Crude Butadiene

Version 5.1 Revision Date 2024-01-29

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product information

Product Name : Crude Butadiene
Material : 1120922, 1037102, 1015401

Use : Chemical intermediate

Company : Chevron Phillips Chemical Company LP
10001 Six Pines Drive
The Woodlands, TX 77380

Emergency telephone:

Health:
866.442.9628 (North America)
1.832.813.4984 (International)
Transport:
CHEMTREC 800.424.9300 or 703.527.3887(int'l)
Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090
Mexico CHEMTREC 01-800-681-9531 (24 hours)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600
Argentina: +(54)-1159839431
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Austria: VIZ +43 1 406 43 43 (24 hours/day, 7 days/week)
Belgium: 070 245 245 (24 hours/day, 7 days/week)
Bulgaria: +359 2 9154 233
Croatia: +3851 2348 342 (24 hours/day, 7 days/week)
Cyprus: 1401
Czech Republic: Toxicological Information Center +420 224 919 293, +420 224 915 402
Denmark: Danish Poison Center (Giftlinjen): +45 8212 1212
Estonia: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Finland: 0800 147 111 09 471 977 (24 hours/day)
France: ORFILA number (INRS): + 33 (0) 1 45 42 59 59 (24 hours/day, 7 days/week)
Germany: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Greece: (0030) 2107793777 (24 hours/day, 7 days/week)
Hungary: +36-80-201-199 (24 hours/day, 7 days/week)
Iceland: 543 2222 (24 hours/day, 7 days/week)
Ireland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)

Italy: POISON CENTER MILAN – Azienda Ospedaliera Niguarda Ca` Grande Tel. +39 02 66101029; POISON CENTER ROME – Policlinico “Agostino Gemelli”, Servizio di tossicologia clinica Tel. +39 06 3054343; POISON CENTER ROME – Ospedale Pediatrico Bambino Gesù Tel. +39 06 68593726;POISON CENTER ROME – Policlinico “Umberto I” Tel. +39 06 4997 8000; POISON CENTER FOGGIA – Azienda Ospedaliera Universitaria Riuniti Tel. +39 0881 732326; POISON CENTER NAPLES – Azienda Ospedaliera “Antonio Cardarelli” Tel. +39 081 7472870; POISON CENTER FLORENCE – Azienda Ospedaliera universitaria Careggi Tel. +39 055 7947819; POISON CENTER PAVIA – IRCCS Fondazione Salvatore Maugeri Tel. +39 0382 24444; POISON CENTER BERGAMO – Azienda Ospedaliera “Papa Giovanni XXIII” Tel. 800 883 300; POISON CENTER VERONA – Azienda Ospedaliera Universitaria integrata Tel. 800 011 858;
Latvia: State Fire and Rescue Service, phone number: 112; Toxicology and Sepsis Clinic Poisoning and Drug Information Center, Hipokrāta 2, Riga, Latvia, LV-1038, phone number +371 67042473. (24 hours.)
Liechtenstein: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Lithuania: +370 (85) 2362052
Luxembourg: (+352) 8002 5500 (24 hours/day, 7 days/week)
Malta: +356 2395 2000
The Netherlands: NVIC: +31 (0)88 755 8000
Norway: 22 59 13 00 (24 hours/day, 7 days/week)
Poland: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Portugal: CIAV phone number: +351 800 250 250
Romania: +40213183606
Slovakia: +421 2 5477 4166
Slovenia: Phone number: 112
Spain: National Emergency Telephone Number of Spanish Poison Centre: +34 91 562 04 20 (24 hours/day, 7 days/week)
Sweden: 112 – ask for Poisons Information

Responsible Department	:	Product Safety and Toxicology Group
E-mail address	:	SDS@CPChem.com
Website	:	www.CPChem.com

SECTION 2: Hazards identification

Classification of the substance or mixture
This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

Classification

: Flammable gases, Category 1
Gases under pressure, Liquefied gas
Skin irritation, Category 2
Eye irritation, Category 2A
Germ cell mutagenicity, Category 1B
Carcinogenicity, Category 1A
Specific target organ toxicity - single exposure, Category 3, Central nervous system
Specific target organ toxicity - repeated exposure, Category 1, Blood
Simple Asphyxiant

Labeling

Symbol(s) :

Signal Word : Danger

Hazard Statements : H220: Extremely flammable gas.
H280: Contains gas under pressure; may explode if heated.
H315: Causes skin irritation.
H319: Causes serious eye irritation.
H336: May cause drowsiness or dizziness.
H340: May cause genetic defects.
H350: May cause cancer.
H372: Causes damage to organs (Blood) through prolonged or repeated exposure.
May displace oxygen and cause rapid suffocation.

Precautionary Statements : **Prevention:**
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 Eliminate all ignition sources if safe to do so.
Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
P410 + P403 Protect from sunlight. Store in a well-ventilated place.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:

IARC	Group 1: Carcinogenic to humans	
	1,3-Butadiene	106-99-0
	Benzene	71-43-2
	Group 2B: Possibly carcinogenic to humans	
	Isoprene	78-79-5
NTP	Known to be human carcinogen	
	1,3-Butadiene	106-99-0
	Benzene	71-43-2
	Reasonably anticipated to be a human carcinogen	
	Isoprene	78-79-5

SECTION 3: Composition/information on ingredients

Synonyms : 1,3-Butadiene
Butadiene, 1,3-
Butadiene Feedstock
Crude C4

Molecular formula : UVCB
CAS-No. : 68955-28-2

Component	CAS-No.	Weight %
Gases (petroleum), light steam-cracked, butadiene conc.	68955-28-2	100
1,3-Butadiene	106-99-0	10 - 80
n-Butane	106-97-8	0 - 60
Isobutane	75-28-5	0 - 42
Isobutylene	115-11-7	0 - 15
1-Butene	106-98-9	0 - 15
cis-2-Butene	590-18-1	0 - 10
trans-2-Butene	624-64-6	0 - 10
1,3-Pentadiene	504-60-9	0 - 5
Isopentane	78-78-4	0 - 5
n-Pentane	109-66-0	0 - 5
Cyclopentadiene	542-92-7	0 - 5
Isoprene	78-79-5	0 - 5
Cyclopentane	287-92-3	0 - 5
2-methyl-2-butene	513-35-9	0 - 5
Propane	74-98-6	0 - 3
Propylene	115-07-1	0 - 3
Propadiene	463-49-0	0 - 3
Benzene	71-43-2	0 - 5

SECTION 4: First aid measures

General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance.

If inhaled : Consult a physician after significant exposure. If unconscious, place in recovery position and seek medical advice.

In case of skin contact	:	If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.
In case of eye contact	:	Immediately flush eye(s) with plenty of water. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
If swallowed	:	Induce vomiting immediately and call a physician. Keep respiratory tract clear. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point	:	-76°C (-105°F)
Autoignition temperature	:	No data available
Suitable extinguishing media	:	Alcohol-resistant foam. Carbon dioxide (CO2). Dry chemical.
Unsuitable extinguishing media	:	High volume water jet.
Specific hazards during fire fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Fire and explosion protection	:	Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	:	Carbon oxides.

SECTION 6: Accidental release measures

Personal precautions	:	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

SECTION 7: Handling and storage

Handling

Advice on safe handling : Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary, but may not by themselves be sufficient. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on a naked flame or any incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers : Prevent unauthorized access. No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

Use : Chemical intermediate

SECTION 8: Exposure controls/personal protection

Ingredients with workplace control parameters

US

Components	Basis	Value	Control parameters	Note
1,3-Butadiene	ACGIH	TWA	2 ppm,	A2,
	OSHA Z-1	TWA	1 ppm,	
	OSHA Z-1	STEL	5 ppm,	
	OSHA CARC	PEL	1 ppm,	
	OSHA 29 CFR 1910.1051(c)	TWA	1 ppm,	
	OSHA CARC	STEL	5 ppm,	
	OSHA 29 CFR 1910.1051(c)	STEL	5 ppm,	
n-Butane	OSHA Z-1-A	TWA	800 ppm, 1,900 mg/m3	
	ACGIH	STEL	1,000 ppm,	CNS impair, EX,
Isobutane	ACGIH	STEL	1,000 ppm,	CNS impair, EX,
Isobutylene	ACGIH	TWA	250 ppm,	A4,
1-Butene	ACGIH	TWA	250 ppm,	
cis-2-Butene	ACGIH	TWA	250 ppm,	

trans-2-Butene	ACGIH	TWA	250 ppm,	
Isopentane	ACGIH	TWA	1,000 ppm,	
n-Pentane	OSHA Z-1	TWA	1,000 ppm, 2,950 mg/m3	
	OSHA Z-1-A	TWA	600 ppm, 1,800 mg/m3	
	OSHA Z-1-A	STEL	750 ppm, 2,250 mg/m3	
	ACGIH	TWA	1,000 ppm,	
Cyclopentadiene	ACGIH	TWA	0.5 ppm,	
	OSHA Z-1	TWA	75 ppm, 200 mg/m3	
	OSHA Z-1-A	TWA	75 ppm, 200 mg/m3	
	ACGIH	STEL	1 ppm,	
	ACGIH	TWA	0.5 ppm,	URT irr, LRT irr, eye irr,
Isoprene	US WEEL	TWA	2 ppm,	
Cyclopentane	ACGIH	TWA	600 ppm,	
	OSHA Z-1-A	TWA	600 ppm, 1,720 mg/m3	
Benzene	ACGIH	TWA	0.5 ppm,	A1, Skin,
	ACGIH	STEL	2.5 ppm,	A1, Skin,
	OSHA Z-1-A	TWA	1 ppm,	
	OSHA Z-1-A	CEIL	5 ppm,	
	OSHA Z-2	Peak	50 ppm,	
	OSHA 29 CFR 1910.1028(c)	TWA	1 ppm,	
	OSHA 29 CFR 1910.1028(c)	STEL	5 ppm,	
	OSHA CARC	PEL	1 ppm,	
	OSHA CARC	STEL	5 ppm,	
2,2-Dimethylpropane	ACGIH	TWA	1,000 ppm,	
Propane	OSHA Z-1	TWA	1,000 ppm, 1,800 mg/m3	
	OSHA Z-1-A	TWA	1,000 ppm, 1,800 mg/m3	
Propylene	ACGIH	TWA	500 ppm,	A4,

A1 Confirmed human carcinogen
A2 Suspected human carcinogen
A4 Not classifiable as a human carcinogen
CNS impair Central Nervous System impairment
EX Explosion hazard: the substance is a flammable asphyxiant or excursions above the TLV ® could approach 10% of the lower explosive limit.
eye irr Eye irritation
LRT irr Lower Respiratory Tract irritation
Skin Danger of cutaneous absorption
URT irr Upper Respiratory Tract irritation

Immediately Dangerous to Life or Health Concentrations (IDLH)

Substance name	CAS-No.	Control parameters	Update
1,3-Butadiene	106-99-0	Immediately Dangerous to Life or Health Concentration Value 2000 parts per million	2017-02-03
n-Butane	106-97-8	Immediately Dangerous to Life or Health Concentration Value 1600 parts per million	2017-02-03
n-Pentane	109-66-0	Immediately Dangerous to Life or Health Concentration Value 1500 parts per million	1995-03-01
Cyclopentadiene	542-92-7	Immediately Dangerous to Life or Health Concentration Value 750 parts per million	1995-03-01
Benzene	71-43-2	Immediately Dangerous to Life or Health Concentration Value 500 parts per million	1995-03-01
1,3-Butadiene	106-99-0	Immediately Dangerous to Life or Health Concentration Value 2000 parts per million	2017-02-03
n-Butane	106-97-8	Immediately Dangerous to Life or Health Concentration Value 1600 parts per million	2017-02-03
n-Pentane	109-66-0	Immediately Dangerous to Life or Health Concentration Value 1500 parts per million	1995-03-01
Cyclopentadiene	542-92-7	Immediately Dangerous to Life or Health Concentration Value 750 parts per million	1995-03-01
Benzene	71-43-2	Immediately Dangerous to Life or Health Concentration Value 500 parts per million	1995-03-01

Propane	74-98-6	Immediately Dangerous to Life or Health Concentration Value 2100 parts per million	1995-03-01

Biological exposure indices

US

Substance name	CAS-No.	Control parameters	Sampling time	Update
1,3-Butadiene	106-99-0	1,2 Dihydroxy-4-(N-acetylcysteinyl)-butane: 2.5 mg/l Background (Urine) Semi-quantitative ()	End of shift (As soon as possible after exposure ceases)	2010-03-01
		Mixture of N-1 and N-2(hydroxybutenyl)valine: 2.5 picomoles per gram Hemoglobin Semi-quantitative (Hemoglobin (Hb) adducts in blood)	Not critical	2010-03-01
Benzene	71-43-2	S-Phenylmercapturic acid: 25 µg/g creatinine Background (Urine)	End of shift (As soon as possible after exposure ceases)	2010-03-01
		t,t-Muconic acid: 500 µg/g creatinine Background (Urine)	End of shift (As soon as possible after exposure ceases)	2010-03-01

Engineering measures

Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection : If ventilation or other engineering controls are not adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure, a supplied-air NIOSH approved respirator may be appropriate. If exposure to harmful levels of airborne material may occur, a NIOSH approved respirator that provides protection may be appropriate, such as:. A positive pressure, air-supplying respirator may be appropriate if there is potential for uncontrolled release, aerosolization, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection : Eye wash bottle with pure water. Safety glasses.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Flame retardant

antistatic protective clothing. Workers should wear antistatic footwear.

Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance

Form	:	Liquefied gas
Physical state	:	Gaseous
Color	:	Colorless
Odor	:	Odorless

Safety data

Flash point	:	-76°C (-105°F)
Lower explosion limit	:	2 %(V)
Upper explosion limit	:	12 %(V)
Oxidizing properties	:	No
Autoignition temperature	:	No data available
Molecular formula	:	UVCB
Molecular weight	:	Not applicable
pH	:	No data available
Pour point	:	No data available
Boiling point/boiling range	:	-11-28°C (12-82°F)
Vapor pressure	:	64.00 PSI at 37.8°C (100.0°F)
Relative density	:	0.63 at 16 °C (61 °F)
Water solubility	:	negligible
Partition coefficient: n-octanol/water	:	No data available
Viscosity, kinematic	:	No data available
Relative vapor density	:	1.9 (Air = 1.0)
Evaporation rate	:	No data available
Percent volatile	:	> 99 %

SECTION 10: Stability and reactivity

Reactivity : Stable under recommended storage conditions.

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
The product is supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerize with heat evolution.

Possibility of hazardous reactions

Hazardous reactions : Hazardous reactions: Hazardous polymerization may occur., Polymerizes readily unless inhibited., Polymerizes with risk of fire and explosion., See 'Conditions to Avoid' and/or “Materials to Avoid” in this section., Vapors may form explosive mixture with air.

Conditions to avoid : Heat, flames and sparks.

Hazardous decomposition products : Carbon oxides

Other data : Product should be inhibited when stored or shipped.
Prolonged storage of the product can cause the stabilizer to lose its effectiveness.
The product is normally supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerize with heat evolution.

SECTION 11: Toxicological information

Crude Butadiene
Acute oral toxicity : Negligible or unlikely exposure pathways

Crude Butadiene
Acute inhalation toxicity : LC50: > 50000 ppm
Species: Rat
Test atmosphere: gas
Information given is based on data obtained from similar substances.
Exposure to very high levels may trigger heartbeat irregularities (cardiac arrhythmia), and possible cardiac sensitization.

Crude Butadiene
Acute dermal toxicity : Negligible or unlikely exposure pathways

Crude Butadiene
Skin irritation : May cause skin irritation in susceptible persons. Contact with liquid or refrigerated gas can cause cold burns and frostbite.
May cause skin irritation in susceptible persons.

Crude Butadiene
Eye irritation : Contact with eyes may cause irritation. Contact with liquid or refrigerated gas can cause cold burns and frostbite.
May cause irreversible eye damage.

Crude Butadiene
Sensitization : Did not cause sensitization on laboratory animals.
Information refers to the main ingredient.

Crude Butadiene
Repeated dose toxicity : This information is not available.

Genotoxicity in vitro

1,3-Butadiene	: Test Type: Ames test Metabolic activation: with and without metabolic activation Result: Positive results were obtained in some in vitro tests. Test Type: Chromosome aberration test in vitro Test system: Chinese hamster cells Method: OECD Guideline 473 Result: positive
n-Butane	Test Type: Ames test Result: negative
Isobutane	Test Type: Ames test Result: negative
Isobutylene	Test Type: Ames test Result: negative Test Type: Reverse mutation assay Result: negative Test Type: Mouse lymphoma assay Result: negative Test Type: Micronucleus test Result: negative
1-Butene	Test Type: Ames test Metabolic activation: with and without metabolic activation Result: negative
cis-2-Butene	Test Type: Reverse mutation assay Metabolic activation: with and without metabolic activation Result: negative

	Test Type: Cell transformation assay Metabolic activation: with and without metabolic activation Result: negative Test Type: in vitro test Result: negative
1,3-Pentadiene	Test Type: Ames test Method: OECD Test Guideline 471 Result: negative
Isopentane	Test Type: Ames test Concentration: 1, 2, 5, 8, 10% Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative Test Type: Ames test Concentration: 1, 2, 5, 8, 10, 25, 50% Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative Remarks: Information given is based on data obtained from similar substances. Test Type: Chromosome aberration test in vitro Metabolic activation: with and without metabolic activation Method: Mutagenicity (in vitro mammalian cytogenetic test) Result: negative Remarks: Information given is based on data obtained from similar substances. Test Type: In vitro mammalian cell gene mutation test Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 476 Result: negative Remarks: Information given is based on data obtained from similar substances.
n-Pentane	Test Type: Ames test Metabolic activation: with and without metabolic activation Result: negative Test Type: Chromosome aberration test in vitro Metabolic activation: with and without metabolic activation Result: Ambiguous
Isoprene	Test Type: Ames test Result: negative Test Type: Sister Chromatid Exchange Assay Result: positive
Cyclopentane	Test Type: Modified Ames test Concentration: 1250 microgram/plate Metabolic activation: with and without metabolic activation Result: negative

	Test Type: Mouse lymphoma assay Concentration: 200 microgram/mililiter Metabolic activation: with and without metabolic activation Result: negative
2-methyl-2-butene	Test Type: Ames test Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative Method: OECD Test Guideline 480 Result: negative
Propane	Test Type: Ames test Result: negative
Propylene	Test Type: Ames test Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: negative Test Type: Mammalian cell gene mutation assay Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 476 Result: Ambiguous
Benzene	Test Type: Ames test Result: negative Test Type: Cytogenetic assay Result: positive Test Type: Mouse lymphoma assay Result: positive Test Type: Sister Chromatid Exchange Assay Result: negative

Genotoxicity in vivo

1,3-Butadiene	:	Test Type: Mouse micronucleus assay Species: mice Route of Application: inhalation (gas) Exposure time: 6 h per day for 5 days Dose: 50, 200, 500, 1300 ppm Method: OECD Test Guideline 474 Result: positive Test Type: Dominant lethal assay Species: mice Method: OECD Test Guideline 478 Result: Positive results were obtained in some in vivo tests.
Isobutylene		Test Type: Mouse micronucleus assay Result: negative
1-Butene		Test Type: Micronucleus test Species: Mouse Dose: 1000, 3260, 10000 ppm

	Method: Mutagenicity (micronucleus test) Result: negative
cis-2-Butene	Test Type: Mouse micronucleus assay Cell type: Bone marrow Dose: 10,000 ppm Result: negative
	Test Type: Mouse micronucleus assay Cell type: Bone marrow Dose: 22, 000 ppm Result: negative
1,3-Pentadiene	Species: Mouse Exposure time: 6h/d, 2 days Dose: 30-300 ppm Method: Mutagenicity (micronucleus test) Result: negative
Isopentane	Test Type: In vivo micronucleus test Species: Rat Cell type: Bone marrow Route of Application: inhalation (vapor) Exposure time: 13 wk Dose: 5000, 10,000, 20,000 mg/m3 Method: Directive 67/548/EEC, Annex V, B.12. Remarks: Information given is based on data obtained from similar substances.
n-Pentane	Test Type: Micronucleus test Species: Rat Cell type: Bone marrow Result: negative
Isoprene	Result: negative
	Test Type: Micronucleus test Result: positive
Cyclopentane	Test Type: Micronucleus test Species: Mouse Route of Application: inhalation (vapor) Dose: 10,000 ppm Result: negative
2-methyl-2-butene	Test Type: Mouse micronucleus assay Species: Rat Cell type: Bone marrow Route of Application: Inhalation Exposure time: 6 h/d 2d Method: OECD Test Guideline 474 Result: positive
Propylene	Test Type: Micronucleus test Species: Rat Route of Application: inhalation (gas) Method: OECD Test Guideline 474 Result: negative
Benzene	Test Type: Mouse micronucleus assay

Result: positive

Carcinogenicity

1,3-Butadiene : Species: Mouse
Sex: male and female
Dose: 6.25, 20, 62.5, 200, 625 ppm
Exposure time: 6hr/day. 5day/wk for up to 2 y
Test substance: yes
Print Date: OECD Test Guideline 453
Remarks: Clear evidence of multiple organ carcinogenicity.

Species: Rat
Sex: male and female
Dose: 1000, 8000 ppm
Exposure time: 6 hr/day, 5 day/wk for 2 years
Test substance: yes
Remarks: weak oncogen

Isobutylene Species: Rat
Sex: male
Dose: 500, 2000, 8000 ppm
Exposure time: 105 wks
Number of exposures: 6 hrs/d, 5 d/wk
Remarks: increased incidence of thyroid tumors

Species: Rat
Sex: female
Dose: 500, 2000, 8000 ppm
Exposure time: 105 wks
Number of exposures: 6 hrs/d, 5 d/wk
Remarks: no increase incidence of tumors

Species: Mouse
Sex: male
Dose: 500, 2000, 8000 ppm
Exposure time: 105 wks
Number of exposures: 6 hrs/d, 5 d/wk
Remarks: no increase incidence of tumors

Species: Mouse
Sex: female
Dose: 500, 2000, 8000 ppm
Exposure time: 105 wks
Number of exposures: 6 hrs/d, 5 d/wk
Remarks: no increase incidence of tumors

1-Butene Species: Rat
Sex: male
Dose: 0, 500, 2000, 8000 ppm
Exposure time: 2 years
Number of exposures: 6 hr/d, 5 d/wk
Remarks: increased incidence of thyroid tumors, Information given is based on data obtained from similar substances.

	Species: Rat Sex: female Dose: 0, 500, 2000, 8000 ppm Exposure time: 2 years Number of exposures: 6 hr/d, 5 d/wk Remarks: no increase incidence of tumors, Information given is based on data obtained from similar substances. Species: Mouse Sex: male Dose: 0, 500, 2000, 8000 ppm Exposure time: 2 years Number of exposures: 6 hr/d, 5 d/wk Remarks: no increase incidence of tumors, Information given is based on data obtained from similar substances. Species: Mouse Sex: female Dose: 0, 500, 2000, 8000 ppm Exposure time: 2 years Number of exposures: 6 hr/d, 5 d/wk Remarks: no increase incidence of tumors, Information given is based on data obtained from similar substances.
cis-2-Butene	Species: Rat Dose: up to 8000 ppm Exposure time: 105 weeks Remarks: increased incidence of thyroid tumors
Isoprene	Species: Rat Dose: 0. 70, 220, 700, 220, 7000 ppm Exposure time: 26 wks Number of exposures: 6 h/d, 5 d/wk Remarks: interstitial cell hyperplasia of testis at 7000 ppm Species: Mouse Dose: 0. 70, 220, 700, 220, 7000 ppm Exposure time: 26 wks Number of exposures: 6 h/d, 5 d/wk Remarks: malignant neoplastic lesions in the liver, lung, fore stomach and Harderian gland at 700 ppm
Propylene	Species: Rat Dose: 0, 5000, 10000 ppm Exposure time: 103 wks Number of exposures: 6 h/d, 5 d/wk Remarks: No evidence of carcinogenicity Species: Mouse Dose: 0, 5000, 10000 ppm Exposure time: 103 wks Number of exposures: 6 h/d, 5 d/wk Remarks: No evidence of carcinogenicity
Benzene	Species: Rat Sex: female Dose: 0, 25, 50, 250 mg/kg Exposure time: 103 wks Number of exposures: daily, 5 days/week Test substance: yes

Remarks: zymbal gland carcinomas, squamous cell papillomas

Species: Rat
Sex: male
Dose: 0, 50, 100, 200 mg/kg
Exposure time: 103 wks
Number of exposures: daily, 5 days/week
Test substance: yes
Remarks: zymbal gland carcinomas, squamous cell papillomas

Species: Mouse
Sex: male and female
Dose: 25, 50, 100 mg/kg
Exposure time: 103 wks
Number of exposures: daily, 5 days/week
Test substance: yes
Remarks: Clear evidence of multiple organ carcinogenicity.

Crude Butadiene
Reproductive toxicity : This information is not available.

Crude Butadiene
Developmental Toxicity : This information is not available.

Crude Butadiene
Aspiration toxicity : No aspiration toxicity classification.
Toxicology Assessment

Crude Butadiene
CMR effects : Carcinogenicity:
May cause cancer.
Mutagenicity:
May cause genetic defects.
Teratogenicity:
Not available
Reproductive toxicity:
Not available

Crude Butadiene
Further information : Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Concentrations substantially above the TLV value may cause narcotic effects. Solvents may degrease the skin.

SECTION 12: Ecological information

Ecotoxicity effects

Toxicity to fish : No data available

Toxicity to daphnia and other aquatic invertebrates	:	No data available
Toxicity to algae	:	No data available
Biodegradability	:	This material is volatile and is expected to partition to air. Expected to be biodegradable

Elimination information (persistence and degradability)

Bioaccumulation	:	Bioaccumulation is unlikely.
Mobility	:	No data available
Results of PBT assessment	:	This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).
Additional ecological information	:	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal., Toxic to aquatic life with long lasting effects.

Ecotoxicology Assessment

Short-term (acute) aquatic hazard	:	Toxic to aquatic life.
Long-term (chronic) aquatic hazard	:	Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product	:	The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping

description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)
UN1010, BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1, RQ (1,3-BUTADIENE, BENZENE)

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)
UN1010, BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1, (-76 °C c.c.)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)
UN1010, BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))
UN1010, BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1, (B/D)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))
239,UN1010,BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)
UN1010, BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, 2.1

Other information	**:**	**IGC CODE: MIXED C4 CARGOES, S.T. 2G/2PG**

Maritime transport in bulk according to IMO instruments

SECTION 15: Regulatory information

National legislation

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Gases under pressure
Simple Asphyxiant
Acute toxicity (any route of exposure)
Germ cell mutagenicity
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation

EPCRA - EMERGENCY PLANNING COMMUNITY RIGHT - TO – KNOW

CERCLA Reportable Quantity : 12 lbs

1,3-Butadiene

100 lbs
Benzene

SARA 302 Reportable Quantity : Calculated RQ exceeds reasonably attainable upper limit.

Hydrogen Sulfide

SARA 302 Threshold Planning Quantity : This material does not contain any components with a section 302 EHS TPQ.

SARA 304 Reportable Quantity : Calculated RQ exceeds reasonably attainable upper limit.

Hydrogen Sulfide 7783-06-4 100 lbs

SARA 313 Components : The following components are subject to reporting levels established by SARA Title III, Section 313:

: 1,3-Butadiene - 106-99-0
Isoprene - 78-79-5
Benzene - 71-43-2
Propylene - 115-07-1

Clean Air Act

Ozone-Depletion Potential : This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):
: 1,3-Butadiene - 106-99-0
Benzene - 71-43-2

The following chemical(s) are listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F):
: 1,3-Butadiene - 106-99-0
n-Butane - 106-97-8
Isobutane - 75-28-5
Isobutylene - 115-11-7
1-Butene - 106-98-9
cis-2-Butene - 590-18-1
trans-2-Butene - 624-64-6
1,3-Pentadiene - 504-60-9
Isopentane - 78-78-4
n-Pentane - 109-66-0
Isoprene - 78-79-5
cis-2-Pentene - 627-20-3
trans-2-Pentene - 646-04-8

3-Methyl-1-Butene - 563-45-1
2-methyl-1-butene - 563-46-2
2,2-Dimethylpropane - 463-82-1
Propane - 74-98-6
Propylene - 115-07-1
Propadiene - 463-49-0
Vinyl acetylene - 689-97-4
Ethyl acetylene - 107-00-6

The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

: 1,3-Butadiene - 106-99-0
Isobutylene - 115-11-7
1-Butene - 106-98-9
Isopentane - 78-78-4
n-Pentane - 109-66-0
Isoprene - 78-79-5
Benzene - 71-43-2
Propylene - 115-07-1

US State Regulations

Pennsylvania Right To Know

: Gases (petroleum), light steam-cracked, butadiene conc. - 68955-28-2
1,3-Butadiene - 106-99-0
n-Butane - 106-97-8
Isobutane - 75-28-5
Isobutylene - 115-11-7
1-Butene - 106-98-9
cis-2-Butene - 590-18-1
trans-2-Butene - 624-64-6
1,3-Pentadiene - 504-60-9
Isopentane - 78-78-4
n-Pentane - 109-66-0
Cyclopentadiene - 542-92-7
Isoprene - 78-79-5
Cyclopentane - 287-92-3
1,4-Pentadiene - 591-93-5
cis-2-Pentene - 627-20-3
trans-2-Pentene - 646-04-8
2-methyl-2-butene - 513-35-9
Benzene - 71-43-2
3-Methyl-1-Butene - 563-45-1
2-methyl-1-butene - 563-46-2
2,2-Dimethylpropane - 463-82-1
Propane - 74-98-6
Propylene - 115-07-1
Propadiene - 463-49-0
Vinyl acetylene - 689-97-4
Acetaldehyde - 75-07-0

Dimethyl Disulfide - 624-92-0

California Prop. 65 Components : WARNING: This product can expose you to chemicals including [listed below], which is [are] known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov/food.

1,3-Butadiene	106-99-0
Isoprene	78-79-5
Benzene	71-43-2
Acetaldehyde	75-07-0
Ethylbenzene	100-41-4
Naphthalene	91-20-3
tert-butyl-4-methoxyphenol	25013-16-5
Cumene	98-82-8

WARNING: This product can expose you to chemicals including [listed below], which is [are] known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

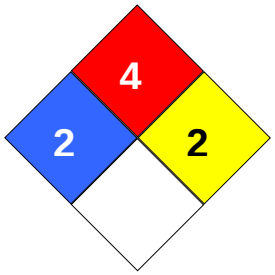
1,3-Butadiene	106-99-0
Benzene	71-43-2
Methanol	67-56-1
Carbon disulfide	75-15-0

Notification status

Europe REACH	:	Not in compliance with the inventory
Switzerland CH INV	:	On the inventory, or in compliance with the inventory
United States of America (USA) TSCA	:	On or in compliance with the active portion of the TSCA inventory
Canada DSL	:	All components of this product are on the Canadian DSL
Australia AIIC	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	Not in compliance with the inventory
Japan ENCS	:	Not in compliance with the inventory
Korea KECI	:	A substance(s) in this product was not registered, notified to be registered, or exempted from registration by CPChem according to K-REACH regulations. Importation or manufacture of this product is still permitted provided the Korean Importer of Record has themselves notified the substance or the exported amount does not exceed the minimum threshold quantity of the non-registered substance(s).
Philippines PICCS	:	Not in compliance with the inventory
Taiwan TCSI	:	Not in compliance with the inventory
China IECSC	:	Not in compliance with the inventory

SECTION 16: Other information

NFPA Classification : Health Hazard: 2
Fire Hazard: 4
Reactivity Hazard: 2



Further information

Legacy SDS Number : 1773

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AIIC	Australian Inventory of Industrial Chemicals	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and	TSCA	Toxic Substance Control Act

	New Chemical Substances		
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%	ATE	Acute toxicity estimate