

SAFETY DATA SHEET

1. Identification

Product identifier	Benzene
Other means of identification	
SDS number	401-GHS
Synonyms	benzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol See section 16 for complete information.
Recommended use	This product is intended for use as a refinery feedstock, fuel or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.
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

2. Hazard(s) identification

Physical hazards	Flammable liquids	Category 2
Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2
	Germ cell mutagenicity	Category 1B
	Carcinogenicity	Category 1A
	Specific target organ toxicity, repeated exposure	Category 1
	Aspiration hazard	Category 1
OSHA defined hazards	Not classified.	
Label elements		



1-800-424-9300 (CHEMTREC USA)

Danger

Hazard statement

Response

Precautionary statement Prevention

Signal word

Causes serious eye irritation. May cause cancer. Causes damage to organs (blood, liver, kidney) through prolonged or repeated exposure.

Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use only non-sparking tools. Take precautionary measures against static discharges. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area.

If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. If exposed or concerned: Get medical advice/attention. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. If swallowed: Immediately call a poison center/doctor. Do not induce vomiting.

Disposal Hazard(s) not otherwise classified (HNOC)

Storage

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Benzene	71-43-2	>99.9

4. First-aid measures

Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
Skin contact	Remove contaminated clothing and shoes. Wash off immediately with soap and plenty of water. Get medical attention if irritation develops or persists. Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes. If high pressure injection under the skin occurs, always seek medical attention.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention.
Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Do not give mouth-to-mouth resuscitation. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Never give anything by mouth to a victim who is unconscious or is having convulsions. Get medical attention immediately.
Most important symptoms/effects, acute and delayed	Irritation of eyes and mucous membranes. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Irritation of nose and throat. Defatting of the skin. Skin irritation. Rash.
Indication of immediate medical attention and special treatment needed	In case of shortness of breath, give oxygen. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	If exposed or concerned: get medical attention/advice. 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 re-use.
5. Fire-fighting measures	
5. Fire-fighting measures Suitable extinguishing media	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
•••	Water spray. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). Do not use a solid water stream as it may scatter and spread fire.
Suitable extinguishing media Unsuitable extinguishing	
Suitable extinguishing media Unsuitable extinguishing media Specific hazards arising from	Do not use a solid water stream as it may scatter and spread fire. Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash
Suitable extinguishing media Unsuitable extinguishing media Specific hazards arising from the chemical Special protective equipment	Do not use a solid water stream as it may scatter and spread fire. Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge. Wear full protective clothing, including helmet, self-contained positive pressure or pressure
Suitable extinguishing media Unsuitable extinguishing media Specific hazards arising from the chemical Special protective equipment and precautions for firefighters Fire-fighting	Do not use a solid water stream as it may scatter and spread fire. Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge. Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapors may form explosive air mixtures even at room temperature. Prevent buildup of vapors or gases to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage. Use compatible foam to minimize vapor

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Local authorities should be advised if significant spills cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.

Methods and materials for containment and cleaning up	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Extinguish all flames in the vicinity. Keep combustibles (wood, paper, oil, etc.) away from spilled material.
	Small Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Cover with plastic sheet to prevent spreading. Collect spillage. Following product recovery, flush area with water. Prevent product from entering drains. Do not allow material to contaminate ground water system. Clean surface thoroughly to remove residual contamination. Wipe up with absorbent material (e.g. cloth, fleece).
	Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. This material and its container must be disposed of as hazardous waste.
Environmental precautions	If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Flammable. Review Firefighting Measures, Section 5, before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g. by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Use compatible foam to minimize vapor generation as needed. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 1-800-424-8802. For highway or railways spills, contact Chemtrec at 1-800-424-9300.
7. Handling and storage	
Precautions for safe handling	Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Wear personal protective equipment. Do not breathe gas/fumes/vapor/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Avoid prolonged exposure. Use only with adequate ventilation. Wash thoroughly after handling. The product is highly flammable, and explosive vapor/air mixtures may be formed even at normal room temperatures. DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. When using, do not eat, drink or smoke. Avoid release to the environment.
Conditions for safe storage, including any incompatibilities	Flammable liquid storage. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. The pressure in sealed containers can increase under the influence of heat. Keep container tightly closed in a cool, well-ventilated place. Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

STEL	5 ppm	
TWA	1 ppm	
Туре	Value	
STEL	5 ppm	
TWA	1 ppm	
00)		
Туре	Value	
Ceiling	25 ppm	
TWA	10 ppm	
Туре	Value	
Ceiling	25 ppm	
TWA	10 ppm	
	TWA Type STEL TWA D00) Type Ceiling TWA Type Ceiling Ceiling	TWA1 ppmTypeValueSTEL5 ppmTWA1 ppmTWA25 ppmTypeValueCeiling25 ppmTWA10 ppmTypeValueCeiling25 ppm

US. ACGIH Threshold Limit Values

Material	Туре	Value	
Benzene (CAS Mixture)	STEL	2.5 ppm	
	TWA	0.5 ppm	
Components	Туре	Value	
Benzene (CAS 71-43-2)	STEL	2.5 ppm	
	TWA	0.5 ppm	

US. NIOSH: Pocket Guide to Chemical Hazards

Material	Туре	Value	
Benzene (CAS Mixture)	STEL	1 ppm	
	TWA	0.1 ppm	
Components	Туре	Value	
Benzene (CAS 71-43-2)	STEL	1 ppm	
	TWA	0.1 ppm	

Biological limit values

ACGIH Biological Exposure Indices

Material	Value	Determinant	Specimen	Sampling Time	
Benzene (CAS Mixture)	25 µg/g	S-Phenylmerca pturic acid	Creatinine in urine	*	
Components	Value	Determinant	Specimen	Sampling Time	
Benzene (CAS 71-43-2)	25 µg/g	S-Phenylmerca	Creatinine	*	

* - For sampling details, please see the source document.

Exposure guidelines

Expediate guiadinies		
US - California OELs: Skin	designation	
Benzene (CAS 71-43-2)	Can be absorbed through the skin.	
US ACGIH Threshold Limit	Values: Skin designation	
Benzene (CAS 71-43-2)	Can be absorbed through the skin.	
Appropriate engineering controls	Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.	
Individual protection measures	, such as personal protective equipment	
Eye/face protection	Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.	
Skin protection		
Hand protection	Avoid exposure - obtain special instructions before use. Wear protective gloves. Protective gloves.	
Other	Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.	
Respiratory protection	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.	
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.	
General hygiene considerations	Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Keep away from food and drink. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practice.	

9. Physical and chemical properties

Appearance	Colorless to pale yellow liquid.
Physical state	Liquid.
Form	Liquid.

Benzene

Color	Colorless to pale yellow.
Odor	Gasoline.
Odor threshold	Not available.
рН	Not available.
Melting point/freezing point	42 °F (5.56 °C)
Initial boiling point and boiling range	176 °F (80 °C)
Flash point	11.9 °F (-11.2 °C) Closed Cup
Evaporation rate	3.5 (n-Butyl Acetate = 1)
Flammability (solid, gas)	Not available.
Upper/lower flammability or exp	losive limits
Flammability limit - lower (%)	1.3 %
Flammability limit - upper (%)	7.1 %
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	2.77
Relative density	0.88
Solubility(ies)	
Solubility (water)	Very slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	1097 °F (591.67 °C)
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	estimated
Molecular formula	C6-H6
Percent volatile	100 %
10. Stability and reactivity	
Reactivity	Not available.
Chemical stability	Stable under normal temperature conditions and recommended use.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Heat, flames and sparks. Ignition sources. Contact with incompatible materials. 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.
Incompatible materials	Strong oxidizing agents. Reducing agents. Acids. Alkalis.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	May be fatal if swallowed and enters airways.
Inhalation	In high concentrations, mists/vapors may irritate throat and respiratory system and cause coughing.
Skin contact	May cause skin irritation. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.
Eye contact	Causes severe eye irritation.

Symptoms related to the
physical, chemical and
toxicological characteristics

Irritation of nose and throat. Irritation of eyes and mucous membranes. Skin irritation. Unconsciousness. Corneal damage. Narcosis. Cyanosis (blue tissue condition, nails, lips, and/or skin). Decrease in motor functions. Behavioral changes. Edema. Liver enlargement. Jaundice. Conjunctivitis. Proteinuria. Defatting of the skin. Rash.

Information on toxicological effects

information on toxicological end			
Acute toxicity	Harmful: may cause lung dan	nage if swallowed.	
Components	Species	Test Results	
Benzene (CAS 71-43-2)			
Acute			
Oral			
LD50	Rat	930 mg/kg	
Skin corrosion/irritation	Causes skin irritation.		
Serious eye damage/eye irritation	Causes serious eye irritation.		
Respiratory or skin sensitization	1		
Respiratory sensitization	Based on available data, the	classification criteria are not met.	
Skin sensitization	Based on available data, the	classification criteria are not met.	
Germ cell mutagenicity	May cause genetic defects. In in-vitro experiments benzene did not change the number of sister-chromatid exchanges (SCEs) or the number of chromosomal aberrations in human lymphocytes.		
Carcinogenicity	May cause cancer.		
IARC Monographs. Overall I	Evaluation of Carcinogenicity	,	
Benzene (CAS 71-43-2) NTP Report on Carcinogens	i	1 Carcinogenic to humans.	
Benzene (CAS 71-43-2)	Known To Be Human Carcinogen.		
	lated Substances (29 CFR 19	10.1001-1050)	
Benzene (CAS 71-43-2)		Cancer	
Reproductive toxicity	chromosomal aberrations and cause adverse reproductive e	ave shown testicular effects, alterations in reproductive cycles, d embryo/fetotoxicity. May damage fertility or the unborn child. Can effects - such as birth defects, miscarriages, or infertility. Avoid arly pregnancy. Avoid contact during pregnancy/while nursing.	
Specific target organ toxicity - single exposure	Based on available data, the classification criteria are not met.		
Specific target organ toxicity - repeated exposure	Causes damage to organs (Blood, liver, kidney) through prolonged or repeated exposure.		
Aspiration hazard	May be fatal if swallowed and	l enters airways.	
Further information	Symptoms may be delayed.		

12. Ecological information

Ecotoxicity

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

	Species	Test Results
EC50	Water flea (Daphnia magna)	8.76 - 15.6 mg/l, 48 Hours
LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	5.9 mg/l, 96 hours
None known.		
Not available.		
nol / water (log I	(ow) 2.13	
Not available.		
Not available.		
	LC50 None known. Not available. nol / water (log l Not available.	EC50 Water flea (Daphnia magna) LC50 Rainbow trout,donaldson trout (Oncorhynchus mykiss) None known. Not available. nol / water (log Kow) 2.13 Not available.

13. Disposal considerations

Disposal instructions	Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container.		
Hazardous waste code	D001: Waste Flammable material with a flash point <140 °F		
US RCRA Hazardous Waste	U List: Reference		
Benzene (CAS 71-43-2)	U019		
Waste from residues / unused products	Dispose of in accordance with local regulations.		
Contaminated packaging	Offer rinsed packaging material to local recycling facilities.		
14. Transport information			

DOT	
UN number	UN1114
UN proper shipping name	Benzene
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Packing group	II. Contraction of the second s
· ·	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB2, T4, TP1
Packaging exceptions	150
Packaging non bulk	202
Packaging bulk	242
ΙΑΤΑ	
UN number	UN1114
UN proper shipping name	Benzene
Transport hazard class(es)	
Class	3
Subsidiary risk	-
Packing group	II
Environmental hazards	Yes
ERG Code	3H
	Read safety instructions, SDS and emergency procedures before handling.
IMDG	
UN number	UN1114
UN proper shipping name	BENZENE
Transport hazard class(es)	
Class	3
Subsidiary risk	
Packing group	Ш
Environmental hazards	
Marine pollutant	Yes
EmS	F-E, S-D
	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to	This product is a liquid and when transported in bulk is covered under MARPOL 73/78 Annex II.
Annex II of MARPOL 73/78 and the IBC Code	This product is listed in the IBC Code. Ship type: 3
	Pollution category: Y

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.

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

Not regulated.

US. OSHA Specifically Re	gulated Substances (29 CFR	1910.1001-1050)		
Benzene (CAS 71-43-2)	Cancer Central nervous Blood Aspiration Skin Eye Respiratory tract		
CERCLA Hazardous Subs	tance List (40 CFR 302.4)	Flammability		
Benzene (CAS 71-43-2	•	LISTED		
Superfund Amendments and F Hazard categories	Reauthorization Act of 1986 Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - Yes Pressure Hazard - No Reactivity Hazard - No	(SARA)		
SARA 302 Extremely haza Not listed.	rdous substance			
SARA 311/312 Hazardous chemical	Yes			
SARA 313 (TRI reporting) Chemical name		CAS number	% by wt.	
Benzene		71-43-2	>99.9	
Other federal regulations				
Benzene (CAS 71-43-2	on 112 Hazardous Air Pollut) on 112(r) Accidental Release		68.130)	
Benzene (CAS 71-43-2 Clean Air Act (CAA) Section Not regulated. Clean Water Act (CWA) Section 112(r) (40 CFR)		68.130)	
Benzene (CAS 71-43-2 Clean Air Act (CAA) Section Not regulated. Clean Water Act (CWA) Section 112(r) (40 CFR 68.130) Safe Drinking Water Act) on 112(r) Accidental Release Hazardous substance Priority pollutant		68.130)	
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Country(s) or region	Inventory name	On inventory (yes/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
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies 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	27-June-2013
Revision date	23-May-2014
Version #	02
Further information	HMIS® is a registered trade and service mark of the NPCA.
NFPA Ratings	

