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Section 1: Identification

1.1 Product identifier:

Aquolin® 161

Other identifiers: Water Dispersible Polyisocyanate
Hydrophilic aliphatic polyisocyanate
Hydrophilic hexamethylene diisocyanate oligomer
Hydrophilically modified, aliphatic polyisocyanate based on hexamethylene diisocyanate
Hydrophilically modified, aliphatic hexamethylene diisocyanate oligomer

1.2 Recommended use:

Identified uses: Component in manufacture of polyurethane coating materials or adhesives

Restrictions on use: Industrial uses only.

1.3 Supplier:

Wanhua Chemical (America) Co., Ltd.
3803 West Chester Pike, Suite 240
Newtown Square, PA 19073
Customer service telephone: 610-566-5297 Telephone in Canada: 613-796-1606
www.whchem.com

1.4 Emergency telephone number:

North America: Chemtrec 800-424-9300 (domestic)
+1-703-527-3887 (international, collect calls accepted)
Europe: +31 20 20 65132/65130 (08:30-17:30) +44 780 183 7343

Section 2: Hazard Identification

2.1 Classification:

Skin Sensitization Cat. 1; H317
Acute Toxicity Inhalation, Cat. 4; H332
Specific Target Organ Toxicity, Single Exposure, Inhalation, Cat. 3; H335

2.2 Label elements:

Warning.
May cause an allergic skin reaction.
Harmful if inhaled.
May cause respiratory irritation.

Prevention
Avoid breathing fume, mist, spray, vapors or dust.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves and protective clothing.
In case of inadequate ventilation wear respiratory protection.

Response
IF ON SKIN: Wash with polyglycol based skin cleanser, corn oil or plenty of water and soap.
If skin irritation or rash occurs: Get medical attention.
Take off contaminated clothing and wash it before reuse.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor if you feel unwell.

Storage
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Disposal
P501: Recycle and or dispose of contents and containers in accordance with local, regional, national and international regulations.

2.3 Other hazards:

Not available

Section 3: Composition/Information on Ingredients

Chemical Name	CAS No.	Wt.%	GHS Classification
Hydrophilic Hexamethylene diisocyanate oligomer (Hexane, 1,6-diisocyanato-, homopolymer, polyethylene glycol mono-Me ether-blocked)	160994-68-3	99.9 - 100	Skin Sens. 1; H317 Acute Tox. inhalation, 4; H332 STOT SE, inhalation, 3; H335
HDI (Hexamethylene diisocyanate)	822-06-0	< 0.1	Skin Irrit. 2; H315 Skin Sens. 1; H317 Eye Irrit. 2; H319 Acute Tox. 3; H331 Resp. Sens. 1; H334 STOT SE 3; H335

Section 4: First-Aid Measures

4.1 Description of first-aid measures:

Precautions: First aid providers should avoid direct contact with this chemical. Wear chemical protective gloves, if necessary. Take proper precautions to ensure your own safety before attempting rescue, (e.g. wear appropriate protective equipment).

Some jurisdictions have specific regulations for isocyanates. These regulations may include requirements for medical surveillance programs, including pre-employment and pre-placement examinations, periodic medical examinations, clinical tests, health education and record keeping. Obtain detailed information from the appropriate government agency in relevant jurisdictions.

Inhalation: Remove source of exposure or move person to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor. If breathing is difficult, trained personnel should administer emergency oxygen if advise to do so by the poison center or doctor. Get immediate medical attention.

Skin contact: Take off contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Blot or brush away excess product. Wash exposed skin with a polyglycol based skin cleanser, corn oil or plenty of water and mild, non-abrasive soap. If skin irritation occurs get medical attention. Wash contaminated clothing before reuse, or discard.

Eye contact: Gently blot or brush away excess product.
If product is a solid in the eye: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. Have victim look right and left, and then up and down. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding the eyelid(s) open. If irritation persists, obtain medical attention. DO NOT attempt to manually remove anything stuck to eye(s).

If product is a liquid: Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Ingestion: Call a Poison Centre or doctor if you feel unwell or are concerned. Rinse mouth.

4.2 Most important symptoms and effects, both acute and delayed:

Inhalation: Respiratory tract irritation, difficulty breathing. Exposures to high concentrations of aerosol or mist can cause chemical pneumonitis with severe wheezing, coughing and accumulation of fluid in the lungs.

Skin contact: Tingling, irritation or redness of the skin. Allergic dermatitis symptoms include redness, itching, rash and swelling.

Eye contact: May cause slight eye irritation, redness and swelling of the eyelids. Product may solidify in contact with moisture in the eye.

Ingestion: Irritation of the tissues of the mouth, throat and digestive tract. Other symptoms include headache, shortness of breath, nausea, vomiting, weakness, burning sensation in the mouth, abdominal pain and vomiting. Onset of symptoms may be delayed.

4.3 Indication of any immediate medical attention and special treatment needed:

None known

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Section 5: Fire-fighting Measures

5.1 Extinguishing media:

Carbon dioxide, dry chemical powder, dry sand, alcohol-resistant foam. Alcohol resistant foams are preferred for large fires. Use water spray to cool fire-exposed containers.

Unsuitable extinguishing media: Exercise caution when using water since the reaction between water and hot HDI-based isocyanates can be vigorous.

5.2 Special hazards arising from the product:

During a fire, products of combustion may include irritating/toxic hydrogen cyanide, isocyanate vapor, carbon monoxide, carbon dioxide, nitrogen oxides, dense smoke and irritating or toxic fumes.
Reacts vigorously with water at high temperatures. Closed containers may rupture violently when heated or contaminated with water.

5.3 Special protective equipment and precautions for firefighters:

As for any fire, evacuate the area and fight the fire from a safe distance. Firefighters must wear full protective equipment including self-contained breathing apparatus with chemical protection clothing when firefighters are exposed to decomposition products from this material.

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures:

Wear adequate personal protective equipment, including an appropriate respirator as indicated in Section 8.
Isolate spill area, preventing entry by unauthorized persons.
Ventilate area of spill.
Do not touch or walk through spilled material.
Stop the leak if you can do it without risk.
When cleaning with Decontamination solution, harmful gases may evolve; ensure adequate ventilation or wear a respirator.

6.2 Environmental precautions:

Avoid releases to the environment and prevent material from entering domestic sewers, natural waterways, or storm water management systems.

6.3 Methods and material for containment and cleaning up:

Immediately shut off the leak if it is safe to do so. Contain the spill with earth, sand, sawdust or suitable absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
Shovel into open-top drums or plastic bags for further decontamination, if necessary. Do not seal drums or containers.
Neutralize small spills with Decontamination solution.
Never return spills in original containers for re-use.

Wash area with one of the following Decontamination solutions:
Formulation A: Liquid surfactant 0.2% to 2%; Sodium carbonate 5% to 10%; Water to make up to 100%.
Formulation B: Liquid surfactant 0.2% to 2%; Concentrated ammonia 3% to 8%; Water to make up to 100%.
Formulation C: Ethanol, isopropanol or butanol 50%; Concentrated ammonia 5%; Water to make up to 100%.

Formulation B reacts faster than Formulation A.
Formulation C is especially suitable for cleaning of equipment from unreacted isocyanate and neutralizing under freezing conditions.

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Section 7: Handling and Storage

7.1 Precautions for safe handling:

Before handling, it is important that engineering controls are operating; protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards and its safe use.
Persons allergic to isocyanates, and particularly those suffering from asthma or other respiratory conditions, should not work with isocyanates.
Keep container tightly closed.
Do not breathe vapors, fumes, spray mist or dusts from this material.
Wear respiratory protection when handling heated product or if spraying.
Use only in a well-ventilated area.
Wear protective gloves, protective clothing and eye/face protection.
Contaminated work clothing must not be allowed out of the workplace.
Do not reseal containers if contamination of containers is suspected.
Keep containers tightly closed when not in use.
Assume that empty containers contain residues which are hazardous.
Keep away from food and drink.
Wash hands and exposed skin before eating, drinking or smoking and at the end of the workshift.

Refer to directives and regulations for instructions on the safe handling, employee training, monitoring and enforcement procedures for isocyanates [e.g. US Department of Labor, OSHA Directive # CPL 03-00-017 National Emphasis Program – Occupational Exposure to Isocyanates. Ontario Designated Substances Regulation-Isocyanates].

7.2 Conditions for safe storage:

Store in a dry, well-ventilated area, out of direct sunlight and away from heat, sources of ignition and incompatible materials.
Keep containers tightly closed. Protect from moisture/humidity.
Recommended storage temperature: 5 – 30°C (41 – 86°F).
Have appropriate fire extinguishers and spill clean-up equipment in or near storage area.
Store in a place accessible by authorized persons only.

Section 8: Exposure Controls / Personal Protection

8.1 Control parameters:

Occupational Exposure Limits: Consult local authorities for acceptable exposure limits.

Ingredient	ACGIH® TLV®	U.S. OSHA PEL	Ontario (Canada) TWA
Hydrophilic Hexamethylene diisocyanate oligomer	Not established	Not established	Not established
HDI (Hexamethylene diisocyanate)	0.005 ppm	Not available	0.005 ppm 0.02 ppm Ceiling Designated Substance
Some jurisdictions have specific regulations for isocyanates. These regulations may include requirements for medical surveillance programs, including pre-employment and pre-placement examinations, periodic medical examinations, clinical tests, health education and record keeping. Obtain detailed information from the appropriate government agency in the relevant jurisdiction.			

8.2 Engineering controls:

Handle product in closed system or area provided with appropriate exhaust ventilation.
Handle in accordance with good industrial hygiene and safety practice. Ensure regular cleaning of equipment, work area and clothing. Curing ovens must be properly ventilated to prevent emissions of isocyanate monomer into the workplace.
Monitor the workplace air for the presence of isocyanate vapor and fume.

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have equipment available for use in emergencies such as spills or fire.

8.3 Individual protection measures:

Eye/Face protection: Wear safety glasses or chemical safety goggles. Wear a face-shield or full-face respirator when needed to prevent exposure to liquid splashes, mist or fume.

Skin protection: Wear chemical protective gloves, suit, and boots to prevent skin exposure. General purpose butyl rubber gloves may be used to minimize dermal exposures to this material and for cleaning and maintenance operations.
Resistance of specific materials can vary from product to product; evaluate resistance under conditions of use and maintain clothing carefully. Contact safety supplier for specifications.

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8.3 Individual protection measures (continued):

Respiratory protection: Approved respiratory protective equipment (RPE) is required. An approved respirator for isocyanates must be available in case of accidental releases.

A respiratory protection program that meets the regulatory requirement, such as OSHA's 29 CFR 1910.134, ANSI Z88.2 or Canadian Standards Association (CSA) Standard Z94.4-2002, must be followed whenever workplace conditions warrant a respirator's use.

NIOSH Recommendations for HDI concentrations in air:
NIOSH TWA: 0.005 ppm TWA / 0.035 mg/m^3
Up to 0.05 ppm:
(APF = 10) Any supplied-air respirator*
Up to 0.125 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 0.25 ppm:
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister or any appropriate escape-type, self-contained breathing apparatus.

Other protection: Safety shower, hand-wash station and eye-wash fountain readily available in the immediate work area.

Follow the applicable code for medical surveillance program indicated for isocyanates.

Environmental exposure controls: Store finished products in closed containers (e.g. bulk tanks, drums, cans).
All waste products are assumed to be collected and returned for re-processing or incineration.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties:	
Appearance:	Liquid. Colorless to pale yellow.
Odor:	Faint odor
Odor threshold:	Not available
pH:	Not available
Melting point/freezing point:	-24°C (-11.2°F)
Initial boiling point and boiling range:	>300°C (572°F)
Flash point:	226°C (438.8°F)
Evaporation rate:	Not available
Flammability:	Not applicable (liquid). Not a flammable solid or gas.
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	18 hPa at 20°C (68°F) (approximate)
Vapor density:	Not available
Relative density:	1.16 (water=1)
Solubility (ies):	Not available
Partition coefficient (n-octanol/water):	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	430°C (806°F) (approximate)
Viscosity:	Dynamic: 4000 mPa s @ 25°C (approximate)

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Section 10: Stability and Reactivity

10.1 Reactivity:

Reacts with water, Amines, Strong bases, Alcohols, Heavy metals, Copper alloys.

10.2 Chemical stability:

Stable at normal ambient and anticipated storage and handling conditions.

10.3 Possibility of hazardous reactions:

Contact with water or humidity may cause a slow reaction, forming carbon dioxide which could rupture closed containers. HDI-based isocyanurates may undergo uncontrolled exothermic polymerization upon contact with incompatible materials, especially strong bases, such as triethylamine and sodium hydroxide, trialkyl phosphines, potassium acetate, many metal compounds soluble in organic media or at temperatures over 204°C. The resulting pressure build-up may rupture closed containers.

10.4 Conditions to avoid:

Avoid moisture, heat and freezing temperatures.

10.5 Incompatible materials:

Strong bases, Amines, Alcohols, Acids - May react violently with generation of heat.

Metal compounds (e.g. organotin catalysts) - May polymerize with the generation of heat and pressure.

Amides, phenols, mercaptans, urethanes, ureas and surface active compounds (surfactants, non-ionic detergents) - May react vigorously or violently with the generation of heat.

Water – Hydrolyses in water. Reacts slowly, forming carbon dioxide which could rupture closed containers.

10.6 Hazardous decomposition products:

By thermal decomposition and combustion, product may generate nitrogen oxide, hydrogen cyanide and isocyanate vapors.

Section 11: Toxicological Information

11.1 Information on toxicological effects:

Likely routes of exposure:

Inhalation of aerosols or vapor. Skin contact. Eye contact.

Acute health effects:

Inhalation: Airborne exposures are unlikely to occur unless product is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Short-term inhalation exposure to Hexamethylene diisocyanate based (HDI-based) isocyanurates can cause respiratory and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing with chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed several hours.
High aerosol concentrations could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary edema), which could prove fatal. Symptoms of pulmonary edema may not appear until several hours after exposure and are aggravated by physical exertion.

Skin: HDI-based isocyanurates can cause irritation. Isocyanates, in general, can cause skin discoloration (staining) and hardening of the skin after repeated exposures. Skin sensitization, resulting in dermatitis, may occur in some individuals. Cured material may be difficult to remove from the skin.

Ingestion: Ingestion is not expected with normal, occupational use of this product. Animal studies indicate that ingested HDI-based isocyanurates have low oral toxicity. Swallowing may result in irritation of the mouth, throat and digestive tract.

11.2 Acute Toxicity Data

Ingredient	LD_{50} Oral	LD_{50} Dermal	LC_{50} Inhalation (4-hour)
Data for a similar HDI oligomer: Hexamethylene diisocyanate oligomer	>5000 mg/kg (rat)	>5000 mg/kg (rabbit)	4600 mg/m^3 (rat) Data converted from 1-hour exposure (NLM)
HDI (Hexamethylene diisocyanate)	745 mg/kg (rat)	Not available	124 mg/m^3 (rat)

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11.2 Acute Toxicity Data

Skin corrosion / irritation

Application of 100 mg hexamethylene diisocyanate based isocyanurates caused moderate skin irritation in rabbits in a standard Draize test.

Serious eye damage / irritation

Slight eye irritation (rabbit); OECD Test Guideline 405. Application of 500 mg hexamethylene diisocyanate based isocyanurates caused moderate eye irritation in rabbits in a standard Draize test.

STOT (Specific Target Organ Toxicity) – Single exposure

Data for a similar HDI oligomer:
NOAEC for acute inhalation toxicity is 3.3 mg/m^3, 6-hour exposure.
May cause respiratory irritation based on evidence from animal tests.

Aspiration hazard

Data not available.

STOT (Specific Target Organ Toxicity) – Repeated exposure

Evidence for a similar substance: when inhaled and have caused concentration-related effects. In a 13-week study, increased wet lung weights, and inflammatory changes in the lungs were seen in rats at 25 mg/m^3 and higher.
3-week inhalation NOAEL: 3.7 – 4.3 mg/m^3 (rat)
90-day inhalation NOAEL: 3.3 – 3.4 mg/m^3 (rat)

Sensitization - respiratory and/or skin

May cause an allergic skin reaction. HDI-based compounds showed skin sensitisation potential in a Local Lymph Node Assay. HDI-based isocyanurates caused slight to moderate skin sensitization in guinea pigs.

Carcinogenicity

Data for a similar HDI oligomer:
Not classifiable as a human carcinogen. Did not show carcinogenic or mutagenic effects in animal experiments.
This material does not contain any component that is considered a human carcinogen by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists, OSHA (Occupational Safety and Health Administration) or NTP (National Toxicology Program).

Reproductive toxicity

Data not available.

Germ cell mutagenicity

Data for a similar HDI oligomer:
In vitro: Negative in Ames test (*Salmonella typhimurium* with and without metabolic activation)

Interactive effects

Data not available

Section 12: Ecological Information

12.1 Toxicity:

Data for a similar HDI oligomer:
Toxicity to fish: LC_{50} > 100 mg/L *Brachydanio rerio* (96-hour)
Toxicity to crustacea: EC_{50} > 100 mg/L *Daphnia magna* (48-hour)
Toxicity to aquatic plants: EC_{50}> 1000 mg/L *Scenedesmus sp.* (72-hour)
Toxicity to microorganisms: EC_{50}> 1000 mg/L Activated sludge microorganisms (3-hour)

12.2 Persistence and degradability:

Not readily biodegradable (1%, 28 days).

12.3 Bioaccumulative potential:

Hydrolyses in presence of water. Bioaccumulation is unlikely.

12.4 Mobility in soil:

Hydrolyses to form water-insoluble compounds.

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Section 13: Disposal Considerations

13.1 Disposal methods:

Do NOT discard into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.
Dispose of waste in accordance with relevant national, regional and local environmental control provisions.

Section 14: Transport Information

14.1 U.S. Hazardous Materials Regulation (DOT 49CFR):

Not regulated

14.2 Shipping name:

Not applicable

14.3 Transport hazard class(es):

Not applicable

14.4 Packing group:

Not applicable

14.5 Environmental hazards:

Not applicable

14.6 Special precautions for user:

Contains isocyanates. Keep away from moisture and water.
Avoid heat >35°C.

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

Not applicable

Section 15: Regulatory Information

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

USA

TSCA Status:

Substances are listed on the TSCA inventory (active).

SARA Title III :

Sec. 313 Hexamethylene-1,6-diisocyanate (Diisocyanates), 1% de minimis
CERCLA RQ Hexamethylene-1,6-diisocyanate 100 lbs (45.4 kg)

Canada

NSNR Status:

Hexane, 1,6-diisocyanato-, homopolymer, polyethylene glycol mono-Me ether-blocked is listed on the on the NDSL.

International Inventories:

Australia:	Not all substances are listed on the Inventory of Chemical Substances (AICS).
China:	Not all substances are present on the Chemical Inventory (IECSC).
European Union:	EC list no. 679-501-7 (HDI polyisocyanate). Component monomer substance listed on EINECS: 212-485-8
Japan:	Not all substances are present on the inventory Existing and New Chemical Substances (ENCS).
Korea:	Substance present on the inventory - Existing and Evaluated Chemical Substances. 2015-3-6244
Mexico:	Not all substances are present on the inventory (INSQ).
New Zealand:	Substance present on the Chemical Inventory (NZIoC).
Philippines:	Not all substances are present on the Inventory of Chemicals and Chemical Substances (PICCS).
Taiwan:	Substance present on the inventory (TCSI).
Turkey:	Not available
Vietnam:	Substance present on the inventory (NCI) 28627.

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Section 16: Other Information

Revision date:

March 20, 2019

Revision summary:

Revisions since previous version February 4, 2019:
Sections 2.1, 2.2 – revised classification and labeling
Section 3 – revised concentration of HDI

References and sources for data:

CCOHS, Cheminfo
ECHA – European Chemicals Agency
HSDB® Hazardous Substances Data Bank, US National Library of Medicine
NIOSH, Pocket Guide to Chemical Hazards.
RTECS, Registry of Toxic Effects of Chemical Substances

Legend to abbreviations:

ACGIH® – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
ERPG – Emergency Response Planning Guidelines
GHS- Globally Harmonized System for Classification and Labeling.
IDLH – Immediately Dangerous to Life or Health
LD_{50}- Median lethal dose; the dose causing 50 % lethality
NIOSH-National Institute for Occupational Safety and Health
OEL– Occupational exposure limit
OSHA - Occupational Safety and Health Administration
PEL – Permissible Exposure Limit
TWA – Time weighted average
TLV® - Threshold Limit Value

Supplier Note: This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.