



Benicia Refinery • Valero Refining Company - California

3400 East Second Street • Benicia, California 94510-1097 • Telephone (707) 745-7011 • Facsimile (707) 745-7339

72 Hour Report

February 24, 2024 Tank 1738 Oil on Roof
Report Completion Date: February 26, 2024

ATTENTION: Fire Chief
Benicia Fire Department
250 East L Street
Benicia CA, 94510

INCIDENT DATE: 2/24/2024 INCIDENT TIME: 06:08 AM

FACILITY: Valero Benicia Refinery

PERSON TO CONTACT FOR ADDITIONAL INFORMATION Paul Adler, Director of
Community Relations and Government Affairs. Phone Number 707-745-7534

I. SUMMARY OF EVENT:

At approximately 5:30am on Saturday February 24, 2024, the Benicia Refinery Fenceline monitors detected Hydrogen Sulfide (H₂S) above background levels Southwest of the Refinery (at GLM 1, OP1A, OP1B, and OP2A) that was accompanied by the signature odor of H₂S (rotten egg smell). Refinery Operations began investigating the source of the odor and identified hydrocarbon on the roof of Tank 1738 at approximately 6:08am.

Valero immediately began responding by providing communication to City and Agencies (see Sections II, III, and IV, below) and initiating cleanup efforts to abate the odor. Valero activated the Emergency Operations Center (EOC) at approximately 7:48 am, which included representation from the City of Benicia Fire Department and Solano County CUPA.

Cleanup efforts began at approximately 1:00pm and refinery personnel continued to clean material off of the tank roof until the majority of the material had been removed and there was insufficient daylight to continue. At the time the work stopped, odors were no longer being detected beyond the refinery fenceline. Operations resumed the next morning to continue spot cleaning the residue on the tank roof and cleanup is expected to be complete by Monday evening.

The fenceline website data is available at www.beniciarefineryairmonitors.org.

An investigation is underway to determine how hydrocarbon material got onto the roof of Tank 1738, but prior to this event refinery operations was following emergency shutdown procedures to safely posture a unit that included transferring material to Tank 1738. A summary of that investigation will be provided to the City Fire Chief once the investigation is completed.

II. AGENCIES NOTIFIED, INCLUDING TIME OF NOTIFICATION:

Date	Time	Agency (Person Notified)
2/24/24	6:42 AM	Benicia FD (Todd Matthews)
2/24/24	7:11 AM	BAAQMD (Odor Line)
2/24/24	7:23 AM	Solano County CUPA (Colby LaPlace)
2/24/24	8:22 AM	BAAQMD (Richard Murray, inspector)

Additional notifications with updates were provided to the agencies throughout the event response and will continue until cleanup efforts and response are completed.

Additionally, agencies were notified on February 24, 2024 due to the ongoing intermittent flaring that exceeded the 500 lbs Sulfur Dioxide (SO₂) reporting threshold as part of the unit shutdown. The flaring did not contribute to the community odors, however notifications are included in this report for full transparency:

- Cal OES – 7:55am (Reference Number [24-1150](#))
- Solano County CUPA – 7:49am
- BAAQMD – 7:50am

III. AGENCIES RESPONDING, INCLUDING CONTACT NAMES AND PHONE NUMBERS:

- Benicia Fire Department
 - Todd Matthews – 707-771-4121
 - Carl Littorno – 707-746-4275
 - Todd and Carl were both onsite and included in the EOC throughout the event response
- Solano County CUPA
 - Colby LaPlace – 707-784-3318
 - Colby LaPlace was onsite and included in the EOC
- Bay Area Air Quality Management District (BAAQMD)
 - Richard Murray – 415-749-8405

IV. EMERGENCY RESPONSE ACTIONS:

Mutual Aid was activated for the Industrial Hygienist branch of the Petrochemical Mutual Aid Organization (PMAO) to support community monitoring as needed. Chevron and PBF responded, and their monitoring is included in the summary of results in Section VIII.

The Valero Fire Department staff were onsite to respond if needed, and the Valero Fire Chief was a participant of the EOC, however a response by the fire department was not needed for the event.

The City of Benicia Fire Department responded as a member of the EOC and also conducted air quality testing using their portable air monitors at multiple points throughout the City.

The City of Benicia Fire Department provided an update to the community via AlertSolano at 7:40am and an update at 12:50pm. An additional update was sent from the Fire Department Notification system at 8:52pm.

- https://www.ci.benicia.ca.us/vertical/Sites/%7BF991A639-AAED-4E1A-9735-86EA195E2C8D%7D/uploads/Level_2_Notification_-February_24_2024.pdf
- https://www.ci.benicia.ca.us/vertical/Sites/%7BF991A639-AAED-4E1A-9735-86EA195E2C8D%7D/uploads/Level_2_Notification_Update_1_-February_24_2024.pdf
- https://www.ci.benicia.ca.us/vertical/Sites/%7BF991A639-AAED-4E1A-9735-86EA195E2C8D%7D/uploads/2-24-24_Incident_Update_2.pdf

V. IDENTITY OF MATERIAL RELEASED AND ESTIMATED OR KNOWN QUANTITIES:

The bulk of the material on the roof on the tank, currently estimated to contain less than 83 gallons of refined hydrocarbon, was removed by Saturday evening. The refinery is continuing to spot clean the remaining residue on the tank roof and expects to have that activity completed by this evening. Samples are being taken of the containers that are holding the material removed from the roof to obtain a more accurate estimate on the amount of oil.

The refined hydrocarbon, generically referred to as Slop, and Hydrogen Sulfide (H₂S) Safety Data Sheets (SDS) are included in Attachment 1.

VI. METEOROLOGICAL CONDITIONS AT THE TIME OF EVENT including wind speed, direction, and temperature:

During the morning of February 24, 2024 wind was predominantly from the E/ENE ranging from 4-8 mph. Temperatures ranged from approximately 50-70F with weather being mostly clear throughout the morning.

VII. DESCRIPTION OF INJURIES:

There were no injuries associated with this event.

VIII. COMMUNITY IMPACT including number of off-site complaints, air sampling data during event, etc.:

The refinery has not received any reports of offsite injuries or property damage associated with this event.

The refinery received two inquiries related to the odors in the community, and were made aware of three odor complaints made to Benicia Dispatch. Per procedures, refinery staff responded to any inquiries that requested a follow-up response. Below is a summary of the inquiries received by Valero:

Date Recieved	Time Received	Comments
2/24/24	05:30-06:00 am	Benicia Dispatch informed Valero of 3 odor complaints
2/24/24	08:15 am	Community Member request for information on odor
2/24/24	09:20 am	Community Member request for information on odor

A summary of the community monitoring results taken by Valero staff and PMAO support staff are included below:

Location	Date	Time	Parameter	Equipment Used	Max Result	Unit of Measure
Gas Station near GLM 1	2/24/24	5:30 am	Hydrogen Sulfide (H2S)	Jerome H2S Analyzer	0.02	ppb
Southampton Park (Panorama Drive)	2/24/24	10:20 am	Hydrogen Sulfide (H2S)	Jerome H2S Analyzer	0	ppb
			Sulfur Dioxide	ISC MX6	0	ppm
			Carbon Monoxide		0	ppm
			Benzene	UltraRAE	0	ppb
			Comments:	Faint odor of hydrocarbon with wind supporting from on-site.		
110 Southampton (Benicia Middle)	2/24/24	10:28 am	Hydrogen Sulfide (H2S)	Jerome H2S Analyzer	0.002	ppb
			Sulfur Dioxide	ISC MX6	0	ppm
			Carbon Monoxide		0	ppm
			Benzene	UltraRAE	0	ppb
2400 E Second St.	2/24/24	10:29 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide		0	ppm
			Sulfur Dioxide	Jerome	0	ppb
150 E L St. Benicia, CA (Benicia Library)	2/24/24	10:35 am	Hydrogen Sulfide (H2S)	Jerome H2S Analyzer	0	ppb
			Sulfur Dioxide	ISC MX6	0	ppm
			Carbon Monoxide		0	ppm
			Benzene	UltraRAE	0.001	ppb
2015 E 3rd St. (Robert Semple)	2/24/24	10:40 am	Hydrogen Sulfide (H2S)	Jerome H2S Analyzer	0	ppb
			Sulfur Dioxide	ISC MX6	0	ppm
			Carbon Monoxide		0	ppm
			Benzene	UltraRAE	0	Ppb
Rose & Panarama Dr	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide		0	Ppm

			Sulfur Dioxide	Jerome	0	ppb
Rose Ave	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
E. Second St	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
Tennys St	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
Rankin	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
5 th St	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
View Mt.	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
Hillcrest	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb
E. 2 nd St.	2/24/24	10:44 am	Carbon Monoxide	Masa Meter & MX6	0	ppm
			Hydrogen Sulfide		0	ppm
			Sulfur Dioxide	0	ppm	
			Sulfur Dioxide	Jerome	0	ppb

The fenceline website data is available at www.beniciarefineryairmonitors.org. A summary of the Hydrogen Sulfide results on February 24, 2024 from approximately 5:00 am to 10:00 am during the event are included below:

Monitoring Location	Concentration Range of H2S
GLM 1	0.2 – 392.6 ppb
OP1A	0 – 109.8 ppb

OP1B	0 – 411.6 ppb
OP2A	0 – 96 ppb

Data from the refinery’s fence line website (www.beniciarefineryairmonitors.org) is reported in parts-per-billion (ppb). Nuisance-level odors from H₂S can be detected as low as 1 ppb, however potential health effects from H₂S are not anticipated until levels are an order of magnitude higher, in the parts-per-million (ppm) range. The website data indicates readings of H₂S from the event with a maximum 5-minute average around 400 ppb (*or 0.4 ppm*) and maximum 1-hour average around 142-ppb (*or 0.142 ppm*). The Reference Exposure Level (REL) for H₂S listed on the website is 30 ppb, based on an OEHHA 1-hour threshold.

The REL is determined by the California Office of Environmental Health Hazard Assessment (OEHHA). A REL is an airborne concentration level of a chemical at or below which no adverse health effects are anticipated for a specified exposure duration. RELs are based on the most sensitive, relevant, adverse health effect reporting in the medical and toxicological literature and are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety. Therefore, exceeding the REL does not automatically indicate an adverse health impact.

IX. INCIDENT INVESTIGATION RESULTS:

Is the investigation of the incident complete at this time?

Yes: _____

No: X

If the answer is no, submit a 30-day final report.

If the answer is yes, complete the following:

X. SUMMARIZE INVESTIGATION RESULTS BELOW OR ATTACH COPY OF REPORT:

An investigation regarding this event is in progress. A 30-day report will be submitted to the City with additional information.

XI. SUMMARIZE PREVENTATIVE MEASURES TO BE TAKEN TO PREVENT RECURRENCE INCLUDING MILESTONE AND COMPLETION DATES FOR IMPLEMENTATION:

An investigation regarding this event is in progress. A 30-day report will be submitted to the City with additional information.

Attachment 1 – Safety Data Sheet (SDS)



SAFETY DATA SHEET

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

1.1. Product identifier

Trade name or designation of the mixture	Slop
Registration number	-
Synonyms	None.
SDS number	2024
Issue date	26-April-2023
Version number	01
Revision date	-
Supersedes date	-

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Refinery feedstock.
Uses advised against	No other uses are advised.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Valero Energy Ltd 27th Floor
Address	1 Canada Square London E14 5AA United Kingdom
Telephone	01/210 345 4593 (General information; US)
e-mail	CorpHSE@valero.com
Contact person	Industrial Hygienist
1.4. Emergency telephone number	0044/(0)18 65 407333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Physical hazards

Flammable liquids	Category 1	H224 - Extremely flammable liquid and vapour.
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Health hazards

Acute toxicity, inhalation	Category 4	H332 - Harmful if inhaled.
Skin corrosion/irritation	Category 2	H315 - Causes skin irritation.
Germ cell mutagenicity	Category 1B	H340 - May cause genetic defects.
Carcinogenicity	Category 1B	H350 - May cause cancer.
Reproductive toxicity	Category 2	H361 - Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - single exposure	Category 3 narcotic effects	H336 - May cause drowsiness or dizziness.
Specific target organ toxicity - repeated exposure	Category 2 (bone marrow, liver, thymus)	H373 - May cause damage to organs (bone marrow, liver, thymus) through prolonged or repeated exposure.
Aspiration hazard	Category 1	H304 - May be fatal if swallowed and enters airways.

Environmental hazards

Hazardous to the aquatic environment, long-term aquatic hazard	Category 2	H411 - Toxic to aquatic life with long lasting effects.
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2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Fuels, diesel, Gasoline, Kerosine (petroleum)

Hazard pictograms



Signal word Danger

Hazard statements

H224	Extremely flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H332	Harmful if inhaled.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs (bone marrow, liver, thymus) through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention

P201	Obtain special instructions before use.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/.

Response

P301 + P310	IF SWALLOWED: Immediately call a POISON CENTRE/doctor/.
P331	Do NOT induce vomiting.

Storage

P403 + P235	Store in a well-ventilated place. Keep cool.
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Disposal

Not assigned.

Supplemental information on the label

None.

2.3. Other hazards

Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapour. May cause flash fire or explosion. This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
Fuels, diesel	< 100	68334-30-5 269-822-7	01-2119484664-27-0052	649-224-00-6	N
					Classification: Flam. Liq. 3;H226, Acute Tox. 4;H332, Skin Irrit. 2;H315, Carc. 2;H351, STOT RE 2;H373, Asp. Tox. 1;H304, Aquatic Chronic 2;H411
Gasoline	< 100	86290-81-5 289-220-8	-	649-378-00-4	P
					Classification: Flam. Liq. 1;H224, Skin Irrit. 2;H315, Muta. 1B;H340, Carc. 1B;H350, Repr. 2;H361, STOT SE 3;H336, Asp. Tox. 1;H304, Aquatic Chronic 2;H411
Kerosine (petroleum)	< 100	8008-20-6 232-366-4	01-2119485517-27-0037	649-404-00-4	
					Classification: Flam. Liq. 3;H226, Skin Irrit. 2;H315, STOT SE 3;H336, Asp. Tox. 1;H304, Aquatic Chronic 2;H411

List of abbreviations and symbols that may be used above

#: This substance has workplace exposure limit(s).

M: M-factor

vPvB: very persistent and very bioaccumulative substance.

PBT: persistent, bioaccumulative and toxic substance.

Note N - The harmonized classification as a carcinogen does not apply because the full refining history is known and the substance from which it is produced is not a carcinogen.

Note P - The harmonized classification as a carcinogen or mutagen does not apply because the substance contains less than 0.1 % w/w of benzene (EINECS No 200-753-7).

Composition comments The full text for all H-statements is displayed in section 16. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First aid measures

General information Take off all contaminated clothing immediately. IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

4.1. Description of first aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Call a poison centre or doctor/physician if you feel unwell.

Skin contact Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Get medical attention if irritation develops and persists.

Ingestion Call a physician or poison control centre immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

4.2. Most important symptoms and effects, both acute and delayed Aspiration may cause pulmonary oedema and pneumonitis. May cause drowsiness or dizziness. Headache. Nausea, vomiting. Diarrhoea. Direct contact with eyes may cause temporary irritation. Skin irritation. May cause redness and pain. Jaundice. Prolonged exposure may cause chronic effects.

4.3. Indication of any immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards Extremely flammable liquid and vapour.

5.1. Extinguishing media

Suitable extinguishing media Water fog. Foam. Carbon dioxide (CO₂). Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture

Vapours may form explosive mixtures with air. Vapours may travel considerable distance to a source of ignition and flash back. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. To reduce potential for static discharge, use proper bonding and grounding procedures. This liquid may accumulate static electricity when filling properly grounded containers. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. Material will float and may ignite on surface of water. During fire, gases hazardous to health may be formed.

5.3. Advice for firefighters

Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special fire fighting procedures In case of fire and/or explosion do not breathe fumes. Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Move containers from fire area if you can do so without risk. ALWAYS stay away from tanks engulfed in flame. Withdraw immediately in case of rising sound from venting safety device or any discolouration of tanks due to fire. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Remove all possible sources of ignition in the surrounding area. Do not breathe mist/vapours. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not touch or walk through spilled material.

For emergency responders Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. Remove all possible sources of ignition in the surrounding area. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Transfer by mechanical means such as vacuum truck to a salvage tank or other suitable container for recovery or safe disposal. Ventilate closed spaces before entering them. Avoid breathing mist/vapours. Use appropriate containment to avoid environmental contamination. Local authorities should be advised if significant spillages cannot be contained. Use personal protection recommended in Section 8 of the SDS.

6.2. Environmental precautions Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Use appropriate containment to avoid environmental contamination.

6.3. Methods and material for containment and cleaning up Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil etc) away from spilled material. Take precautionary measures against static discharge. Use only non-sparking tools. The product is immiscible with water and will spread on the water surface. Prevent entry into waterways, sewer, basements or confined areas.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Put material in suitable, covered, labelled containers. The product is insoluble in water.

6.4. Reference to other sections For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. When using do not smoke. Explosion-proof general and local exhaust ventilation. Minimize fire risks from flammable and combustible materials (including combustible dust and static accumulating liquids) or dangerous reactions with incompatible materials. Handling operations that can promote accumulation of static charges include but are not limited to: mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Do not breathe mist/vapours. Avoid contact with eyes, skin, and clothing. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.

For additional information on equipment bonding and grounding, refer to the Canadian Electrical Code in Canada, (CSA C22.1), or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" or National Fire Protection Association (NFPA) 70, "National Electrical Code".

7.2. Conditions for safe storage, including any incompatibilities Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Store in a cool, dry place out of direct sunlight. Store in tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see section 10 of the SDS).

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

ANNEX 1, PART 1 Categories of dangerous substances
Hazard categories in accordance with Regulation (EC) No 1272/2008
- P5a FLAMMABLE LIQUIDS (Lower-tier requirements = 10 tonnes; Upper-tier requirements = 50 tonnes)
- E2 Hazardous to the Aquatic Environment Chronic (Lower-tier requirements = 200 tonnes; Upper-tier requirements = 500 tonnes)

7.3. Specific end use(s) Refinery feedstock. Observe industrial sector guidance on best practices.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).
Recommended monitoring procedures	Follow standard monitoring procedures.
Derived no effect levels (DNELs)	Not available.
Predicted no effect concentrations (PNECs)	Not available.
8.2. Exposure controls	
Appropriate engineering controls	Explosion-proof general and local exhaust ventilation. Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station and safety shower.
Individual protection measures, such as personal protective equipment	
General information	Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection	Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles. Eye protection should meet standard EN 166.
Skin protection	
- Hand protection	Wear appropriate chemical resistant gloves. Viton® or nitrile rubber gloves are recommended. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Wear suitable gloves tested to EN374.
- Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended. Full body suit and boots are recommended when handling large volumes or in emergency situations.
Respiratory protection	Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Use respiratory equipment with combination filter, type A2/P2.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures	Observe any medical surveillance requirements. When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.
Environmental exposure controls	Inform appropriate managerial or supervisory personnel of all environmental releases. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance

Physical state	Liquid.
Form	Liquid.
Colour	Colourless.
Odour	Hydrocarbon.
Odour threshold	Not available.
pH	Not determined.
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	> 25 - < 385 °C (> 77 - < 725 °F)
Flash point	-40 °C (-40 °F) (Minimum)
Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	0.6 % v/v
Explosive limit - upper (%)	7.6 % v/v
Vapour pressure	Not determined.

Vapour density	Not determined.
Relative density	> 0.75
Solubility(ies)	
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not determined.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	< 7 mm ² /s (40°C)
Explosive properties	Not explosive.
Oxidising properties	Not oxidising.
9.2. Other information	
Kinematic viscosity	Not determined.

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Material is stable under normal conditions.
10.3. Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
10.4. Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Do not pressurize, cut, weld, braze, solder, drill, grind or expose empty containers to heat, flame, sparks, static electricity, or other sources of ignition; they may explode and cause injury or death. Avoid temperatures exceeding the flash point. Contact with incompatible materials.
10.5. Incompatible materials	Strong acids. Strong oxidizers such as nitrates, chlorates, peroxides.
10.6. Hazardous decomposition products	No hazardous decomposition products are known.

SECTION 11: Toxicological information

General information	Occupational exposure to the substance or mixture may cause adverse effects.
Information on likely routes of exposure	
Inhalation	Harmful if inhaled. May cause drowsiness or dizziness. Headache. Nausea, vomiting.
Skin contact	Causes skin irritation.
Eye contact	Direct contact with eyes may cause temporary irritation.
Ingestion	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms	Aspiration may cause pulmonary oedema and pneumonitis. May cause drowsiness or dizziness. Headache. Nausea, vomiting. Diarrhoea. Skin irritation. May cause redness and pain. Jaundice.
11.1. Information on toxicological effects	

Acute toxicity Harmful if inhaled.

Components	Species	Test Results
Fuels, diesel (CAS 68334-30-5)		
Acute		
Dermal		
LD50	Rabbit	> 4300 mg/kg
Inhalation		
<i>vapour/aerosol</i>		
LC50	Rat	4.1 mg/l, 4 Hours
Oral		
LD50	Rat	> 5000 mg/kg
Skin corrosion/irritation	Causes skin irritation.	
Serious eye damage/eye irritation	Direct contact with eyes may cause temporary irritation.	
Respiratory sensitisation	Based on available data, the classification criteria are not met.	
Skin sensitisation	Based on available data, the classification criteria are not met.	
Germ cell mutagenicity	May cause genetic defects.	
Carcinogenicity	May cause cancer.	

IARC Monographs. Overall Evaluation of Carcinogenicity

Gasoline (CAS 86290-81-5)

2B Possibly carcinogenic to humans.

Reproductive toxicity	Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - single exposure	May cause drowsiness or dizziness.
Specific target organ toxicity - repeated exposure	May cause damage to organs (bone marrow, liver, thymus) through prolonged or repeated exposure.
Aspiration hazard	May be fatal if swallowed and enters airways.
Mixture versus substance information	No information available.
Other information	None known.

SECTION 12: Ecological information

12.1. Toxicity Toxic to aquatic life with long lasting effects.

Components	Species	Test Results
Fuels, diesel (CAS 68334-30-5)		
Aquatic		
<i>Acute</i>		
Algae	ErL50	Algae 22 mg/l
Crustacea	EL50	Daphnia 68 mg/l
Fish	LL50	Fish 21 mg/l

12.2. Persistence and degradability No data is available on the degradability of this product.

12.3. Bioaccumulative potential No data available.

Partition coefficient n-octanol/water (log Kow) Not available.

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil No data available.

12.5. Results of PBT and vPvB assessment This mixture does not contain substances assessed to be vPvB / PBT according to Regulation (EC) No 1907/2006, Annex XIII.

12.6. Other adverse effects No data available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.
EU waste code	The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Disposal methods/information	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Special precautions	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. UN number	UN1268
14.2. UN proper shipping name	PETROLEUM PRODUCTS, N.O.S. (Gasoline, Fuels, diesel)
14.3. Transport hazard class(es)	
Class	3
Subsidiary risk	-
Label(s)	3
Hazard No. (ADR)	33
Tunnel restriction code	D/E
14.4. Packing group	I

14.5. Environmental hazards Yes
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

RID

14.1. UN number UN1268
14.2. UN proper shipping name PETROLEUM PRODUCTS, N.O.S. (Gasoline, Fuels, diesel)
14.3. Transport hazard class(es)
 Class 3
 Subsidiary risk -
 Label(s) 3
14.4. Packing group I
14.5. Environmental hazards Yes
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

ADN

14.1. UN number UN1268
14.2. UN proper shipping name PETROLEUM PRODUCTS, N.O.S. (Gasoline, Fuels, diesel)
14.3. Transport hazard class(es)
 Class 3
 Subsidiary risk -
 Label(s) 3
14.4. Packing group I
14.5. Environmental hazards Yes
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IATA

14.1. UN number UN1268
14.2. UN proper shipping name Petroleum products, n.o.s. (Gasoline, Fuels, diesel)
14.3. Transport hazard class(es)
 Class 3
 Subsidiary risk -
14.4. Packing group I
14.5. Environmental hazards Yes
ERG Code 3H
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

14.1. UN number UN1268
14.2. UN proper shipping name PETROLEUM PRODUCTS, N.O.S. (Gasoline, Fuels, diesel)
14.3. Transport hazard class(es)
 Class 3
 Subsidiary risk -
14.4. Packing group I
14.5. Environmental hazards
 Marine pollutant Yes
 EmS F-E, S-E
14.6. Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

General information Shipping descriptions in this section are offered as examples only. Classification for transport must accurately reflect the material hazards as designated under a variety of regulations and is solely the responsibility of the person offering the material for transport into commerce.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Retained direct EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EU) 2019/1021 On persistent organic pollutants (recast), as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Gasoline (CAS 86290-81-5)

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

ANNEX 1, PART 1 Categories of dangerous substances
Hazard categories in accordance with Regulation (EC) No 1272/2008
- P5a FLAMMABLE LIQUIDS
- E2 Hazardous to the Aquatic Environment Chronic

Directive 2012/18/EU on major accident hazards involving dangerous substances, as amended

Fuels, diesel (CAS 68334-30-5)

Gasoline (CAS 86290-81-5)

Kerosine (petroleum) (CAS 8008-20-6)

Other regulations

This product is classified and labelled in accordance with the retained CLP Regulation (EC) No 1272/2008, as amended for Great Britain. This Safety Data Sheet is compiled in accordance with REACH Regulation (EC) No 1907/2006, as amended by UK REACH Regulations SI 2019/758.

Follow specific measures on the prevention and control of exposure to carcinogens and mutagens in accordance with the Control of Substances Hazardous to Health Regulations 2002 [SI 2002/2677], as amended. Use of this product by young persons under the age of 18 is not allowed in accordance with the Management of Health and Safety at Work Regulations 1999 [SI 1999/3242], as amended. New or expectant mothers should not work with this product if there is a risk due to exposure, in accordance with the Management of Health and Safety at Work Regulations 1999 [SI 1999/3242], as amended. Follow the requirements of the Control of Substances Hazardous to Health Regulations 2002 [SI 2002/2677], as amended, when using this material.

15.2. Chemical safety assessment

Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

ADN: European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways.

ADR: Agreement concerning the International Carriage of Dangerous Goods by Road.

CAS: Chemical Abstract Service.

CEN: European Committee for Standardization.

IATA: International Air Transport Association.

IBC Code: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.

IMDG: International Maritime Dangerous Goods.

MARPOL: International Convention for the Prevention of Pollution from Ships.

PBT: Persistent, bioaccumulative and toxic.

RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.

STEL: Short term exposure limit.

TWA: Time Weighted Average.

vPvB: Very persistent and very bioaccumulative.

References

CONCAWE

ECHA: European Chemical Agency.

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any statements, which are not written out in full under sections 2 to 15

H224 Extremely flammable liquid and vapour.
H226 Flammable liquid and vapour.
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H332 Harmful if inhaled.
H336 May cause drowsiness or dizziness.
H340 May cause genetic defects.
H350 May cause cancer.
H351 Suspected of causing cancer.
H361 Suspected of damaging fertility or the unborn child.
H373 May cause damage to organs through prolonged or repeated exposure.
H411 Toxic to aquatic life with long lasting effects.

Training information

Follow training instructions when handling this material.

Disclaimer

The information in this Safety Data Sheet (SDS) was obtained from sources believed to be reliable and accurate, and is not represented as being absolutely complete. The end user of this product has the responsibility for evaluating the adequacy of the data for the intended application and conditions of use; for determining the safety, toxicity, regulatory requirements, and suitability of the product under these conditions; and for obtaining additional or clarifying data where uncertainty exists. The data serves as general guidance only, and is to be used in combination with professional judgement of persons experienced in a specific application, use or process; and additional data may be required.




SAFETY DATA SHEET

1. Identification

Product identifier	Hydrogen Sulfide
Other means of identification	
SDS number	IUO-H2S-GHS
Synonyms	Stink damp, sulfureted hydrogen, sulfur hydride, sulfuretted hydrogen, hydrosulfuric acid, hepatic gas, hydrosulfuric acid (hydrogen sulfide)
Recommended use	Not available.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Manufacturer/Supplier	Valero Marketing & Supply Company and Affiliates One Valero Way San Antonio, TX 78269-6000
General Assistance	210-345-4593
E-Mail	CorpHSE@valero.com
Contact Person	Industrial Hygienist
Emergency Telephone	24 Hour Emergency 866-565-5220 1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards	Flammable gases Gases under pressure	Category 1 Liquefied gas
Health hazards	Acute toxicity, inhalation Specific target organ toxicity, single exposure	Category 2 Category 3 respiratory tract irritation
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
OSHA defined hazards	Not classified.	
Label elements		

Signal word	Danger
Hazard statement	Extremely flammable gas. Contains gas under pressure; may explode if heated. Fatal if inhaled. May cause respiratory irritation. Very toxic to aquatic life.
Precautionary statement	
Prevention	Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not breathe gas. Avoid breathing vapors. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear respiratory protection.
Response	If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor. Specific treatment is urgent (see this label). Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Collect spillage.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up. Protect from sunlight. Store in a well-ventilated place.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Hydrogen sulfide	7783-06-4	100

4. First-aid measures

Inhalation	Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory tract irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. Move to fresh air. Get medical attention immediately.
Skin contact	If frostbite occurs, immerse affected area in warm water (not exceeding 105°F/41°C). Keep immersed for 20 to 40 minutes. Get medical attention immediately.
Eye contact	If frostbite occurs, immediately flush eyes with plenty of warm water (not exceeding 105°F/41°C) for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention immediately.
Ingestion	Not likely, due to the form of the product.
Most important symptoms/effects, acute and delayed	Headache. Dizziness. Nausea, vomiting. May cause respiratory irritation.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO ₂).
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Do not extinguish a leaking gas fire unless leak can be stopped. In case of fire: Stop leak if safe to do so. Do not move cargo or vehicle if cargo has been exposed to heat. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Move containers from fire area if you can do so without risk. Do not direct water at source of leak or safety devices as icing may occur. Use water spray to cool unopened containers. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials. Cool containers exposed to flames with water until well after the fire is out.
General fire hazards	Extremely flammable gas. Contents under pressure. Pressurized container may explode when exposed to heat or flame.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep out of low areas. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Wear appropriate protective equipment and clothing during clean-up. Do not breathe gas. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Refer to attached safety data sheets and/or instructions for use. Stop leak if you can do so without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Isolate area until gas has dispersed. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. For waste disposal, see section 13 of the SDS.

Environmental precautions Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Do not smoke. All equipment used when handling the product must be grounded. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Purge air from system before introducing gas. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Do not breathe gas. Avoid prolonged exposure. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Avoid release to the environment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities Store locked up. Keep away from heat, sparks and open flame. This material can accumulate static charge which may cause spark and become an ignition source. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in a cool, dry place out of direct sunlight. Store in tightly closed container. Store in a well-ventilated place. Stored containers should be periodically checked for general condition and leakage. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value
Hydrogen sulfide (CAS 7783-06-4)	Ceiling	20 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Hydrogen sulfide (CAS 7783-06-4)	STEL	5 ppm
	TWA	1 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Hydrogen sulfide (CAS 7783-06-4)	Ceiling	15 mg/m ³
		10 ppm

Biological limit values No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Wear appropriate chemical resistant gloves.

Skin protection

Other Wear suitable protective clothing.

Respiratory protection Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

Thermal hazards Wear appropriate thermal protective clothing, when necessary. Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

General hygiene considerations When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state	Gas.
Form	Liquefied gas.
Color	Colorless.

Odor Rotten-egg like.

Odor threshold Not available.

pH 4.5 Aqueous solution

Melting point/freezing point -121.88 °F (-85.49 °C)

Initial boiling point and boiling range -76.6 °F (-60.33 °C)

Flash point Not available.

Evaporation rate Not available.

Flammability (solid, gas) Flammable gas.

Upper/lower flammability or explosive limits

Explosive limit - lower (%) Not available.

Explosive limit - upper (%) Not available.

Vapor pressure 2079.79 kPa @ 25 °C

Vapor density Not available.

Relative density 0.0015

Solubility(ies)

Solubility (water) 4 g/l

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature 500 °F (260 °C)

Decomposition temperature Not available.

Viscosity Not available.

Other information

Density 0.0015 g/cm³

Dynamic viscosity 8 mPa.s

Dynamic viscosity temperature 77 °F (25 °C)

Explosive properties Not explosive.

Molecular formula H₂S

Molecular weight 34.08 g/mol

Oxidizing properties Not oxidizing.

10. Stability and reactivity

Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability Material is stable under normal conditions.

Possibility of hazardous reactions No dangerous reaction known under conditions of normal use.

Conditions to avoid Avoid heat, sparks, open flames and other ignition sources. Contact with incompatible materials.

Incompatible materials Strong oxidizing agents.

Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation Fatal if inhaled.

Skin contact Contact with liquefied gas may cause frostbite.

Eye contact Contact with liquefied gas may cause frostbite.

Ingestion This material is a gas under normal atmospheric conditions and ingestion is unlikely.
Symptoms related to the physical, chemical and toxicological characteristics Convulsions. Headache. Dizziness. May cause respiratory irritation.

Information on toxicological effects

Acute toxicity Fatal if inhaled.

Components	Species	Test Results
Hydrogen sulfide (CAS 7783-06-4)		
Acute		
Inhalation		
Gas		
LC50	Rat	444 ppm, 4 Hours

Skin corrosion/irritation Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

Serious eye damage/eye irritation Direct contact with liquefied gas may cause eye damage from frostbite.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not likely, due to the form of the product.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Very toxic to aquatic life.

Components	Species	Test Results
Hydrogen sulfide (CAS 7783-06-4)		
Aquatic		
<i>Acute</i>		
Crustacea	EC50	Crustacea 0.042 mg/l, 48 Hours
Fish	LC50	Fathead minnow (Pimephales promelas) 0.0243 mg/l, 96 hours

Persistence and degradability No data available.

Bioaccumulative potential No data available.

Mobility in soil Not relevant, due to the form of the product.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not incinerate sealed containers. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.
Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

US RCRA Hazardous Waste U List: Reference

Hydrogen sulfide (CAS 7783-06-4) U135

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN1053
UN proper shipping name Hydrogen sulfide
Transport hazard class(es)
Class 2.3
Subsidiary risk 2.1
Label(s) 2.3, 2.1
Packing group Not applicable
Environmental hazards
Marine pollutant Yes
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 2, B9, B14, N89
Packaging exceptions None
Packaging non bulk 304
Packaging bulk 314, 315

IATA

UN number UN1053
UN proper shipping name Hydrogen sulphide
Transport hazard class(es)
Class 2.3
Subsidiary risk 2.1
Packing group Not applicable
Environmental hazards Yes
ERG Code 10P
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number UN1053
UN proper shipping name HYDROGEN SULPHIDE
Transport hazard class(es)
Class 2.3
Subsidiary risk 2.1
Packing group Not applicable
Environmental hazards
Marine pollutant Yes
EmS F-D, S-U
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

General information Shipping descriptions in this section are offered as examples only. Classification for transport must accurately reflect the material hazards as designated under a variety of regulations and is solely the responsibility of the person offering the material for transport into commerce.

15. Regulatory information

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

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Hydrogen sulfide (CAS 7783-06-4) Listed.

SARA 304 Emergency release notification

Hydrogen sulfide (CAS 7783-06-4) 100 LBS

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA)

All components of the mixture on the TSCA 8(b) inventory are designated "active".

Superfund Amendments and Reauthorization Act of 1986 (SARA)**SARA 302 Extremely hazardous substance**

Chemical name	CAS number	Reportable quantity (pounds)	Threshold planning quantity (pounds)	Threshold planning quantity, lower value (pounds)	Threshold planning quantity, upper value (pounds)
Hydrogen sulfide	7783-06-4	100	500		

SARA 311/312 Hazardous chemical

Yes

Classified hazard categories

Flammable (gases, aerosols, liquids, or solids)
 Gas under pressure
 Acute toxicity (any route of exposure)
 Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Hydrogen sulfide	7783-06-4	100

Other federal regulations**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Hydrogen sulfide (CAS 7783-06-4)

Clean Water Act (CWA) Section 112(r) (40 CFR 68.130)

Hazardous substance

Safe Drinking Water Act (SDWA)

Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace

Hydrogen sulfide (CAS 7783-06-4) High priority

US state regulations**US. Massachusetts RTK - Substance List**

Hydrogen sulfide (CAS 7783-06-4)

US. New Jersey Worker and Community Right-to-Know Act

Hydrogen sulfide (CAS 7783-06-4)

US. Pennsylvania Worker and Community Right-to-Know Law

Hydrogen sulfide (CAS 7783-06-4)

US. Rhode Island RTK

Hydrogen sulfide (CAS 7783-06-4)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Hydrogen sulfide (CAS 7783-06-4)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	13-August-2013
Revision date	18-May-2022
Version #	03
NFPA ratings	



Disclaimer

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