

isooctane

Chemwatch Material Safety Data Sheet
Issue Date: 11-Sep-2008
A317L

Hazard Alert Code: HIGH

CHEMWATCH 4115-23
Version No:7
Page 1 of 16

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

isooctane

PROPER SHIPPING NAME

OCTANES

PRODUCT USE

■ The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. In determining octane numbers of fuels, in spectrophotometric analysis. Component of aliphatic solvents, thinners, motor fuels. As a intermediate azeotropic distillation entrainer.

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

RISK

- Highly flammable.
- Irritating to skin.
- Very toxic to aquatic organisms, may cause long- term adverse effects in the aquatic environment.
- HARMFUL- May cause lung damage if swallowed.
- Vapours may cause drowsiness and dizziness.

SAFETY

- Keep away from sources of ignition. No smoking.
- Avoid contact with skin.
- Wear suitable protective clothing.

- Wear suitable gloves.
- Use only in well ventilated areas.
- Keep container in a well ventilated place.
- Do not empty into drains.
- To clean the floor and all objects contaminated by this material, use water and detergent.
- This material and its container must be disposed of in a safe way.
- Keep away from food, drink and animal feeding stuffs.
- If swallowed, IMMEDIATELY contact Doctor or Poisons Information Centre. (show this container or label).
- Use appropriate container to avoid environmental contamination.
- Avoid release to the environment. Refer to special instructions/Safety data sheets.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 2 of 16

Section 2 - HAZARDS IDENTIFICATION

- This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
isooctane	26635-64-3	>98
being a mixture of isomers including		
2, 3, 4- trimethylpentane	565-75-3	
2- methylheptane	592-27-8	
4- methylheptane	589-53-7	
3- methylheptane	589-81-1	

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.
- Avoid giving milk or oils.
- Avoid giving alcohol.
- 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.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin contact occurs:
 - Immediately remove all contaminated clothing, including footwear.
 - 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

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 3 of 16

Section 4 - FIRST AID MEASURES

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 petroleum distillates or related hydrocarbons:

- Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
- Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO₂ 50 mm Hg) should be intubated.
- Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
- Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- 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.
 - 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.
- When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 500 metres in all directions.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 4 of 16

Section 5 - FIRE FIGHTING MEASURES

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.
- Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

FIRE INCOMPATIBILITY

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

HAZCHEM

3YE

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 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: aliphatic hydrocarbons

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross- linked polymer - particulate	1	shovel	shovel	R, W, SS
cross- linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
wood fiber - pillow	2	throw	pitchfork	R, P, DGC, RT
treated wood fibre-pillow	2	throw	pitchfork	DGC, RT
sorbent clay - particulate	3	shovel	shovel	R, I, P
foamed glass - pillow	3	throw	pitchfork	R, P, DGC, RT

LAND SPILL - MEDIUM

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 5 of 16

Section 6 - ACCIDENTAL RELEASE MEASURES

cross- linked polymer - particulate	1	blower	skiploader	R, W, SS
cross- linked polymer - pillow	2	throw	skiploader	R, DGC, RT
sorbent clay - particulate	3	blower	skiploader	R, I, P
polypropylene - particulate	3	blower	skiploader	W, SS, DGC
expanded mineral - particulate	4	blower	skiploader	R, I, W, P, DGC
polypropylene - mat	4	throw	skiploader	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.

Contains low boiling substance:

Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 6 of 16

Section 7 - HANDLING AND STORAGE

- Check for bulging containers.
- Vent periodically
- Always release caps or seals slowly to ensure slow dissipation of vapours.
- DO NOT allow clothing wet with material to stay in contact with skin.
- Electrostatic discharge may be generated during pumping - this may result in fire.
- Ensure electrical continuity by bonding and grounding (earthing) all equipment.
- Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/sec until fill pipe submerged to twice its diameter, then ≤ 7 m/sec).
- Avoid splash filling.
- Do NOT use compressed air for filling discharging or handling operations.
- 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 storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

SUITABLE CONTAINER

- Glass container is suitable for laboratory quantities.
- 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

- Avoid reaction with oxidising agents.
- n-Octane/ iso-octane:

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 7 of 16

Section 7 - HANDLING AND STORAGE

- reacts violently with strong oxidisers, dinitrogen tetraoxide
- is incompatible with sulfuric acid, nitric acid, caustics, aliphatic amines, isocyanates
- attacks some plastics, rubber and coatings
- may generate electrostatic charges on agitation or flow, due to low conductivity.

PACKAGING MATERIAL INCOMPATIBILITIES

Chemical Name	Container Type
Isooctane	EPDM, NORYLr, Silicone

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 storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• isooctane:	CAS:26635- 64- 3
• 2, 3, 4- trimethylpentane:	CAS:565- 75- 3
• 2- methylheptane:	CAS:592- 27- 8
• 4- methylheptane:	CAS:589- 53- 7
• 3- methylheptane:	CAS:589- 81- 1

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
isooctane	209	1,000 [LEL]
2,3,4-trimethylpentane	209	1,000 [LEL]
2-methylheptane	209	1,000 [LEL]
4-methylheptane	209	1,000 [LEL]
3-methylheptane	209	1,000 [LEL]

NOTES

Values marked LEL indicate that the IDLH was based on 10% of the lower explosive limit for safety considerations even though the relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations.

MATERIAL DATA

2,3,4-TRIMETHYLPENTANE:

2-METHYLHEPTANE:

3-METHYLHEPTANE:

4-METHYLHEPTANE:

ISOCTANE:

- as octane CAS 111-65-9

The TLV-TWA is thought to be protective against narcotic effects produced at higher concentrations.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 8 of 16

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTION

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

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.
- 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.

- Neoprene rubber gloves.

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 footwear.

RESPIRATOR

• Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 9 of 16

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half- face Respirator	Full- Face Respirator
up to 10	1000	a- AUS / Class1	-
up to 50	1000	-	a- AUS / Class 1
up to 50	5000	Airline *	-
up to 100	5000	-	a- 2
up to 100	10000	-	a- 3
100+			Airline**

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

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).

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

■ CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.

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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Colourless mobile highly flammable liquid; floats on water. Odour similar to gasoline. Vapour denser than air. Soluble in alcohol, aromatic and aliphatic hydrocarbons, chloroform, ether, carbon tetrachloride, DMF, and oils (except castor oil).

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Floats on water.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 10 of 16

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

State	Liquid	Molecular Weight	114.2
Melting Range (°C)	- 107.4	Viscosity	Not Available
Boiling Range (°C)	99	Solubility in water (g/L)	Immiscible
Flash Point (°C)	- 12	pH (1% solution)	Not applicable.
Decomposition Temp (°C)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°C)	346	Vapour Pressure (kPa)	5.47 @ 21 deg.
Upper Explosive Limit (%)	6.0	Specific Gravity (water=1)	0.69
Lower Explosive Limit (%)	1.0	Relative Vapour Density (air=1)	3.9
Volatile Component (%vol)	100	Evaporation Rate	>1 BuAc=1
Gas group	IIA		

Section 10 - STABILITY AND REACTIVITY

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

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ 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. Signs and symptoms of chemical (aspiration) pneumonitis may include coughing, gasping, choking, burning of the mouth, difficult breathing, and bluish coloured skin (cyanosis).
Accidental ingestion of the material may be damaging to the health of the individual.
Rats given isoparaffinic hydrocarbons (after 18-24 hours fasting) showed lethargy and/or general weakness, ataxia and diarrhoea. Symptoms disappeared within 24-28 hours.
Considered an unlikely route of entry in commercial/industrial environments The liquid may produce considerable gastrointestinal discomfort and may be harmful or toxic if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

EYE

■ Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).

SKIN

■ Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 11 of 16

Section 11 - TOXICOLOGICAL INFORMATION

blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. The material may accentuate any pre-existing dermatitis condition.

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.

INHALED

■ 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.

Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Acute effects from inhalation of high concentrations of vapour are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterised by headache and dizziness, increased reaction time, fatigue and loss of co-ordination.

Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

Some aliphatic hydrocarbons produce axonal neuropathies. Isoparaffinic hydrocarbons produce injury to the kidneys of male rats. When albino rats were exposed to isoparaffins at 21.4 mg/l for 4 hours, all animals experienced weakness, tremors, salivation, mild to moderate convulsions, chromodacryorrhoea and ataxia within the first 24 hours. Symptoms disappeared after 24 hours.

Several studies have evaluated sensory irritation in laboratory animals or odor or sensory response in humans. When evaluated by a standard procedure to assess upper airway irritation, isoparaffins did not produce sensory irritation in mice exposed to up to 400 ppm isoparaffin in air. Human volunteers were exposed for six hours to 100 ppm isoparaffin. The subjects were given a self-administered questionnaire to evaluate symptoms, which included dryness of the mucous membranes, loss of appetite, nausea, vomiting, diarrhea, fatigue, headache, dizziness, feeling of inebriation, visual disturbances, tremor, muscular weakness, impairment of coordination or paresthesia. No symptoms associated with solvent exposure were observed. With a human expert panel, odour from liquid imaging copier emissions became weakly discernible at approximately 50 ppm.

Numerous long-term exposures have been conducted in animals with only one major finding observed. Renal tubular damage has been found in kidneys of male rats upon repeated exposures to isoparaffins. It does not occur in mice or in female rats. This male rat nephropathy has been observed with a number of hydrocarbons, including wholly vaporized unleaded gasoline. The phenomenon has been attributed to reversible binding of hydrocarbon to alpha2-globulin. Since humans do not synthesize alpha2-globulin or a similar protein, the finding is not considered to be of biological significance to man. No clinically significant renal abnormalities have been found in refinery workers exposed to hydrocarbons.

When evaluated for developmental toxicity in rats, isoparaffins were neither embryotoxic nor teratogenic. Isoparaffins were consistently negative on standard bacterial genotoxicity assays. They were also non-genotoxic in in vivo mammalian testing for somatic or germ cell mutations (mouse micronucleus test and rat dominant lethal assay, respectively).

Mullin et al: Jnl Applied Toxicology 10, pp 136-142, 2006.

Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. Vapour is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 12 of 16

Section 11 - TOXICOLOGICAL INFORMATION

Results are shallow respiration, unconsciousness, convulsions, also possible is ventricular fibrillation. Cardiac effects and respiratory arrest may occur rapidly at 16000 ppm.

CHRONIC HEALTH EFFECTS

■ Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes.

[PATTYS].

Chronic exposure by inhalation may cause weakness, weight loss, anemia, nervousness, pains in the limbs, peripheral numbness, and paresthesias.

TOXICITY AND IRRITATION

2-METHYLHEPTANE:

4-METHYLHEPTANE:

3-METHYLHEPTANE:

2,3,4-TRIMETHYLPENTANE:

■ No significant acute toxicological data identified in literature search.

ISOOCTANE:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

as octane CAS 111-65-9

2,3,4-TRIMETHYLPENTANE:

as octane CAS 111-65-9

Section 12 - ECOLOGICAL INFORMATION

2,3,4-TRIMETHYLPENTANE:

2-METHYLHEPTANE:

4-METHYLHEPTANE:

3-METHYLHEPTANE:

ISOOCTANE:

■ DO NOT discharge into sewer or waterways.

■ for iso-octane (as 2,2,4-trimethylpentane):

log Kow 4.09

Water solubility 2.44 mg/l, 25 C

Vapour pressure 49.3 mm Hg, 25 C

Henry's Law Constant 3.01 atm-m³/mol 25 C

log Koc 4.35, in 3 sediments; 3.43 in soil

Environmental fate:

Aquatic fate: The hydrolysis of isooctane in water is not expected to be important because the compound does not contain a hydrolysable group. The photolysis is also expected to be unimportant because isooctane is transparent to wavelengths available in sunlight. Although slow biodegradation may occur in aquatic media, volatilisation from water is expected to be the dominant process as indicated by the Henry's Law constant. The average log Koc value of 4.35 in sediments indicates that the compound remains adsorbed to sediments and

suspended solids in aquatic media. A log bioconcentration factor of 2.57 estimated from water solubility indicates that bioconcentration in aquatic organisms may be important.

Atmospheric fate: The rate constant for reaction of isooctane with atomic oxygen is $5.5 \times 10^{+10}$ cm³/mol-sec.

Based on this rate constant and the concentration of atmospheric oxygen ($2.5 \times 10^{+4}$ mol/cm³ in a typical atmosphere this reaction will not be important in the atmosphere. The gas phase reaction with alkanes with

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 13 of 16

Section 12 - ECOLOGICAL INFORMATION

ozone and nitrate radicals are of negligible importance. The rate constant for reaction of isooctane with OH radicals is $3.66-3.68 \times 10^{-12}$ cm³/mol-sec. based on an average 24 hr atmospheric OH radical concentration of 5×10^5 mol/cm³, the half-life of isooctane is 4.4 days.

Biodegradation: It is likely that isooctane may undergo slow biodegradation with acclimated microorganisms.

Abiotic degradation: Alkanes do not contain hydrolysable groups and are generally resistant to hydrolysis.

The compound is transparent to tropospheric sunlight so direct photolysis in ambient water and soil is unlikely to be important.

■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

ISOOCTANE:

Half-life (hr) H₂O surface water: 5.55

2,3,4-TRIMETHYLPENTANE:

Degradation Biological: 54%(192)[13]

2-METHYLHEPTANE:

4-METHYLHEPTANE:

3-METHYLHEPTANE:

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
2, 3, 4- trimethylpentane	HIGH	No Data Available	LOW	MED
2- methylheptane	LOW	No Data Available	LOW	MED
4- methylheptane	LOW	No Data Available	LOW	MED
3- methylheptane	LOW	No Data Available	LOW	MED

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / Cas No / RTECS No	EHS	TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	
Octane / CAS:26635 -64- 3 /	107	538	5		5	(R)	4	NI	(0)	(0)	0	0	0	0	A		FE	2

Legend:

EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 14 of 16

Section 12 - ECOLOGICAL INFORMATION

mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation& corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities,

For column A2: R=Readily biodegradable, NR=Not readily biodegradable.

For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic.

For column E1: NT=Not tainting (tested), T=Tainting test positive.

For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances.

The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard.

(GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

Section 13 - DISPOSAL CONSIDERATIONS

■ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: FLAMMABLE LIQUID

HAZCHEM:

3YE (ADG7)

Land Transport UNDG:

Class or division:	3	Subsidiary risk:	None
UN No.:	1262	UN packing group:	II
Shipping Name:	OCTANES		

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 15 of 16

Section 14 - TRANSPORTATION INFORMATION

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	1262	Packing Group:	II
Special provisions:	None		

Shipping name:OCTANES

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	1262	Packing Group:	II
EMS Number:	F-E,S-E	Special provisions:	None
Limited Quantities:	1 L	Marine Pollutant:	Yes

Shipping name:OCTANES

GESAMP hazard profiles for this material can be found in section 12 of the MSDS.

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

S5, NZS4

REGULATIONS

isooctane (CAS: 26635-64-3) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD List of High Production Volume (HPV) Chemicals"

Regulations for ingredients

2, 3, 4-trimethylpentane (CAS: 565-75-3) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD List of High Production Volume (HPV) Chemicals"

2-methylheptane (CAS: 592-27-8) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD List of High Production Volume (HPV) Chemicals"

4-methylheptane (CAS: 589-53-7) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD List of High Production Volume (HPV) Chemicals"

continued...

isooctane

Hazard Alert Code: HIGH

Chemwatch Material Safety Data Sheet

Issue Date: 11-Sep-2008

A317L

CHEMWATCH 4115-23

Version No:7

Page 16 of 16

Section 15 - REGULATORY INFORMATION

3-methylheptane (CAS: 589-81-1) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD List of High Production Volume (HPV) Chemicals"

Section 16 - OTHER INFORMATION

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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This is the end of the MSDS.