

Mixed Fuel Gas (Sour)

SECTION 1. IDENTIFICATION

Product Identifier	Mixed Fuel Gas (Sour)
Other Means of Identification	Sour Produced Gas
Product Family	Hydrocarbons
Recommended Use	Process feedstock.
Restrictions on Use	None known.
Manufacturer/Supplier Identifier	Devon Canada Corporation 2000, 400 - 3rd Avenue SW Calgary, Alberta T2P 4H2 (403) 232-7100
Emergency Phone No.	CANUTEC, 1-888-CAN-UTEC (226-8832), (24 hr)

SECTION 2. HAZARD IDENTIFICATION

Classification

Flammable gas - Category 1; Gas under pressure - Compressed gas; Simple asphyxiant - Category 1; Acute toxicity (Oral) - Category 4; Acute toxicity (Dermal) - Category 4; Acute toxicity (Inhalation) - Category 3; Skin irritation - Category 2; Serious eye damage - Category 2

Label Elements



Signal Word:
Danger

Hazard Statement(s):

H220	Extremely flammable gas.
H331	Toxic if inhaled.
H280	Contains gas under pressure; may explode if heated.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
May displace oxygen and cause rapid suffocation.	

Precautionary Statement(s):

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241	Use explosion-proof electrical, ventilating, and lighting equipment.
P242	Use only non-sparking tools.

- P261 Avoid breathing gas, vapours.
 P280 Wear protective gloves/protective clothing.
 P284 In case of inadequate ventilation wear respiratory protection (NIOSH approved self-contained breathing apparatus (SCBA) or supplied air respirator).

Other Hazards

EMERGENCY OVERVIEW :

FLAMMABLE GAS. Extremely flammable. May form flammable/explosive gas-air mixtures. Electrostatic charges may be generated during handling. Electrostatic discharges may cause fire.

CONTAINS HYDROGEN SULFIDE. Product may contain significant quantities of hydrogen sulfide gas. H2S has a broad range of effects dependent on the airborne concentration and length of exposure: 0.02 ppm odour threshold, smell of rotten eggs; 10 ppm eye and respiratory tract irritation; 100 ppm coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes; 200 ppm potential for pulmonary edema after >20-30 minutes; 500 ppm loss of consciousness after short exposures, potential for respiratory arrest; >1000 ppm immediate loss of consciousness, may lead rapidly to death, prompt cardiopulmonary resuscitation may be required. Do not depend on sense of smell for warning. H2S causes rapid olfactory fatigue (deadens sense of smell). There is no evidence that H2S will accumulate in the body tissue after repeated exposure.

General Hygiene Comments :
 Do NOT eat, drink or store food in work areas.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	%	Other Identifiers
Natural gas	8006-14-2	100	Fuel gas
Carbon Dioxide	124-38-9	1.50 - 2.00	Carbonic acid gas
Methane	74-82-8	91.00 - 92.00	Methyl hydride
Ethane	74-84-0	3.50 - 4.00	Ethyl hydride
Propane	74-98-6	0.75 - 1.25	Propyl hydride
Isobutane	75-28-5	0.25 - 0.50	2-methylpropane
n-Butane	106-97-8	0.25 - 0.50	Butyl hydride
Isopentane	78-78-4	0.25 - 0.50	2-methylbutane
n-Pentane	109-66-0	0.15 - 0.30	Pentyl hydride
Hexanes	110-54-3	0.05 - 0.20	Not available
Heptanes+	142-82-5	0.01 - 0.10	Not available
Benzene	71-43-2	< 0.01	Benzol
Toluene	108-88-3	< 0.01	Methylbenzene
Ethylbenzene	100-41-4	< 0.01	Phenylethane
Xylene (mixed isomers)	1330-20-7	< 0.01	1,2/1,3/1,4-dimethylbenzene
Hydrogen Sulfide	7783-06-4	0.03 - 0.05	Sulfur hydride, acid gas

Notes

Concentrations are expressed in % volume/volume.
 H2S : Identified as Potential Inhalation Hazard

SECTION 4. FIRST-AID MEASURES

First-aid Measures

Inhalation

Take precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). Move to fresh air. **CONTAINS HYDROGEN SULFIDE.** Do NOT perform rescue breathing if the victim inhaled or ingested the material; induce artificial respiration with a respiratory medical device. Keep at rest in a position

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comfortable for breathing. If breathing is difficult, trained personnel should administer emergency oxygen if advised to do so by Poison Centre or doctor. Obtain medical attention immediately.

Skin Contact

Wash gently and thoroughly with lukewarm, gently flowing water and mild soap for 5 minutes. If persistent irritation occurs, obtain medical attention.

Liquefied gas:

Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice or attention.

Eye Contact

If irritation or redness develops from exposure, flush eyes with clean water. If persistent irritation occurs, obtain medical attention.

Liquefied gas:

Immediately rinse the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes, while holding the eyelid(s) open. Obtain medical attention.

Ingestion

Not a likely route of exposure.

Most Important Symptoms and Effects, Acute and Delayed

If inhaled:

A high concentration can displace oxygen in the air. If less oxygen is available to breathe, symptoms such as rapid breathing, rapid heart rate, clumsiness, emotional upsets and fatigue can result. As less oxygen becomes available, nausea and vomiting, collapse, convulsions, coma and death can occur. Symptoms occur more quickly with physical effort. Lack of oxygen can cause permanent damage to organs including the brain and heart.

Hydrogen sulfide is extremely toxic. Can cause severe irritation of the nose and throat. Symptoms may include coughing, shortness of breath, difficult breathing and tightness in the chest.

If in eyes: may cause moderate to severe irritation. Symptoms include sore, red eyes, and tearing.

If on skin:

Direct contact with the pressurized gas release can chill or freeze the skin (frostbite). Symptoms of more severe frostbite include a burning sensation and stiffness. The skin may become waxy white or yellow. Blistering, tissue death and infection may develop in severe cases.

Immediate Medical Attention and Special Treatment

Special Instructions

Treat symptomatically. Hydrogen sulfide (H₂S) - CNS asphyxiant. May cause rhinitis, bronchitis, and occasionally pulmonary edema after severe exposure. Consider oxygen therapy. Consult a Poison Control Centre for guidance.

SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media

Small fire: Carbon dioxide, dry chemical powder, appropriate foam, water spray or fog.

Unsuitable Extinguishing Media

Do not use water in a stream or jet.

Specific Hazards Arising from the Product

Flammable gas. Can easily ignite. Can readily form explosive mixtures with air at room temperature. May displace oxygen in the air, causing rapid suffocation.

PRODUCT CONTAINS HYDROGEN SULFIDE. May accumulate in hazardous amounts in low-lying areas especially inside confined spaces (sumps, drains, sewers), resulting in a fire and/or health hazard.

Special Protective Equipment and Precautions for Fire-fighters

Stop leak/source before attempting to put out the fire. Product could form an explosive mixture and reignite. If the leak/source cannot be stopped, let the fire burn itself out.

Wear full protective clothing and self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures

Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Evacuate downwind locations. Do not operate electrical equipment. Vent contaminated area thoroughly. Shut off leaks, if possible, without personal risks. Eliminate all ignition sources. Use grounded, explosion-proof equipment. Take precautionary measures against static discharge. Before entry, especially into confined areas, check atmosphere with an appropriate monitor.

Environmental Precautions

It is good practice to prevent releases into the environment.

Methods and Materials for Containment and Cleaning Up

Ventilate the area to prevent the gas from accumulating, especially in confined spaces.

Other Information

Report leaks/spills to local health, safety and environmental authorities, as required.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling

Only use where there is adequate ventilation. Prevent uncontrolled release of product. Eliminate heat and ignition sources such as sparks, open flames, hot surfaces and static discharge. Post "No Smoking" signs. Electrically bond and ground equipment. Ground clips must contact bare metal. Check for oxygen deficiency in work area. If used in a confined space, check for oxygen deficiency before worker entry and during work. In the event of a leak, exit the area immediately.

Conditions for Safe Storage

Store in an area that is: cool, well-ventilated, out of direct sunlight and away from heat and ignition sources.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Chemical Name	ACGIH TLV®		OSHA PEL		AIHA WEEL	
	TWA	STEL	TWA	Ceiling	8-hr TWA	TWA
Methane	Not established					
Ethane	Not established					
Propane	1000 ppm					
Isobutane		1000 ppm				
n-Butane		1000 ppm	800 ppm			
Isopentane	600 ppm					
n-Pentane	600 ppm		1000 ppm			
Hexanes	50 ppm Skin		500 ppm			
Heptanes+	400 ppm	500 ppm	500 ppm			
Carbon Dioxide	5000 ppm	30000 ppm				
Hydrogen Sulfide	1 ppm	5 ppm		20 ppm		
Benzene	0.5 ppm A1 Skin	2.5 ppm A1 Skin				
Toluene	20 ppm A4		200 ppm			
Ethylbenzene	100 ppm	125 ppm				
Xylene (mixed isomers)	100 ppm A4	150 ppm A4				

Appropriate Engineering Controls

Do not allow product to accumulate in the air in work or storage areas, or in confined spaces. Use local exhaust and

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general ventilation, if necessary, to maintain air oxygen levels at a minimum of 18%. Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas where this product is used and stored. Control static electricity discharges which includes bonding of equipment to ground.

Individual Protection Measures

Eye/Face Protection

Not required if product is used as directed.

Skin Protection

Not required, if used as directed.

Respiratory Protection

If the oxygen content of the air is below acceptable limits, wear a NIOSH approved self-contained breathing apparatus (SCBA) or supplied air respirator.

PRODUCT CONTAINS HYDROGEN SULFIDE. Where there is potential for airborne exposure to hydrogen sulfide (H₂S) above exposure limits, a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent, operated in a pressure demand or other positive pressure mode should be used. Under conditions where hydrogen sulfide is not detected, a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Basic Physical and Chemical Properties

Appearance	Colourless gas.
Odour	Slight hydrocarbon, moderate to strong rotten egg smell
Odour Threshold	Not available
pH	Not applicable
Melting Point/Freezing Point	Not applicable (melting); Not applicable (freezing)
Initial Boiling Point/Range	Not applicable
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid, gas)	Extremely flammable gas.
Upper/Lower Flammability or Explosive Limit	<= 15% (upper); >= 5% (lower)
Vapour Pressure	Not applicable
Vapour Density (air = 1)	< 1.0
Relative Density (water = 1)	Not applicable
Solubility	Practically insoluble in water
Partition Coefficient, n-Octanol/Water (Log Kow)	Not applicable
Auto-ignition Temperature	~ 500 °C (estimated) (Methane)
Decomposition Temperature	Not applicable
Viscosity	Not applicable (kinematic)
Other Information	
Physical State	Gas
Molecular Formula	CH ₄ (Methane)
Molecular Weight	18.1 (calculated)
Critical Temperature	Not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity

Not reactive.

Chemical Stability

Normally stable.

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Possibility of Hazardous Reactions

None expected under normal conditions of storage and use.

Conditions to Avoid

Open flames, sparks, static discharge, heat and other ignition sources. May form explosive mixture on contact with air.

Incompatible Materials

Strong oxidizing agents (e.g. perchloric acid).

Hazardous Decomposition Products

Hazardous decomposition products are not expected to form during normal storage. Combustion releases carbon dioxide, trace amounts of sulfur oxides, and nitrogen oxides. A lack of oxygen during combustion can produce carbon monoxide and other toxic and flammable products.

SECTION 11. TOXICOLOGICAL INFORMATION

Likely Routes of Exposure

Inhalation; skin contact; eye contact.

Acute Toxicity

Chemical Name	LC50	LD50 (oral)	LD50 (dermal)
Methane	Not available	Not available	Not applicable
Ethane	Not available	Not available	Not available
Propane	> 800000 ppm (rat) (30-minute exposure)	Not applicable	Not applicable
Isobutane	368000 mg/kg (male mouse) (4-hour exposure) (vapour)	> 5000 mg/kg	> 5000 mg/kg
n-Butane	658 mg/L (rat) (4-hour exposure)	Not available	Not available
Isopentane	140000 ppm (mouse) (2-hour exposure) (vapour)	> 2000 mg/kg (rat)	Not available
n-Pentane	6106 ppm (rat) (4-hour exposure)	> 2000 mg/kg (rat)	Not available
Hexanes	73680 ppm (rat) (4-hour exposure) (vapour)	32290 mg/kg (male rat)	> 3295 mg/kg (rabbit)
Heptanes+	~ 25000 ppm (rat) (4-hour exposure)	> 15000 mg/kg (rat)	Not available
Carbon Dioxide	Not available	Not available	Not available
Hydrogen Sulfide	444 ppm (rat) (4-hour exposure)	Not available	Not available
Benzene	13700 ppm (rat) (4-hour exposure)	930 mg/kg (rat)	> 8240 mg/kg (rabbit)
Toluene	7585 ppm (rat) (4-hour exposure)	5580 mg/kg (male rat)	12125 mg/kg (rabbit)
Ethylbenzene	~ 4000 ppm (rat) (4-hour exposure)	3500 mg/kg (rat)	15380 mg/kg (rabbit)
Xylene (mixed isomers)	6350 ppm (male rat) (4-hour exposure)	3523 mg/kg (rat)	> 1700 mg/kg (rabbit)

Skin Corrosion/Irritation

May be irritating to skin. Symptoms may include redness, swelling, and itching.

Serious Eye Damage/Irritation

May be irritating to eyes. Symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

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STOT (Specific Target Organ Toxicity) - Single Exposure

Inhalation

A high concentration can displace oxygen in the air. If less oxygen is available to breathe, symptoms such as rapid breathing, rapid heart rate, clumsiness, emotional upsets and fatigue can result. As less oxygen becomes available, nausea and vomiting, collapse, convulsions, coma and death can occur. Symptoms occur more quickly with physical effort. Lack of oxygen can cause permanent damage to organs including the brain and heart.

At high concentrations: depression of the central nervous system, resulting in dizziness, light-headedness, headache, and nausea. Depression of the central nervous system.

Toxic, can cause death based on human experience and animal tests.

Ingestion

Not an expected route of exposure.

Aspiration Hazard

Not known to be an aspiration hazard.

STOT (Specific Target Organ Toxicity) - Repeated Exposure

Not expected to be a hazard.

Respiratory and/or Skin Sensitization

Not a respiratory sensitizer. Not a skin sensitizer.

Carcinogenicity

Not expected to be a hazard.

Reproductive Toxicity

Development of Offspring

Material in general is not expected to cause harm. The material in general is not expected to produce teratogenic or embryotoxic effects. Not known to harm the unborn child.

Sexual Function and Fertility

Material in general is not expected to cause harm. The material in general is not expected to have toxic reproductive effects.

Effects on or via Lactation

No information was located.

Germ Cell Mutagenicity

Material in general is not expected to cause harm. The material in general is not expected to produce mutagenic effects.

Interactive Effects

Not expected to be a hazard.

Other Information

High gas concentrations will displace available oxygen from the air, unconsciousness and death may occur suddenly from lack of oxygen.

CONTAINS HYDROGEN SULPHIDE. H₂S has a broad range of effects dependent on the airborne concentration and length of exposure: 0.02 ppm odour threshold, smell of rotten eggs; 10 ppm eye and respiratory tract irritation; 100 ppm coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes; 200 ppm potential for pulmonary edema after >20-30 minutes; 500 ppm loss of consciousness after short exposures, potential for respiratory arrest; >1000 ppm immediate loss of consciousness, may lead rapidly to death, prompt cardiopulmonary resuscitation may be required. Do not depend on sense of smell for warning. H₂S causes rapid olfactory fatigue (deadens sense of smell). There is no evidence that H₂S will accumulate in the body tissue after repeated exposure.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

May be harmful to aquatic life.

Persistence and Degradability

No ingredient of this product or its degradation products is known to be highly persistent.

Bioaccumulative Potential

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This product and its degradation products are not known to bioaccumulate.

Mobility in Soil

If released, this material will move rapidly through and into the environment.

Other Adverse Effects

There is no information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal Methods

Material Disposal:

Do not discharge into areas where there is a risk of forming an explosive mixture with air.

Local Legislation:

Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be complied with.

SECTION 14. TRANSPORT INFORMATION

Regulation	UN No.	Proper Shipping Name	Transport Hazard Class(es)	Packing Group
Canadian TDG	1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S. (contains Hydrogen Sulphide)	2.3 (2.1)	Not applicable.
US DOT	1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	2.3 (2.1)	Not applicable.

Environmental Hazards Not applicable

Special Precautions Please note: CONTAINS HYDROGEN SULFIDE : TOXIC BY INHALATION.

Transport in Bulk According to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15. REGULATORY INFORMATION

Safety, Health and Environmental Regulations

This section is not required by WHMIS.

SECTION 16. OTHER INFORMATION

NFPA Rating Health - 4 Flammability - 4 Instability - 0
Special Hazard - Simple asphyxiant Based on Methane

SDS Prepared By Maxxam Analytics

Phone No. 1-800-386-7247

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Revision Indicators Document updated from 2015-10-06 original SDS (all sections).

Key to Abbreviations ACGIH® = American Conference of Governmental Industrial Hygienists
OSHA = US Occupational Safety and Health Administration
RTECS® = Registry of Toxic Effects of Chemical Substances

References CHEMINFO database. Canadian Centre for Occupational Health and Safety (CCOHS).
Registry of Toxic Effects of Chemical Substances (RTECS®) database. Dassault Systèmes/BIOVIA ("BIOVIA"). Available from Canadian Centre for Occupational Health and Safety (CCOHS).

Disclaimer This SDS provides safety information and was developed for employees, customers and

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agents of Devon Canada Corporation from data obtained from the sample(s) submitted for analysis. The information may not be valid or complete if the product or material is used in combination with other products or materials, or in any process. This information is intended for reasonable normal usage and recommended practices, and to underscore the potential hazards that may be inherent to the nature of the product or material. Although every effort is made to ensure accuracy and completeness of the contained information, it is understood that Maxxam Analytics makes no warranty as to the accuracy or completeness of information and assumes no liability for any damage or loss suffered as result of any inaccuracy or incompleteness therein. This information is considered to be as accurate as possible, as of the date of preparation. The reader is invited to contact Devon Canada Corporation at the address shown to insure the information is up to date or to obtain further information related to an unusual or other use.

SDS representative sample(s) :

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