1990 effective date: 01JAN1989

amendment: GOSTS*, GOSUDARSTVENNYI STANDART SSSR (STATE STANDARD OF
 USSR), 12.1.005 , , , 1988

File: 17.01 LEGAL rn : 1123251

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : RUS type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AQ | SURF | MAC |
| | | CLASS |

0.25MG/L HAZARD CLASS: IV
 entry date: JUL 1990 effective date: 1JAN1989

amendment: SPNPV*, SANITARNYE PRAVILA I NORMY OKHRANY POVERKHNOSTNYKH
 VOD OT ZAGRIAZNENIA (HEALTH REGULATION AND STANDARDS OF
 SURFACE WATER PROTECTION FROM CONTAMINATION), 4630-88 , , ,
 1988

File: 17.01 LEGAL rn : 1200149

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000

area : SWE type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| AIR   | OCC   | HLV   |
|-----+-----+-----|

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1D-TWA: 350MG/M3 (150PPM); 15MIN-STEL: 600MG/M3 (250PPM). (APPLIES TO ALL ISOMERS OF PROPANOL).

entry date: 1992 effective date: 01JUL1991

title: HYGIENIC LIMIT VALUES.

original : AFS***, ARBETARSKYDDSSTYRELSENS FOERFATTNINGSSAMLING, 1990:13
, , 5-64 , 1990

File: 17.01 LEGAL rn : 1301002

systematic name:2-Propanol

common name :2-propanol

reported name :2-Propanol

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| MANUF | REQ   | PRMT  |
| USE   | OCC   | PRMT  |
| SAFTY | OCC   | MXL   |
|-----+-----+-----|

```

; Summary - THE FOLLOWING CHEMICAL IS INCLUDED ON A LIST OF CHEMICALS AND MIXTURES FOR WHICH REPORTING IS CURRENTLY REQUIRED UNDER THE TOXIC SUBSTANCES CONTROL ACT SECTION 2607A. THIS TOXIC SUBSTANCE IS SUBJECT TO PRELIMINARY ASSESSMENT INFORMATION RULES ON PRODUCT ION QUANTITIES, USES, EXPOSURES, AND ADVERSE EFFECTS. MANUFACTURERS INCLUDING IMPORTERS MUST SUBMIT A REPORT FOR THIS LISTED CHEMICAL MANUFACTURED AT EACH SITE.
entry date: OCT 1991 effective date: 1982

title: PRELIMINARY ASSESSMENT INFORMATION RULES

original : FEREAC, Federal Register, 47 , , 26998 , 1982

amendment: CFRUS*, Code of Federal Regulations, 40 , 712 , 30 , 1990

File: 17.01 LEGAL rn : 1302342

systematic name:2-Propanol

common name :2-propanol

reported name :ISOPROPYL ALCOHOL

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REG

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-----
|subject|specification|descriptor|
|-----+-----+-----|
| FOOD  | ADDIT | RSTR  |
| TRANS |       | RSTR  |
| STORE |       | RSTR  |
| PACK  |       | RSTR  |
|-----+-----+-----|

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; Summary - THIS SUBSTANCE IS INCLUDED ON A LIST OF SUBSTANCES USED TO PREPARE ADHESIVES WHICH MAY BE SAFELY USED AS COMPONENTS OF ARTICLES INTENDED FOR USE IN PACKAGING, TRANSPORTATION, OR HOLDING FOOD IN

ACCORDANCE WITH THE FOLLOWING PRESCRIBED CONDITIONS: SUBSTANCE MUST BE SEPARATED FROM THE FOOD BY A FUNCTIONAL BARRIER, MUST NOT EXCEED LIMITS OF GOOD MANUFACTURING PRACTICE USED WITH DRY FOODS, OR NOT EXCEED TRACE AMOUNTS AT SEAMS AND EDGE EXPOSURES WHEN USED WITH FATTY AND AQUEOUS FOODS. ALSO REGULATED BY SEA M INTEGRITY, LABELING STANDARDS, AND ANY PROVISION UNDER 21 CFR 175

entry date: NOV 1991

effective date: 1977

title: SUBSTANCES FOR USE ONLY AS COMPONENTS OF ADHESIVES

original : FEREAC, Federal Register, 42 , , 14534 , 1977

amendment: CFRUS*, Code of Federal Regulations, 21 , 175 , 105 , 1988

File: 17.01 LEGAL

rn : 1314568

systematic name:2-Propanol

common name :2-propanol

reported name :ISOPROPANOL

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REG

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-----
|subject|specification|descriptor|
|-----+-----+-----|
| TRNSP |                | PRMT  |
| PACK  |                | CNTRL |
| LABEL |                | RQR   |
|-----+-----+-----|

```

MAY BE TRANSPORTED IN PASSENGER AIRCRAFT AND PASSENGER RAILCAR NOT TO EXCEED 1 QUART/PACKAGE. MAY BE TRANSPORTED IN CARGO AIRCRAFT NOT TO EXCEED 10 GALLONS/PACKAGE. MAY BE TRANSPORTED IN CARGO VESSELS ON AND BELOW DECK AND IN PASSENGER VESSELS ON DECK. ALL SHIPMENTS MUST BE LABELED FLAMMABLE LIQUID.; Summary - THIS REGULATION LISTS AND CLASSIFIES THOSE MATERIALS WHICH THE DEPARTMENT OF TRANSPORTATION HAS DESIGNATED AS HAZARDOUS MATERIALS FOR SHIPPING PAPERS, PACKAGE MARKING, LABELING, AND TRANSPORT VEHICLE PLACARDING APPLICABLE TO THE SHIPMENT AND TRANSPORT OF THOSE HAZARDOUS MATERIALS.

entry date: NOV 1991

effective date: OCT1991

title: HAZARDOUS MATERIALS REGULATIONS, PART 172--HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

original : CFRUS*, Code of Federal Regulations, 49 , 172 , 101 , 1984

amendment: CFRUS*, Code of Federal Regulations, 49 , 172 , 101 , 1990

File: 17.01 LEGAL

rn : 1323007

systematic name:2-Propanol

common name :2-propanol

reported name :ISOPROPANOL

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
| CLASS | PESTI        | RQR   |
| MANUF | PESTI        | PRMT  |
| FOOD  | ADDIT        | RQR   |
|-----+-----+-----|

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CASE NAME ALIPHATIC ALCOHOLS, C1-C5; Summary - THIS SUBSTANCE IS

INCLUDED ON A LIST OF ACTIVE INGREDIENTS CONTAINED IN A PRODUCT FIRST REGISTERED BEFORE NOVEMBER 1, 1984, FOR WHICH A REGISTRATION STANDARD HAS NOT BEEN ISSUED. PUBLICATION OF THIS LIST INITIATES AN ACCELERATED REREGISTRATION AND DATA C ALL-IN FOR PRODUCTS CONTAINING THE LISTED ACTIVE INGREDIENTS.

entry date: JAN 1992 effective date: 1989

title: FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT PESTICIDES REQUIRED TO BE REREGISTERED; LIST D

original : FEREAC, Federal Register, 54 , 204 , 43388 , 1989

amendment: FEREAC, Federal Register, 54 , 204 , 43388 , 1989

File: 17.01 LEGAL rn : 1325037

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000
 area : USA type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| SAFTY | OCC | MXL |
| USE | OCC | MXL |

12000 PPM
 entry date: OCT 1991 effective date: JUN1990

title: POCKET GUIDE TO CHEMICAL HAZARDS
 original : XPHPAW, US PUBLIC HEALTH SERVICE PUBLICATION, 90 , 117 , 132 , 1990
 amendment: XPHPAW, US PUBLIC HEALTH SERVICE PUBLICATION, 90 , 117 , 132 , 1990

File: 17.01 LEGAL rn : 1336031

systematic name:2-Propanol
 common name :2-propanol
 reported name :2-Propanol
 cas no :67-63-0 rtecs no :NT8050000
 area : USA type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | EMI | RQR |
| SOIL | EMI | RQR |
| AQ | EMI | RQR |
| MANUF | EMI | RQR |

; Summary - FACILITIES THAT EXCEEDED A MANUFACTURING, IMPORTATION, OR PROCESSING THRESHOLD OF 25,000 LBS OR THE USE OF 10,000 LBS FOR THIS CHEMICAL MUST REPORT TO EPA ANY RELEASES OF THE CHEMICAL (OR CATEGORY CHEMICAL) TO AIR, LAND, WATER, POTW, UNDERGROUND INJECTION, OR OFF SITE TRANSFER. THIS REGULATION COVERS STANDARD INDUSTRIAL CLASSIFICATION

(SIC) CODES 20-39 ONLY).

entry date: OCT 1991

effective date: 1987

title: SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, TITLE III. EPCRA SECTION 313 LIST OF TOXIC SUBSTANCES

original : CFRUS*, Code of Federal Regulations, 40 , 372 , 65 , 1988

amendment: CFRUS*, Code of Federal Regulations, 40 , 372 , 65 , 1988

File: 17.01 LEGAL

rn : 1340603

systematic name:2-Propanol

common name :2-propanol

reported name :ISOPROPANOL

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REC

| subject | specification | descriptor |
|---------|---------------|------------|
| AIR | OCC | TLV |

Time Weighted Avg (TWA) 400 ppm, 985 MG/M3; Short Term Exposure Limit (STEL) 500 ppm, 1230 MG/M3; Summary - THIS THRESHOLD LIMIT VALUE IS INTENDED FOR USE IN THE PRACTICE OF INDUSTRIAL HYGIENE AS A GUIDELINE OR RECOMMENDATION IN THE CONTROL OF POTENTIAL HEALTH HAZARDS.

entry date: DEC 1991

effective date: 1989

title: THRESHOLD LIMIT VALUES

original : ACGIH*, Threshold Limit Values and Biological Exposure Indices, , , 11 , 1989

amendment: ACGIH*, Threshold Limit Values and Biological Exposure Indices, , , 11 , 1991

File: 17.01 LEGAL

rn : 1345002

systematic name:2-Propanol

common name :2-propanol

reported name :2-Propanol

cas no :67-63-0

rtecs no :NT8050000

area : USA

type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| MONIT | | RQR |

; Summary - THIS IS A CHEMICAL OR MIXTURE FOR WHICH REPORTING IS CURRENTLY REQUIRED UNDER THE TOXIC SUBSTANCE CONTROL ACT HEALTH AND SAFETY STUDIES SECTION 2607D. PERSONS WHO CURRENTLY MANUFACTURE OR PROCESS CHEMICAL SUBSTANCES OR MIXTURES FOR COMMERCIAL PURPOSES, THOSE WHO PROPOSE TO DO SO, AND THOSE WHO ARE NOT CURRENTLY INVOLVED WITH A LISTED CHEMICAL BUT WHO MANUFACTURED OR PROCESSED IT OR PROPOSED TO DO SO ANY TIME DURING THE TEN YEAR PERIOD PRIOR TO THE TIME IT BECAME LISTED MUST SUBMIT TO THE ADMINISTRATOR OF THE U.S. EPA STUDIES OR LISTS OF HEALTH AND SAFETY STUDIES CONDUCTED ON THIS SUBSTANCE FOR EVALUATION.

entry date: OCT 1991

effective date: 1986

title: HEALTH AND SAFETY DATA REPORTING RULES SECTION 8(D)

original : FEREC, Federal Register, 51 , , 32726 , 1986

amendment: CFRUS*, Code of Federal Regulations, 40 , 716 , 120 , 1990

File: 17.01 LEGAL rn : 1346073

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : USA type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| FOOD | ADDIT | RSTR |
| PACK | ADDIT | RSTR |
| MANUF | ADDIT | GL |
| USE | | RSTR |

; Summary - THIS SUBSTANCE INCLUDED ON A LIST OF SUBSTANCES USED TO PREPARE BASE SHEET OR COATING SUBSTANCES FOR CELLOPHANE MUST BE OF A GRADE OF PURITY SUITABLE FOR USE IN FOOD PACKAGING TO IMPART THE DESIRED TECHNOLOGICAL PROPERTIES. ACRYLONITRILE COPOLYMER SUBSTANCES MUST ABIDE UNDER THE CONDITIONS GIVEN IN 21 CFR 180.22 1988.

entry date: NOV 1991 effective date: 1977

title: INDIRECT FOOD ADDITIVES; POLYMERS-CELLOPHANE.

original : FEREAC, Federal Register, 42 , , 14572 , 1977

amendment: CFRUS*, Code of Federal Regulations, 21 , 177 , 1200 , 1988

File: 17.01 LEGAL rn : 1400094

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPYL ALCOHOL
 cas no :67-63-0 rtecs no :NT8050000
 area : EEC type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| FOOD | ADDIT | PRMT |

THIS SUBSTANCE MAY BE USED AS A DILUTANT OR SOLVENT FOR COLOURING MATTERS AUTHORIZED FOR USE IN FOODSTUFFS INTENDED FOR HUMAN CONSUMPTION.
 entry date: FEB 1986

title: COUNCIL DIRECTIVE ON THE APPROXIMATION OF THE RULES OF THE MEMBER STATES CONCERNING THE COLOURING MATTERS AUTHORISED FOR USE IN FOODSTUFFS INTENDED FOR HUMAN CONSUMPTION.

original : OJEC**, Official Journal of the European (Communities)/Union, 115 , , 2645/62 , 1962

amendment: OJEC**, Official Journal of the European (Communities)/Union, L43 , , 11 , 1981

File: 17.01 LEGAL rn : 1402098

systematic name:2-Propanol
 common name :2-propanol

reported name : ISOPROPYL ALCOHOL
 cas no : 67-63-0 rtecs no : NT8050000
 area : EEC type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| FOOD | | RQR |
| FOOD | | MXL |
| FOOD | | RSTR |

THE SUBSTANCE MAY BE USED FOR THE MANUFACTURE OF REGENERATED CELLULOSE FILM WHICH IS INTENDED TO OR DOES COME INTO CONTACT WITH FOODSTUFFS. IT MAY BY USED AS SOLVENT; MAXIMUM TOTAL QUANTITY OF ALL SOLVENTS: 0.6MG/DM2 ON THE SIDE IN CONTACT WITH FOODSTUFFS.
 entry date: OCT 1987 effective date: 01APR1987

title: COUNCIL DIRECTIVE OF 25 APRIL 1983 ON THE APPROXIMATION OF THE LAWS OF THE MEMBER STATES RELATING TO MATERIALS AND ARTICLES MADE OF REGENERATED CELLULOSE FILM INTENDED TO COME INTO CONTACT WITH FOODSTUFFS. (83/229/EEC).

original : OJEC**, Official Journal of the European (Communities)/Union, L123 , , 31 , 1983

amendment: OJEC**, Official Journal of the European (Communities)/Union, L228 , , 32 , 1986

File: 17.01 LEGAL

rn : 1402213

systematic name: 2-Propanol
 common name : 2-propanol
 reported name : ISOPROPYL ALCOHOL
 cas no : 67-63-0 rtecs no : NT8050000
 area : EEC type : REG

| subject | specification | descriptor |
|---------|---------------|------------|
| GOODS | FUEL | PRMT |
| GOODS | FUEL | RQR |

MEMBER STATES MAY NOT PREVENT OR DISCOURAGE, ON GROUNDS OF OXYGENATE CONTENT, THE PRODUCTION, MARKETING AND FREE MOVEMENT OF BLENDED PETROL CONTAINING ISOPROPYL ALCOHOL UP TO 5% (VOL.). PUMPS WHICH DISPENSE MOTOR FUELS CONTAINING MORE THAN 10% (VOL.) OF ISOPROPYL ALCOHOL SHALL BE VERY CLEARLY MARKED ACCORDINGLY TO MAKE ACCOUNT IN PARTICULAR OF VARIATIONS IN THE CALORIFIC VALUE OF SUCH FUELS
 entry date: FEB 1986 effective date: 01JAN1988

title: COUNCIL DIRECTIVE OF 5 DECEMBER 1985 ON CRUDE-OIL SAVINGS THROUGH THE USE OF SUBSTITUTE FUEL COMPONENTS IN PETROL. (85/536/EEC).

original : OJEC**, Official Journal of the European (Communities)/Union, L334 , , 20 , 1985

File: 17.01 LEGAL

rn : 1402713

systematic name: 2-Propanol
 common name : 2-propanol
 reported name : ISOPROPYL ALCOHOL
 cas no : 67-63-0 rtecs no : NT8050000

area : EEC type : REG

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|subject|specification|descriptor|
|-----+-----+-----|
|  USE   |    OCC   |    RSTR  |
| SAFTY  |    OCC   |    RQR   |
| MONIT  |    OCC   |    RQR   |
|-----+-----+-----|

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STRONG ACID PROCESS IN THE MANUFACTURE OF ISOPROPYL ALCOHOL IS A PROCESS BY WHICH WORKERS ARE OR ARE LIKELY TO BE EXPOSED TO CARCINOGENS AS A RESULT OF THEIR WORK. IN THIS TYPE OF ACTIVITY, THE RISK TO THE HEALTH AND SAFETY OF WORKERS MUST BE ASSESSED. EMPLOYERS' OBLIGATIONS INCLUDE REDUCTION OF THE USE OF THE PROCESS AND WHERE POSSIBLE ITS REPLACEMENT BY A LESS DANGEROUS PROCESS. WHERE THE REPLACEMENT OF THE PROCESS IS NOT POSSIBLE, MEASURES TO ENSURE THE PROTECTION OF THE WORKERS AND TO REDUCE THE LEVEL OF THEIR EXPOSURE MUST BE TAKEN. EMPLOYERS SHALL WHEN REQUESTED, MAKE AVAILABLE TO THE COMPETENT AUTHORITY APPROPRIATE INFORMATION. THE WORKERS AND/OR THEIR REPRESENTATIVES MUST BE INFORMED ABOUT THE HEALTH RISKS, HYGIENIC REQUIREMENTS AND PRECAUTIONS TO BE TAKEN AND THEY CAN CHECK THAT THIS DIRECTIVE IS APPLIED. RELEVANT HEALTH SURVEILLANCE OF WORKERS IS REQUIRED. THE MEDICAL RECORDS SHALL BE KEPT FOR AT LEAST 40 YEARS.

entry date: JUN 1992

effective date: 31DEC1992

title: COUNCIL DIRECTIVE OF 28 JUNE 1990 ON THE PROTECTION OF WORKERS FROM THE RISKS RELATED TO EXPOSURE TO CARCINOGENS AT WORK (SIXTH INDIVIDUAL DIRECTIVE WITHIN THE MEANING OF ARTICLE 16(1) OF DIRECTIVE 89/391/EEC). (90/394/EEC).

original : OJEC**, Official Journal of the European (Communities)/Union, 196 , , 1 , 1990

File: 17.01 LEGAL

rn : 1646178

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000
 area : IMO type : REC

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|subject|specification|descriptor|
|-----+-----+-----|
| TRNSP |    MARIN  |    CLASS  |
| LABEL |           |           |
| PACK  |           |           |
|-----+-----+-----|

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HAZARD CLASS: 3 = INFLAMMABLE LIQUID. PACKING GROUP: II = MEDIUM DANGER (I=GREAT DANGER - III=MINOR DANGER). UN NO. 1219

entry date: JAN 1991

amendment: !IMCOC*, International Maritime Dangerous Goods Code, , , 10004 , 1990

File: 17.01 LEGAL

rn : 1744419

systematic name:2-Propanol
 common name :2-propanol
 reported name :ISOPROPANOL
 cas no :67-63-0 rtecs no :NT8050000

area : UN type : REC

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|subject|specification|descriptor|  
-----+-----+-----  
|  TRNSP |                |    CLASS |  
|  LABEL |                |          |  
|  PACK  |                |          |  
-----
```

HAZARD CLASS: 3 = INFLAMMABLE LIQUID. PACKING GROUP: II = MEDIUM DANGER
(I=GREAT DANGER - III=MINOR DANGER). UN NO. 1219
entry date: AUG 1990

amendment: !UNTDG*, UN Transport of Dangerous Goods, Recommendation
prepared by the Committee of Experts on the Transport of
Dangerous Goods, , , 15 , 1989