Safety Data Sheet

Section 1: Identification

Product identifier

Product Name • **Hydrogen**

CAS Number • 1333-74-0

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

Recommended use • Fuel, Chemical Production

Details of the supplier of the safety data sheet

Manufacturer • Westlake Vinyls, Inc.
P.O. Box 527
2468 Industrial Parkway Calvert City, KY 42029
United States
www.westlake.com

Telephone (General) • 270-395-4151

Emergency telephone number

Manufacturer • (800) 424-9300 - Chemtrec - Transportation emergency

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Flammable Gases 1
Compressed Gas
Simple Asphyxiant

Label elements

OSHA HCS 2012

DANGER

Hazard statements • Extremely flammable gas
Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation.

Precautionary statements

Prevention • Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.

Response • Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage/Disposal • Protect from sunlight. Store in a well-ventilated place.

Other hazards

OSHA HCS 2012 • Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to: WHMIS

Classification of the substance or mixture

WHMIS • Compressed Gas - A
Flammable Gases - B1

Label elements

WHMIS

• Compressed Gas - A
Flammable Gases - B1

Other hazards

WHMIS • This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.
In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

Substances

Composition					
Chemical Name	**Identifiers**	**%**	**LD50/LC50**	**Classifications According to Regulation/Directive**	**Comments**
Hydrogen	**CAS:**1333-74-0	> 99%	NDA	**OSHA HCS 2012:** Flam. Gas 1, Press. Gas - Comp.; Simp. Asphyx.	NDA

Mixtures

• Material does not meet the criteria of a mixture.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation • Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin • Not an anticipated hazard.

Eye • Not an anticipated hazard.

Ingestion
- Not an anticipated hazard.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media
- SMALL FIRES: Dry chemical or CO2.
  LARGE FIRES: Water spray or fog.

Unsuitable Extinguishing Media
- No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
- EXTREMELY FLAMMABLE
  Will form explosive mixtures with air.
  Vapors may travel to source of ignition and flash back.
  Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
  Containers may explode when heated.
  Ruptured cylinders may rocket.
  Hydrogen burns with an almost invisible flame.
  Since hydrogen is light it rises rapidly in air and may collect in explosive concentrations in upper portions of buildings.

Hazardous Combustion Products
- No data available

Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
  Wear positive pressure self-contained breathing apparatus (SCBA).
  DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED
  Move containers from fire area if you can do it without risk.
  FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
  FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.
  FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
  FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.
  FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
  FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.

FIRE INVOLVING TANKS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions
- Ventilate the area before entry. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile)

Environmental precautions

- Prevent spreading of vapors through sewers, ventilation systems and confined areas.

Methods and material for containment and cleaning up

Containment/Clean-up Measures
- Stop leak if you can do it without risk.
  All equipment used when handling the product must be grounded.
  If possible, turn leaking containers so that gas escapes rather than liquid.
  A vapor suppressing foam may be used to reduce vapors.
  Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
  Do not direct water at spill or source of leak.
  Isolate area until gas has dispersed.

Section 7 - Handling and Storage

Precautions for safe handling

Handling
- Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation. Ventilate closed spaces before entering. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

Conditions for safe storage, including any incompatibilities

Storage
- Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52C (125F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines
- No applicable exposure limits available for product or components.

Exposure controls

Engineering Measures/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. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory	• In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134. Use a NIOSH/MSHA approved respirator if exposure limits are exceeded or symptoms are experienced.
Eye/Face	• Wear safety glasses.
Skin/Body	• Wear leather gloves when handling cylinders.
Environmental Exposure Controls	• Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Clear gas with no odor.
Color	Clear	Odor	Odorless
Odor Threshold	No data available		
General Properties			
Boiling Point	-253 C(-423.4 F)	Melting Point	No data available
Decomposition Temperature	No data available	pH	No data available
Specific Gravity/Relative Density	= 0.0696 @ 21.1 C(69.98 F) Water=1	Water Solubility	Slightly Soluble
Viscosity	No data available		
Volatility			
Vapor Pressure	> 760 mmHg (torr) as gas	Vapor Density	0.0052 Air=1 @ 21.1C (70F)
Evaporation Rate	No data available	Volatiles (Wt.)	100 %
Volatiles (Vol.)	100 %		
Flammability			
Flash Point	No data available	UEL	75 %
LEL	4 %	Autoignition	500 C(932 F)
Flammability (solid, gas)	No data available		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excess heat, sparks, open flame.

Incompatible materials

- Hydrogen may explosively react with bromine, chlorine, fluorine, nitrogen trifluoride, other strong oxidizers and with combinations of materials such as dioxane and nickel, magnesium and calcium carbonate and oxygen.

Hazardous decomposition products

- None

Section 11 - Toxicological Information

Information on toxicological effects

GHS Properties	Classification
Acute toxicity	**OSHA HCS 2012**•No data available
Aspiration Hazard	**OSHA HCS 2012**•No data available
Carcinogenicity	**OSHA HCS 2012**•No data available
Germ Cell Mutagenicity	**OSHA HCS 2012**•No data available
Skin corrosion/Irritation	**OSHA HCS 2012**•No data available
Skin sensitization	**OSHA HCS 2012**•No data available
STOT-RE	**OSHA HCS 2012**•No data available
STOT-SE	**OSHA HCS 2012**•No data available
Toxicity for Reproduction	**OSHA HCS 2012**•No data available
Respiratory sensitization	**OSHA HCS 2012**•No data available
Serious eye damage/Irritation	**OSHA HCS 2012**•No data available

Potential Health Effects

Inhalation

Acute (Immediate)
- If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)
- No data available

Skin

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- No data available

Eye

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- No data available

Ingestion

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- No data available

Section 12 - Ecological Information

Toxicity

- Non-mandatory section - information about this substance not complied for this reason.

Persistence and degradability

- Non-mandatory section - information about this substance not complied for this reason.

Bioaccumulative potential

- Non-mandatory section - information about this substance not complied for this reason.

Mobility in Soil

- Non-mandatory section - information about this substance not complied for this reason.

Other adverse effects

- Non-mandatory section - information about this substance not complied for this reason.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1049	Hydrogen, Compressed	2.1	NDA	NDA
TDG	UN1049	HYDROGEN, COMPRESSED	2.1	NDA	NDA

Special precautions for user
- None specified.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- No data available

Section 15 - Regulatory Information

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

SARA Hazard Classifications
- Acute, Fire, Pressure(Sudden Release of)

Inventory						
Component	**CAS**	**Australia AICS**	**Canada DSL**	**Canada NDSL**	**China**	**EU EINECS**
Hydrogen	1333-74-0	Yes	Yes	No	Yes	Yes

Inventory (Con't.)						
Component	**CAS**	**EU ELNICS**	**Japan ENCS**	**Korea KECL**	**New Zealand**	**Philippines PICCS**
Hydrogen	1333-74-0	No	No	Yes	Yes	Yes

Inventory (Con't.)		
Component	**CAS**	**TSCA**
Hydrogen	1333-74-0	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

•Hydrogen	1333-74-0	A, B1

Canada - WHMIS - Ingredient Disclosure List

•Hydrogen	1333-74-0	Not Listed

Environment

Canada - CEPA - Priority Substances List

•Hydrogen	1333-74-0	Not Listed

Europe

Other

EU - Hazardous Substances Restricted or Prohibited in Electrical Equipment (2011/65/EU) (RoHS)

•Hydrogen	1333-74-0	Not Listed

EU - Inventory of Cosmetic Ingredients Directive (INCI) (76/768/EEC) - Other Ingredients

•Hydrogen	1333-74-0	Not Listed

Japan

Environment

Japan - Pollutant Release Transfer Register (PRTR) - Class 1 Substances

•Hydrogen	1333-74-0	Not Listed

Japan - Pollutant Release Transfer Register (PRTR) - Class 2 Substances

•Hydrogen	1333-74-0	Not Listed

Inventory - Japan - Industrial Safety and Health Law Substances (ISHL)

•Hydrogen	1333-74-0	Not Listed

Other Agency Information

Other

CONEG - Model Toxics in Packaging Legislation

•Hydrogen	1333-74-0	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

•Hydrogen	1333-74-0	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

•Hydrogen	1333-74-0	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

•Hydrogen	1333-74-0	Not Listed

U.S. - CAA (Clean Air Act) - Class I Ozone Depletors

•Hydrogen	1333-74-0	Not Listed

U.S. - CAA (Clean Air Act) - Class II Ozone Depletors

•Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

•Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

•Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

•Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

•Hydrogen	1333-74-0	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

•Hydrogen	1333-74-0	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - Basis for Listing - Appendix VII

•Hydrogen	1333-74-0	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261

•Hydrogen	1333-74-0	Not Listed

U.S. - TSCA (Toxic Substances Control Act) - Section 12(b) - Export Notification

•Hydrogen	1333-74-0	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

•Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

•Hydrogen	1333-74-0	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
•Hydrogen	1333-74-0	Not Listed
U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)		
•Hydrogen	1333-74-0	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Female		
•Hydrogen	1333-74-0	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
•Hydrogen	1333-74-0	Not Listed

Section 16 - Other Information

Last Revision Date
- 05/June/2015

Preparation Date
- 05/June/2015

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