

SAFETY DATA SHEET

ANGUS CHEMICAL COMPANY

Product name : HYDROGUARD® I-15, Hydroxylamine

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ANGUS CHEMICAL COMPANY encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. PRODUCT AND COMPANY IDENTIFICATION

Product name HYDROGUARD® I-15, Hydroxylamine

Manufacturer or supplier's details

Company name of supplier ANGUS CHEMICAL COMPANY

Address 1500 E. LAKE COOK ROAD
Buffalo Grove IL 60089-6553

Customer Information Number +1-847-808-3711

E-mail address NAR_CC@ANGUS.COM

Emergency telephone number 800-424-9300

Recommended use of the chemical and restrictions on use

Recommended use Water treatment.
Corrosion inhibitor.
Oxygen scavenger.
For industrial use.
The ANGUS Chemical Company recommends that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact the Customer Information Group (see Section 1 of this data sheet).

2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label elements, including precautionary statements

This product is not hazardous per the Globally Harmonized System of Classification and Labelling (GHS).

Other hazards

None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a mixture.

Components

Chemical Name	CAS-No.	Concentration (% w/w)
Water	7732-18-5	<= 85.0 %
Isopropyl hydroxylamine	5080-22-8	>= 15.0 %
Acetone oxime	127-06-0	< 1.0 %

4. FIRST AID MEASURES

If inhaled	Move person to fresh air; if effects occur, consult a physician.
In case of skin contact	Wash off with plenty of water.
In case of eye contact	Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.
If swallowed	If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.
Most important symptoms and effects, both acute and delayed	Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.
Protection of first-aiders	If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Notes to physician	Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. No specific antidote.

5. FIREFIGHTING MEASURES

Suitable extinguishing media	Water fog or fine spray. Carbon dioxide fire extinguishers. Dry chemical fire extinguishers. Foam. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.
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Unsuitable extinguishing media	None known.
Specific hazards during firefighting	Product may produce flash fire, but will not continue to burn. If exposed to intense heat, water in the product may evaporate, leaving a residue. Residue can burn.
Hazardous combustion products	Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Carbon dioxide. Carbon monoxide. Nitrogen oxides.
Further information	Keep people away. Isolate fire and deny unnecessary entry. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Eliminate ignition sources.
Special protective equipment for firefighters	Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Isolate area. Keep unnecessary and unprotected personnel from entering the area. No smoking in area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to section 7, Handling, for additional precautionary measures.
Environmental precautions	Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up	Pump with explosion-proof equipment. If available, use foam to smother or suppress. Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Advice on safe handling	Containers, even those that have been emptied, can contain
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vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation.

No smoking, open flames or sources of ignition in handling and storage area.

Wash thoroughly after handling.

See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage

Minimize sources of ignition, such as static build-up, heat, spark or flame.

Product may become a solid at temperatures below -5°C (23°F)

Store in a cool, dry place.

Storage tanks should be blanketed with nitrogen.

Keep container tightly closed when not in use.

Do not store in:

Aluminum.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures

Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

Personal protective equipment

Respiratory protection

Under intended handling conditions, no respiratory protection should be needed.

Hand protection

Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Chlorinated polyethylene. Examples of acceptable glove barrier materials include: Butyl rubber. Nitrile/butadiene rubber ("nitrile" or "NBR"). Natural rubber ("latex"). Neoprene. Viton. Polyvinyl chloride ("PVC" or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Eye protection	Use safety glasses (with side shields).
Skin and body protection	Wear clean, body-covering clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Liquid.
Color	Colorless
Odor	Amine.
Odor Threshold	No test data available
pH	10.6 Method: Literature
Melting point/range	Not applicable
Freezing point	-5 °C (23 °F) Method: Literature
Boiling point/boiling range	>= 98 °C (>= 208 °F) Method: Literature
Flash point	45.6 °C (114.1 °F) Method: Setafash Closed Cup ASTM D3828 Test Type: closed cup Does not sustain combustion.
Evaporation rate	No test data available
Flammability (solid, gas)	No data available.
Upper explosion limit	No test data available
Lower explosion limit	No test data available
Vapor Pressure	<= 6.00 mmHg (20 °C) Method: Literature
	0.24 mmHg (20 °C) Active ingredient
Relative Vapor Density (air = 1)	No test data available
Relative density	1 (25 °C) Method: Literature
Water solubility	Miscible with water

Partition coefficient: n-octanol/water	No data available.
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Viscosity	
Viscosity, dynamic	1 mPa.s (20 °C) Method: Literature Approx.
Viscosity, kinematic	No test data available
Explosive properties	No data available.
Oxidizing properties	No data available.
Fire Point	>100 Does not sustain combustion. Method: ISO 2592
Molecular weight	75.11 g/mol Method: Literature

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity	No dangerous reaction known under conditions of normal use.
Chemical stability	Stable under recommended storage conditions. See Storage, Section 7. Unstable at elevated temperatures.
Possibility of hazardous reactions	Polymerization will not occur.
Conditions to avoid	Avoid temperatures above 40 °C Avoid temperatures below -5 °C Generation of gas during decomposition can cause pressure in closed systems. Active ingredient decomposes at elevated temperatures. Avoid direct sunlight or ultraviolet sources. Avoid contact with air (oxygen).
Incompatible materials	Avoid contact with oxidizing materials. Avoid contact with metals such as: Iron.

	Avoid contact with: Air. Avoid unintended contact with: Oxygen. Free radical sources. Avoid contact with absorbent materials such as: Clay-based absorbents.
Hazardous decomposition products	Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon dioxide. Carbon monoxide. Nitrogen oxides.

11. TOXICOLOGICAL INFORMATION

Toxicological information on this product or its components appear in this section when such data is available.

Acute toxicity

Product:

Acute oral toxicity	Remarks: Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Low toxicity if swallowed. LD50 (Rat): > 2,000 mg/kg Assessment: The substance or mixture has no acute oral toxicity
Acute inhalation toxicity	Remarks: Vapors are primarily water; single exposure is not likely to be hazardous. Remarks: The LC50 has not been determined.
Acute dermal toxicity	Remarks: Prolonged skin contact is unlikely to result in absorption of harmful amounts. LD50 (Rat, male and female): > 2,000 mg/kg Assessment: The substance or mixture has no acute dermal toxicity

Components:

Isopropyl hydroxylamine

Acute oral toxicity	LD50 (Rat, male and female): 2,189 mg/kg
Acute inhalation toxicity	Remarks: The LC50 has not been determined.
Acute dermal toxicity	LD50 (Rat, male and female): > 2,000 mg/kg Symptoms: No deaths occurred at this concentration. Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Product:

Remarks: Prolonged contact may cause slight skin irritation with local redness.

Components:

Isopropyl hydroxylamine

Result: No skin irritation

Remarks: Brief contact may cause slight skin irritation with local redness.

Serious eye damage/eye irritation

Product:

Remarks: May cause slight temporary eye irritation.
Corneal injury is unlikely.

Components:

Isopropyl hydroxylamine

Result: No eye irritation

Remarks: May cause moderate eye irritation.
May cause slight corneal injury.

Respiratory or skin sensitization

Product:

Remarks: For skin sensitization:
Did not cause allergic skin reactions when tested in guinea pigs.

Remarks: For respiratory sensitization:
No relevant information found.

Components:

Isopropyl hydroxylamine

Remarks: Did not demonstrate the potential for contact allergy in mice.

Remarks: For respiratory sensitization:
No relevant data found.

Carcinogenicity

Product:

The minor component acetone oxime has caused an increase in benign liver tumors in rats when given in the drinking water for 18 months at a toxic dose level

Components:

Isopropyl hydroxylamine

No relevant data found.

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Teratogenicity

Product

No relevant data found.

Components:

Isopropyl hydroxylamine

No relevant data found.

Mutagenicity

Product

Animal genetic toxicity studies were negative.
In vitro genetic toxicity studies were predominantly negative.

Components:

Isopropyl hydroxylamine

Animal genetic toxicity studies were negative.
In vitro genetic toxicity studies were predominantly negative.

Reproductive toxicity

Product:

No relevant data found.

Components:

Isopropyl hydroxylamine

No relevant data found.

STOT - single exposure

Product:

Assessment: Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Components:

Isopropyl hydroxylamine

Assessment: Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Repeated dose toxicity**Product:**

Remarks: No relevant data found.

Components:**Isopropyl hydroxylamine**

Remarks: Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

Aspiration toxicity**Product:**

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

Components:**Isopropyl hydroxylamine**

Based on physical properties, not likely to be an aspiration hazard.

12. ECOLOGICAL INFORMATION**Ecotoxicity****Components:****Isopropyl hydroxylamine**

Toxicity to fish

Remarks: Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

LC50 (Oncorhynchus mykiss (rainbow trout)): 465 mg/l
Exposure time: 96.0 h
Test Type: static testLC50 (Leuciscus idus (Golden orfe)): 510 mg/l
Exposure time: 96.0 h

Toxicity to daphnia and other aquatic invertebrates

EC50 (Daphnia magna (Water flea)): 201.00 mg/l
Exposure time: 48.0 h
Test Type: semi-static testEC50 (copepod Acartia tonsa): 1.40 mg/l
Exposure time: 48.0 h
Test Type: static test

Toxicity to algae

ErC50 (Skeletonema costatum): 32 mg/l
End point: Growth rate inhibition
Exposure time: 72 h
Test Type: static test

Toxicity to bacteria

EC50 (Bacteria): 130 mg/l

Exposure time: 16 h

Persistence and degradability**Components:****Isopropyl hydroxylamine**

Biodegradability

Result: Not readily biodegradable.

Remarks: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Biodegradation: 40 %

Exposure time: 28 d

Method: OECD Test Guideline 301D or Equivalent

Remarks: 10-day Window: Fail

Biodegradation: 0 %

Exposure time: 28 d

Method: OECD Test Guideline 301F or Equivalent

Remarks: 10-day Window: Fail

ThOD

2.560 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitiser: OH radicals

Rate constant: Degradation half life: 0.13 d

Method: Estimated.

Bioaccumulative potential**Product:**

Partition coefficient: n-octanol/water

Remarks: No data available.

Components:**Isopropyl hydroxylamine**

Partition coefficient: n-octanol/water

log Pow: -0.574

Method: Measured

Remarks: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Mobility in soil**Components:****Isopropyl hydroxylamine**

Distribution among environmental compartments

Koc: 11

Method: Measured

Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).

Other adverse effects

Product:

Ozone-Depletion Potential	Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
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Components:

Isopropyl hydroxylamine

Results of PBT and vPvB assessment	This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).
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Ozone-Depletion Potential	Remarks: no data available
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13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device. Landfill. ANGUS HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL.
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14. TRANSPORT INFORMATION

International Regulation

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations

49 CFR (DOT) – NON BULK

Not regulated as a dangerous good

49 CFR (DOT) - BULK

UN/ID/NA number	3082
Proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2-NITROPROPANE)
Class	9
Packing group	III
Labels	Class 9 - Miscellaneous Dangerous Goods
ERG Code	171
Marine pollutant	no

Reportable Quantity: 2-NITROPROPANE

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazards This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)
2-Nitropropane	79-46-9	10

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

SARA 302 No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
 This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).
 This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
 This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM I Intermediate or Final VOC's (40 CFR 60.489).

US State Regulations

Massachusetts Right To Know

Massachusetts Right to Know List of Chemicals and Hazard Classifications

Cas No.	Component
79-46-9	2-Nitropropane

Pennsylvania Right To Know

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Cas No.	Component
5080-22-8	Isopropyl hydroxylamine
79-46-9	2-Nitropropane

New Jersey Right To Know

The following chemicals are listed because of the additional requirements of New Jersey law:

Cas No.	Component
7732-18-5	Water
5080-22-8	Isopropyl hydroxylamine

California Prop. 65

WARNING! This product contains a chemical known to the State of California to cause cancer.

Cas No.	Component
79-46-9	2-Nitropropane

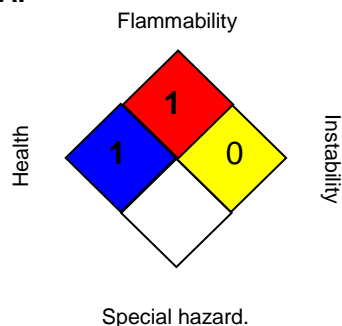
The components of this product are reported in the following inventories:

United States TSCA Inventory
 All Components OK

16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
 2 = Moderate, 3 = High
 4 = Extreme, * = Chronic

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US / EN

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

Full text of other abbreviations

(Q)SAR - (Quantitative) Structure Activity Relationship; ASTM - American Society for the Testing of Materials; bw - Body weight; DIN - Standard of the German Institute for Standardisation; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying

Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISO - International Organisation for Standardization; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative; DSL - Domestic Substances List (Canada); KECI - Korea Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); AICS - Australian Inventory of Chemical Substances; IECSC - Inventory of Existing Chemical Substances in China; ENCS - Existing and New Chemical Substances (Japan); ISHL - Industrial Safety and Health Law (Japan); PICCS - Philippines Inventory of Chemicals and Chemical Substances; NZIoC - New Zealand Inventory of Chemicals; TCSI - Taiwan Chemical Substance Inventory; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; DOT - Department of Transportation; EHS - Extremely Hazardous Substance; HMIS - Hazardous Materials Identification System; MSHA - Mine Safety and Health Administration; NFPA - National Fire Protection Association; RCRA - Resource Conservation and Recovery Act; RQ - Reportable Quantity; SARA - Superfund Amendments and Reauthorization Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; GLP - Good Laboratory Practice; ERG - Emergency Response Guide; NTP - National Toxicology Program; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods