



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 1 of 10
Issue Date: 31-05-2019
Version No.: 1.7

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name

Isopropyl Alcohol 99.9%

Supplier

Company: Best Chemical Co (S) Pte Ltd
Address: 60 Senoko Road, Singapore 758124
Telephone: +65 6755 2400
Fax: +65 6752 8809
Email: enquiry@best-chemical.com
Website: www.best-chemical.com

SECTION 2 - HAZARDS IDENTIFICATION

GHS Classification

Flammable Liquid Category 2

Eye Irritation Category 2

STOT - SE (Narcosis) Category 3



Signal word

DANGER

Hazard Statements

H225 Highly flammable liquid and vapour
H319 Causes serious eye irritation
H336 May cause drowsiness or dizziness

Prevention

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P271 Use only outdoors or in a well-ventilated area.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

Response

P370+P378_2 In case of fire: Use alcohol resistant foam or fine spray/water fog for extinction.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER/doctor/physician/first aider/if you feel unwell.
P337+P313 If eye irritation persists: Get medical advice/attention.
P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Storage

P403+P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal

P501 Dispose of contents/containers in accordance with Singapore regulations.

Other hazards

None

SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 2 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Chemical identification Isopropyl Alcohol

Synonyms sec-Propyl alcohol, Isopropanol, IPA

Composition 99.9%

Chemical structure C₃H₈O

CAS No. 67-63-0

SECTION 4 - FIRST AID MEASURES

Swallowed

If swallowed do NOT induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. Seek medical advice. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

Eye

If this product comes in contact with the eyes: Wash out immediately with fresh running water. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. Seek medical attention without delay; if pain persists or recurs seek medical attention.

Skin

If skin or hair contact occurs: Flush skin and hair with running water (and soap if available). Seek medical attention in event of irritation.

Inhaled

If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested. Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. Transport to hospital, or doctor.

Notes to Physician

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours. For acute or short term repeated exposures to isopropanol: Rapid onset respiratory depression and hypotension indicates serious ingestions that require careful cardiac and respiratory monitoring together with immediate intravenous access. Rapid absorption precludes the usefulness of emesis or lavage 2 hours post-ingestion. Activated charcoal and cathartics are not clinically useful. Ipecac is most useful when given 30 mins. post-ingestion. There are no antidotes. Management is supportive. Treat hypotension with fluids followed by vasopressors. Watch closely, within the first few hours for respiratory depression; follow arterial blood gases and tidal volumes. Ice water lavage and serial haemoglobin levels are indicated for those patients with evidence of gastrointestinal bleeding.

SECTION 5 - FIRE FIGHTING MEASURES

Extinguishing media

Alcohol stable foam. Dry chemical powder. BCF (where regulations permit). Carbon dioxide. Water spray or fog - Large fires only.

Fire fighting

Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves in the event of a fire. Prevent, by any means available, spillage from entering drains or water course. Consider evacuation (or protect in place). Fight fire from a safe distance, with adequate cover. If safe, switch off electrical equipment until vapour fire hazard removed. Use water delivered as a fine spray to control the fire and cool adjacent area. Avoid spraying water onto liquid pools. Do not approach containers suspected to be hot. Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire.

Fire/Explosion hazard

Liquid and vapour are highly flammable. Severe fire hazard when exposed to heat, flame and/or oxidisers. Vapour may travel a considerable distance to source of ignition. Heating may cause expansion or decomposition leading to violent rupture of containers. On combustion, may emit toxic fumes of carbon monoxide (CO). Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

Fire incompatibility



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 3 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Personal protective equipment

Breathing apparatus. Chemical splash suit. Chemical goggles. Safety glasses with side shields. Safety gumboots.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Minor spills

Remove all ignition sources. Clean up all spills immediately. Avoid breathing vapours and contact with skin and eyes. Control personal contact with the substance, by using protective equipment. Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

Major spills

Chemical Class: alcohols and glycols. For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
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LAND SPILL - SMALL

Cross-linked polymer – particulate	1	shovel	shovel	R, W, SS
Cross-linked polymer – pillow	1	throw	pitchfork	R, DGC, RT
Sorbent clay – particulate	2	shovel	shovel	R, I, P
Wood fiber – pillow	3	throw	pitchfork	R, P, DGC, RT
Treated wood fiber – pillow	3	throw	pitchfork	DGC, RT
Foamed glass – pillow	4	throw	pitchfork	R, P, DGC, RT

LAND SPILL – MEDIUM

Cross-linked polymer – particulate	1	blower	skid loader	R, W, SS
Polypropylene – particulate	2	blower	skid loader	W, SS, DGC
Sorbent clay – particulate	2	blower	skid loader	R, I, W, P, DGC
Polypropylene – mat	3	throw	skid loader	DGC, RT
Expanded mineral – particulate	3	blower	skid loader	R, I, W, P, DGC
Polyurethane – mat	4	throw	skid loader	DGC, RT

Legend

DGC: Not effective where ground cover is dense

R: Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT: Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988

Clear area of personnel and move upwind. Alert Fire Brigade and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water course. Consider evacuation (or protect in place). No smoking, naked lights or ignition sources. Increase ventilation. Stop leak if safe to do so. Water spray or fog may be used to disperse / absorb vapour. Contain spill with sand, earth or vermiculite. Use only spark-free shovels and explosion proof equipment. Collect recoverable product into labelled containers for recycling. Absorb remaining product with sand, earth or vermiculite. Collect solid residues and seal in labelled drums for disposal. Wash area and prevent runoff into drains. If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

SECTION 7 - HANDLING AND STORAGE

Procedure for handling

Containers, even those that have been emptied, may contain explosive vapours. Do NOT cut, drill, grind, weld or perform similar operations on or near containers. DO NOT allow clothing wet with material to stay in contact with skin. The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example. Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised. A



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 4 of 10
Issue Date: 31-05-2019
Version No.: 1.7

responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date. The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date. Unopened containers received from the supplier should be safe to store for 18 months. Opened containers should not be stored for more than 12 months. Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked. Avoid smoking, naked lights, heat or ignition sources. When handling, DO NOT eat, drink or smoke. Vapour may ignite on pumping or pouring due to static electricity. DO NOT use plastic buckets. Earth and secure metal containers when dispensing or pouring product. Use spark-free tools when handling. Avoid contact with incompatible materials. Keep containers securely sealed. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Use good occupational work practice. Observe manufacturer's storage and handling recommendations contained within this MSDS. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Suitable container

DO NOT use aluminium or galvanised containers. Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are clearly labelled and free from leaks. For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C). For manufactured product having a viscosity of at least 250 cSt. (23 deg. C). Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C): (i) Removable head packaging; (ii) Cans with friction closures and (iii) low pressure tubes and cartridges may be used. Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages. In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

Storage incompatibility

Isopropyl alcohol: forms ketones and unstable peroxides on contact with air or oxygen; the presence of ketones especially methyl ethyl ketone (MEK, 2-butanone) will accelerate the rate of peroxidation reacts violently with strong oxidisers, powdered aluminium (exothermic), crotonaldehyde, diethyl aluminium bromide (ignition), dioxygenyl tetrafluoroborate (ignition/ ambient temperature), chromium trioxide (ignition), potassium-tert-butoxide (ignition), nitroform (possible explosion), oleum (pressure increased in closed container), cobalt chloride, aluminium triisopropoxide, hydrogen plus palladium dust (ignition), oxygen gas, phosgene, phosgene plus iron salts (possible explosion), sodium dichromate plus sulfuric acid (exothermic/ incandescence), triisobutyl aluminium reacts with phosphorus trichloride forming hydrogen chloride gas reacts, possibly violently, with alkaline earth and alkali metals, strong acids, strong caustics, acid anhydrides, halogens, aliphatic amines, aluminium isopropoxide, isocyanates, acetaldehyde, barium perchlorate (forms highly explosive perchloric ester compound), benzoyl peroxide, chromic acid, dialkylzincs, dichlorine oxide, ethylene oxide (possible explosion), hexamethylene diisocyanate (possible explosion), hydrogen peroxide (forms explosive compound), hypochlorous acid, isopropyl chlorocarbonate, lithium aluminium hydride, lithium tetrahydroaluminate, nitric acid, nitrogen dioxide, nitrogen tetraoxide (possible explosion), pentafluoroguanidine, perchloric acid (especially hot), permonosulfuric acid, phosphorus pentasulfide, tangerine oil, triethylaluminium, triisobutylaluminium, trinitromethane attacks some plastics, rubber and coatings reacts with metallic aluminium at high temperature may generate electrostatic charges. Alcohols are incompatible with strong acids, acid chlorides, acid anhydrides, oxidising and reducing agents. Reacts, possibly violently, with alkaline metals and alkaline earth metals to produce hydrogen react with strong acids, strong caustics, aliphatic amines, isocyanates, acetaldehyde, benzoyl peroxide, chromic acid, chromium oxide, dialkylzincs, dichlorine oxide, ethylene oxide, hypochlorous acid, isopropyl chlorocarbonate, lithium tetrahydroaluminate, nitrogen dioxide, pentafluoroguanidine, phosphorus halides, phosphorus pentasulfide, tangerine oil, triethylaluminium, triisobutylaluminium should not be heated above 49 deg. C. when in contact with aluminium equipment Secondary alcohols and some branched primary alcohols may produce potentially explosive peroxides after exposure to light and/or heat. Avoid isocyanates.

Storage requirements

Store in original containers in approved flame-proof area. No smoking, naked lights, heat or ignition sources. DO NOT store in pits, depressions, basements or areas where vapours may be trapped. Keep containers securely sealed. Store away from incompatible materials in a cool, dry well ventilated area. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this MSDS.



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 5 of 10
Issue Date: 31-05-2019
Version No.: 1.7



Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US ACGIH Threshold Limit Values (TLV)	isopropanol	2-Propanol	500 ppm	750 ppm	Not Available	TLV® Basis: (URT & eye irr CNS impair; hematologic eff); BEI

EMERGENCY LIMITS

Ingredient	TEEL-0	TEEL-1	TEEL-2	TEEL-3
ISOPROPANOL	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
isopropanol	12,000 ppm	2,000 [LEL] ppm

MATERIAL DATA

Odour Threshold Value: 3.3 ppm (detection), 7.6 ppm (recognition).

Exposure at or below the recommended isopropanol TLV-TWA and STEL is thought to minimise the potential for inducing narcotic effects or significant irritation of the eyes or upper respiratory tract. It is believed, in the absence of hard evidence, that this limit also provides protection against the development of chronic health effects. The limit is intermediate to that set for ethanol, which is less toxic, and n-propyl alcohol, which is more toxic, than isopropanol

Respirator

Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent) Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required. Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	Air-line*	A-2	A-PAPR-2 ^
up to 20 x ES	-	A-3	-
20+ x ES	-	Air-line**	-

* - Continuous-flow; ** - Continuous-flow or positive pressure demand

^ - Full-face

A[All classes] = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

Eye

Safety glasses with side shields. Chemical goggles.

Hands/feet

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: frequency and duration of contact, chemical resistance of glove material, glove thickness and dexterity. Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent). When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. Contaminated gloves should be replaced. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended. Wear chemical protective gloves, e.g. PVC. Wear safety footwear or safety gumboots, e.g. Rubber

Recommended material(s)

GLOVE SELECTION INDEX



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 6 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Glove selection is based on a modified presentation of the: "Forsberg Clothing Performance Index". The effect(s) of the following substance(s) are taken into account in the computer generated selection: ISOPROPANOL

Material	PI
NEOPRENE	A
NITRILE	A
NITRILE+PVC	A
PE/EVAL/PE	A
PVC	B
NAT+NEOPR+NITRILE	C
NATURAL RUBBER	C
NATURAL+NEOPRENE	C

* PI - Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. - * Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

Other

Overalls. PVC Apron. PVC protective suit may be required if exposure severe. Eyewash unit. Ensure there is ready access to a safety shower. Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.

Engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use. Employers may need to use multiple types of controls to prevent employee overexposure.

For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:

solvent, vapours, degreasing etc., evaporating from tank (in still air).

Air Speed:

0.25-0.5 m/s (50-100 f/min)

aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)

0.5-1 m/s (100-200 f/min.)

direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)

1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 7 of 10
Issue Date: 31-05-2019
Version No.: 1.7

4: Large hood or large air mass in motion

4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s [200-400 f/min] for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Clear, colourless highly flammable liquid with an odour of rubbing alcohol; mixes with water, alcohol and ether.

Physical properties

State	Liquid	Molecular Weight	60.11
Melting Range [°C]	- 88.5	Viscosity	Not available
Boiling Range [°C]	82.0	Solubility in water [g/L]	Miscible
Flash Point [°C]	11.7	pH [1% solution]	Not applicable
Decomposition Temp [°C]	Not available	pH [as supplied]	Not applicable
Auto ignition Temp [°C]	456	Vapour Pressure [kPa]	4.4 @ 20 degC
Upper Explosive Limit [%]	12.7	Specific Gravity [water=1]	0.78 @ 20 degC
Lower Explosive Limit [%]	2.3	Relative Vapour density [air=1]	2.07
Volatile Component [%vol]	100	Evaporation Rate	2.4 BuAc=1

SECTION 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

Conditions contributing to instability

Presence of incompatible materials. Product is considered stable. Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

SECTION 11 - TOXICOLOGICAL INFORMATION

Acute toxicity

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.

TOXICITY

LD50 - Dermal - [rabbit] - 12800 mg/kg
 TCLo - Inhalation - [human] - 150 ppm/2 hours
 TCLo - Inhalation - [human] - 35 ppm/4 hours
 LC50 - Inhalation - [mouse] - 53000 mg/m³/4 hours
 LC50 - Inhalation - [rat] - 72600 mg/m³/4 hours
 LD50 - Intraperitoneal - [guinea pig] - 2560 mg/kg
 LD50 - Intraperitoneal - [mouse] - 4477 mg/kg
 LD50 - Intraperitoneal - [rabbit] - 667 mg/kg
 LD50 - Intraperitoneal - [rat] - 2735 mg/kg
 TDLo - Intraperitoneal - [rat] - 800 mg/kg
 LD50 - Intravenous - [mouse] - 1509 mg/kg
 LD50 - Intravenous - [rabbit] - 1184 mg/kg
 LD50 - Intravenous - [rat] - 1088 mg/kg

IRRITATION

Eye - [rabbit] - 10 ppm - moderate
 Eye - [rabbit] - 100 mg - SEVERE
 Eye - [rabbit] - 100 mg/24 hours - moderate
 Skin - [rabbit] - 500 mg - mild



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 8 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Skin corrosion or irritation

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. Repeated exposure may cause skin cracking, flaking or drying following normal handling and use. Most liquid alcohols appear to act as primary skin irritants in humans. Significant percutaneous absorption occurs in rabbits but not apparently in man. Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Serious eye damage or irritation

Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur. Isopropanol vapour may cause mild eye irritation at 400 ppm. Splashes may cause severe eye irritation, possible corneal burns and eye damage. Eye contact may cause tearing or blurring of vision.

Respiratory or skin sensitization

The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of vapours, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo. Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual. Exposure to aliphatic alcohols with more than 3 carbons may produce central nervous system effects such as headache, dizziness, drowsiness, muscle weakness, delirium, CNS depression, coma, seizure, and neurobehavioural changes. Symptoms are more acute with higher alcohols. Respiratory tract involvement may produce irritation of the mucosa, respiratory insufficiency, respiratory depression secondary to CNS depression, pulmonary oedema, chemical pneumonitis and bronchitis. Cardiovascular involvement may result in arrhythmias and hypotension. Gastrointestinal effects may include nausea and vomiting. Kidney and liver damage may result following massive exposures. The alcohols are potential irritants being, generally, stronger irritants than similar organic structures that lack functional groups (e.g. alkanes) but are much less irritating than the corresponding amines, aldehydes or ketones. Alcohols and glycols (diols) rarely represent serious hazards in the workplace, because their vapour concentrations are usually less than the levels which produce significant irritation which, in turn, produce significant central nervous system effects as well. The odour of isopropanol may give some warning of exposure, but odour fatigue may occur. Inhalation of isopropanol may produce irritation of the nose and throat with sneezing, sore throat and runny nose. The effects in animals subject to a single exposure, by inhalation, included inactivity or anaesthesia and histopathological changes in the nasal canal and auditory canal.

Germ cell mutagenicity

No data available

Carcinogenicity

rodent inhalation studies were conducted to evaluate isopropanol for cancer potential. 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. 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. The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.

Reproductive toxicity

A recent two-generation reproductive study characterised 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.

Specific target organ toxicity -single exposure

May cause stomach, lungs and kidneys, incoordination, lethargy, gastrointestinal tract irritation, and inactivity or anaesthesia. Swallowing 10 ml. of isopropanol may cause.



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SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 9 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Specific target organ toxicity - repeated exposure

May cause liver/kidney damage.

Aspiration hazard

Swallowing of the liquid may cause aspiration of vomit into the lungs with the risk of haemorrhaging, pulmonary oedema, progressing to chemical pneumonitis; serious consequences may result.

Potential health effects

Inhalation May be harmful if inhaled. Vapours may cause drowsiness and dizziness.

Ingestion Harmful if swallowed.

Skin May cause skin irritation.

Eyes May cause eye irritation.

Signs and Symptoms of Exposure

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Long term or repeated ingestion exposure of isopropanol may produce incoordination, lethargy and reduced weight gain. Repeated inhalation exposure to isopropanol may produce narcosis, incoordination and liver degeneration. Animal data show developmental effects only at exposure levels that produce toxic effects in the adult animals. Isopropanol does not cause genetic damage in bacterial or mammalian cell cultures or in animals. There are inconclusive reports of human sensitisation from skin contact with isopropanol. Chronic alcoholics are more tolerant of systemic isopropanol than are persons who do not consume alcohol; alcoholics have survived as much as 500 ml. of 70% isopropanol. Continued voluntary drinking of a 2.5% aqueous solution through two successive generations of rats produced no reproductive effects. NOTE: Commercial isopropanol does not contain "isopropyl oil". An excess incidence of sinus and laryngeal cancers in isopropanol production workers has been shown to be caused by the byproduct "isopropyl oil". Changes in the production processes now ensure that no byproduct is formed. Production changes include use of dilute sulfuric acid at higher temperatures.

ISOPROPANOL:

Repeat dose studies: 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.

Developmental toxicity: The developmental toxicity of isopropanol has been characterized in rat and rabbit developmental toxicity studies. 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 foetal body weights, but no teratogenicity

Genotoxicity: All genotoxicity assays reported for isopropanol have been negative.

SECTION 12 - ECOLOGICAL INFORMATION

DO NOT discharge into sewer or waterways.

Toxicity

Toxicity to fish

No data available

Toxicity to daphnia and other aquatic invertebrates

No data available

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
Isopropanol	Not available	Not available	Not available	Not available

SECTION 13 - DISPOSAL CONSIDERATIONS

Consult manufacturer for recycling options and recycle where possible. Consult State Land Waste Management Authority for disposal. Incinerate residue at an approved site. Recycle containers if possible, or dispose of in an authorized landfill.

SECTION 14 - TRANSPORTATION INFORMATION



Labels Required: FLAMMABLE LIQUID



The Best In Chemicals

SAFETY DATA SHEET

ISOPROPYL ALCOHOL 99.9%

Page 10 of 10
Issue Date: 31-05-2019
Version No.: 1.7

Hazchem:

*2YE Use alcohol resistant foam

Land Transport UNDG:

Class or division:	3	Subsidiary risk:	Not applicable
UN No.:	1219	UN packing group:	II
Limited quantity:	1 L	Special provisions:	Not applicable
Shipping Name: ISOPROPANOL (ISOPROPYL ALCOHOL)			

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	Not applicable
UN/ID Number:	1219	Packing Group:	II
Special provisions:	A180	ERG Code:	3L
Cargo Only			
Packing Instructions:	364	Maximum Qty / Pack:	60 L
Passenger and Cargo			
Packing Instructions:	353	Maximum Qty / Pack:	5 L
Passenger and Cargo Limited			
Quantity Packing Instructions:	Y341	Maximum Qty / Pack:	1 L
Shipping Name: ISOPROPANOL (ISOPROPYL ALCOHOL)			

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	Not applicable
UN Number:	1219	Packing Group:	II
EMS Number:	F-E, S-D	Special provisions:	Not applicable
Limited Quantities:	1 L		
Shipping Name: ISOPROPANOL (ISOPROPYL ALCOHOL)			

SECTION 15 - REGULATORY INFORMATION

REGULATIONS

isopropanol(67-63-0) is found on the following: "Singapore Odour Thresholds and Irritation Concentration of Chemicals", "International Maritime Dangerous Goods Requirements (IMDG Code)", "IOFI Global Reference List of Chemically Defined Substances", "Singapore Permissible Exposure Limits of Toxic Substances", "Singapore Fire Safety (Petroleum and Flammable Materials) - Licensable Products - Flammable Materials", "International Maritime Dangerous Goods Requirements (IMDG Code) - Substance Index", "FisherTransport Information", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (English)", "IMO Provisional Categorization of Liquid Substances - List 2: Pollutant only mixtures containing at least 99% by weight of components already assessed by IMO", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "OSPAR National List of Candidates for Substitution - Norway", "OECD List of High Production Volume (HPV) Chemicals", "Joint FAO/WHO Expert Committee on Food Additives (JECFA) - Specifications for Flavourings", "International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs", "Belgium Federal Public Service Mobility and Transport, Regulations concerning the International Carriage of Dangerous Goods by Rail - Table A: Dangerous Goods List - RID 2013 (Dutch)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Existing Chemicals Database", "Sigma-AldrichTransport Information", "United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (Spanish)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "International Air Transport Association (IATA) Dangerous Goods Regulations", "Joint FAO/WHO Expert Committee on Food Additives (JECFA) - Compendium of Food Additive Specifications - Extraction solvents", "International Fragrance Association (IFRA) Survey: Transparency List", "IMO IBC Code Chapter 17: Summary of minimum requirements", "Acros Transport Information"

SECTION 16 - OTHER INFORMATION

Reason for the revision: General update.

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the products. Best Chemical Co (S) Pte Ltd shall not be held liable for any damage resulting from handling or from contact with the above product.