



Material Safety Data Sheet

The Dow Chemical Company

Product Name: C4 Raffinate-1

Issue Date: 04/15/2008

Print Date: 16 Apr 2008

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

C4 Raffinate-1

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number: 800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400

Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview

Color: Colorless

Physical State: Liquefied gas

Odor: Pungent

Hazards of product:

DANGER! Extremely flammable liquid and vapor - Vapor may cause flash fire. Harmful if inhaled. May cause frostbite. May cause anesthetic effects. Contents under pressure. Vapors may travel a long distance; ignition and/or flash back may occur. Evacuate area. Keep upwind of spill. Stay out of low areas. Warn public of downwind explosion hazard. Cancer hazard. Can cause cancer.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: Vapor may cause eye irritation experienced as mild discomfort and redness. Liquid may cause frostbite.

Skin Contact: No hazard from gas. Liquid may cause frostbite.

Skin Absorption: No adverse effects anticipated by skin absorption.

Inhalation: In confined or poorly ventilated areas, vapor can readily accumulate and can cause unconsciousness and death. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats).

Ingestion: Swallowing is unlikely because of the physical state. Liquid may cause frostbite.

Effects of Repeated Exposure: For the major component(s): In animals, effects have been reported on the following organs: Nasal tissue.

Cancer Information: Contains component(s) which have caused cancer in laboratory animals. Butadiene epidemiology studies have linked employment in two different chemical operations each with a different type of cancer. The causative factors for these excess cancers have not been determined.

Birth Defects/Developmental Effects: For the minor component(s): Butadiene. Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in lab animals at doses nontoxic to the mother.

3. Composition Information

Component	CAS #	Amount
Hydrocarbons, C4, steam-cracker distillate; Petroleum gas	92045-23-3	100.0 %
Isobutene	115-11-7	37.0 - 50.0 %
Butene	106-98-9	20.0 - 30.0 %
Butane	106-97-8	5.0 - 15.0 %
Trans-2-Butene	624-64-6	5.0 - 15.0 %
Cis-2-Butene	590-18-1	2.0 - 8.0 %
Isobutane	75-28-5	1.0 - 4.0 %
1,3-Butadiene	106-99-0	0.0 - 1.0 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist. In case of frostbite, immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention promptly, preferably from an ophthalmologist.

Skin Contact: Immediately flush skin with plenty of water for 15 minutes. Seek medical attention.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Ingestion: In case of frostbite, immediately rinse lips and mouth with tepid water for at least 15 minutes. Obtain medical attention promptly.

Notes to Physician: Maintain adequate ventilation and oxygenation of the patient. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. Treat for frostbite, if present. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. Fire Fighting Measures

Extinguishing Media: Do not extinguish. Stop flow of product and allow fire to burn out. Once product flow has stopped, small fires may be extinguished with: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Do not extinguish. If flames are

accidentally extinguished, explosive re-ignition may occur. Shut off source of fuel if possible and allow fire to burn out. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Eliminate ignition sources. For spills of liquefied gas, apply appropriate foam or vapor suppressing agent. Warning! Contact of water with liquefied gas can result in boiling, frothing, and rapid generation of vapor. For unignited vapor cloud, use water spray to knock down and control dispersion of vapors.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

Unusual Fire and Explosion Hazards: Container may vent and/or rupture due to fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur.

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Contain spilled material if possible. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Keep personnel out of low areas. Keep personnel out of confined or poorly ventilated areas. Keep upwind of spill. Ventilate area of leak or spill. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. For large spills, warn public of downwind explosion hazard. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. See Section 10 for more specific information. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: Avoid contact with eyes. Wash thoroughly after handling. Electrically bond and ground all containers and equipment before transfer or use of material. Avoid breathing vapor. Keep container closed. Use with adequate ventilation. Do not enter confined spaces unless adequately ventilated. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Other Precautions: Never use air pressure for transferring product. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur.

Storage

No smoking or open flame in storage area. See Section 10 for more specific information.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
1,3-Butadiene	ACGIH	TWA	2 ppm
	OSHA	TWA	1 ppm
	OSHA	STEL	5 ppm
	OSHA	Action Level	0.5 ppm

Isobutane	ACGIH	TWA	1,000 ppm
Isobutene	ACGIH	TWA	250 ppm
Butane	ACGIH	TWA	1,000 ppm
Butene	ACGIH	TWA	250 ppm
Cis-2-Butene	ACGIH	TWA	250 ppm

Personal Protection

Eye/Face Protection: For handling the gas, wear safety glasses. When contact with the liquid (condensed gas) is possible, wear chemical goggles. If exposure causes eye discomfort, use a full-face respirator.

Skin Protection: Wear clean, body-covering clothing.

Hand protection: Use gloves with insulation for thermal protection, when needed.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply. The following should be effective types of air-purifying respirators: Organic vapor cartridge.

Ingestion: No precautions necessary due to the physical properties of the material.

Engineering Controls

Ventilation: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

9. Physical and Chemical Properties

Physical State	Liquefied gas
Color	Colorless
Odor	Pungent
Flash Point - Closed Cup	-80 °C (-112 °F) <i>Literature</i>
Flammable Limits In Air	Lower: 1.6 %(V) <i>Literature</i> (1-butene) Upper: 10.0 %(V) <i>Literature</i> (1-butene)
Autoignition Temperature	
Vapor Pressure	2,500 mmHg @ 20 °C <i>Literature</i>
Boiling Point (760 mmHg)	-6.5 °C (20.3 °F) <i>Literature</i> .
Vapor Density (air = 1)	1.9 <i>Literature</i>
Specific Gravity (H2O = 1)	0.6 <i>Literature</i>
Freezing Point	-140 °C (-220 °F) <i>Literature</i>
Melting Point	-140 °C (-220 °F) <i>Literature</i>
Solubility in Water (by weight)	<i>Literature</i> Insoluble
pH	Not applicable
Percent Volatiles	100 %(m) <i>Literature</i>
Dynamic Viscosity	Not applicable

10. Stability and Reactivity

Stability/Instability

Stable under recommended storage conditions. See Storage, Section 7.

Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose. Avoid static discharge. Avoid contact with air to prevent formation of explosive peroxides.

Incompatible Materials: Avoid contact with oxidizing materials. Avoid contact with: Strong acids. Avoid unintended contact with: Peroxides.

Hazardous Polymerization

Can occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity

Skin Absorption

The dermal LD50 has not been determined.

Repeated Dose Toxicity

For the major component(s): In animals, effects have been reported on the following organs: Nasal tissue.

Chronic Toxicity and Carcinogenicity

Contains component(s) which have caused cancer in laboratory animals. Butadiene epidemiology studies have linked employment in two different chemical operations each with a different type of cancer. The causative factors for these excess cancers have not been determined.

Carcinogenicity Classifications:

Component	List	Classification
1,3-Butadiene	ACGIH	Suspected human carcinogen.; Group A2
	NTP	Known carcinogen.
	OSHA	Cancer hazard.
	IARC	Human carcinogen.; 1

Developmental Toxicity

For the minor component(s): Butadiene. Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in lab animals at doses nontoxic to the mother.

Reproductive Toxicity

No relevant information found.

Genetic Toxicology

Contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others. Contains component(s) which were negative in some animal genetic toxicity studies and positive in others.

12. Ecological Information

CHEMICAL FATE

Movement & Partitioning

Based largely or completely on data for major component(s): Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50).

Persistence and Degradability

Based largely or completely on data for major component(s): Biodegradation may occur under aerobic conditions (in the presence of oxygen).

ECOTOXICITY

Typical for this family of materials. Not expected to be acutely toxic to aquatic organisms.

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device. As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Group at 1-800-258-2436 or 1-989-832-1556 (U.S.), or 1-800-331-6451 (Canada) for further details.

14. Transport Information

DOT Non-Bulk

Proper Shipping Name: Hydrocarbon gas mixture, liquefied, n.o.s.(Mixture A)
Hazard Class: 2.1 **ID Number:** UN1965

DOT Bulk

Proper Shipping Name: Hydrocarbon gas mixture, liquefied, n.o.s.(Mixture A)
Hazard Class: 2 **ID Number:** UN1965

IMDG

Proper Shipping Name: Hydrocarbon gas mixture, liquefied, n.o.s.(Mixture A)
Hazard Class: 2 **ID Number:** UN1965
EMS Number: F-D,S-U

ICAO/IATA

Proper Shipping Name: Hydrocarbon gas mixture, liquefied, n.o.s.(Mixture A)
Hazard Class: 2.1 **ID Number:** UN1965 **Cargo Packing Instruction:** 200

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes

Reactive Hazard No
Sudden Release of Pressure Hazard Yes

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
1,3-Butadiene	106-99-0	0.0 - 1.0 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Isobutene	115-11-7	37.0 - 50.0 %
Butene	106-98-9	20.0 - 30.0 %
Butane	106-97-8	5.0 - 15.0 %
Trans-2-Butene	624-64-6	5.0 - 15.0 %
Cis-2-Butene	590-18-1	2.0 - 8.0 %
Isobutane	75-28-5	1.0 - 4.0 %
1,3-Butadiene	106-99-0	0.0 - 1.0 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
1,3-Butadiene	106-99-0	0.0 - 1.0 %

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

Component	CAS #	Amount
1,3-Butadiene	106-99-0	0.0 - 1.0 %

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Component	CAS #	Amount
1,3-Butadiene	106-99-0	0.0 - 1.0 %

US. Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

European Inventory of Existing Commercial Chemical Substances (EINECS)

The components of this product are on the EINECS inventory or are exempt from inventory requirements.

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Recommended Uses and Restrictions

Raw material for industrial use.

Revision

Identification Number: 51043 / 1001 / Issue Date 04/15/2008 / Version: 2.1

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.