1. IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1 Product identifier

Substance name : Acrylonitrile

Synonyms : Acrylonitrile; Vinyl cyanide; 2-Propenitrile; 2-Propenenitrile

EC Number : 203-466-5

CAS Number : 107-13-1

Index Number from Annex VI (Part 3) of Regulation (EC) No 1272/2008 : 608-003-00-4

REACH Registration Number : 01-2119474195-34-0006

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

1.2.1 Identified uses

Production of acrylic and modacrylic textile fibers, production of plastics and nitrile rubbers, laboratory chemical, intermediate.

1.2.2 Uses advised against

Not for use in any process other than an intermediate or monomer. Not for direct use by the general public. Use resulting in wide and dispersive release is not advised.

1.3 Details of the supplier of the safety data sheet

Name :	Envigo Research Limited
Address :	Shardlow Business Park, London Road, Shardlow, Derbyshire, DE72 2GD United Kingdom
Telephone number :	+44 (0)1332 792896
E-mail :	ORR-UK@envigo.com

Non-Community manufacturer :

Name :	Tongsuh Petrochemical Corp., ltd.
Address :	108-70, Sapyeong-ro, Nam-gu, Ulsan, 44785 Republic of Korea
Telephone number :	+82-2-3215-0710
Telefax number :	+82-2-3215-0770
E-mail address :	tspcmail@tspc.co.kr

1.4 Emergency telephone number

EU-wide emergency number : 112

See section 16.6 for the list of telephone number of poison centers in the European Economic Area.

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Flammable Liquid Category 2
Acute Toxicity (Oral) Category 3
Acute Toxicity (Dermal) Category 3
Acute Toxicity (Inhalation) Category 3
Skin Corrosion/Irritation Category 2
Serious eye damage/Irritation Category 1
Skin Sensitization Category 1
Carcinogenicity Category 1B
Specific Target Organ Toxicity Single Exposure Category 3(Respiratory tract irritation), H335
Aquatic Toxicity Chronic Category 2

2.2 Label elements

2.2.1 Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard Pictograms :

Signal word :

Danger

Hazard statements :

H225 Highly flammable liquid and vapor.
H301 Toxic if swallowed.
H311 Toxic in contact with skin
H315 Causes skin irritation.

H317 May cause allergic skin reaction.
H318 Causes serious eye damage.
H331 Toxic if inhaled.
H335 May cause respiratory irritation.
H350 May cause cancer.
H411 Toxic to aquatic life with long lasting effects.

Precautionary Phrases :

1) Prevention

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P242 Use only non-sparking tools. Flammable liquids (chapter 2.6) 1, 2, 3
P243 Take precautionary measures against static discharge.

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281 Use personal protective equipment as required.

2) Response

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 If exposed or concerned: Get medical advice/attention.
P310 Immediately call a POISON CENTER or doctor/physician.
P311 Call a POISON CENTER or doctor/physician.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P321 Specific treatment
P322 Specific measures
P330 Rinse mouth.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P361 Remove/Take off immediately all contaminated clothing.
P362 Take off contaminated clothing and wash before reuse.
P363 Wash contaminated clothing before reuse.
P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section MSDS 5).
P391 Collect spillage.

3) Storage
- P403+P233 Store in a well-ventilated place. Keep container tightly closed.
- P403+P235 Store in a well-ventilated place. Keep cool.
- P405 Store locked up.

4) Disposal
- P501 Dispose of contents/container in accordance with local and national regulations.

For full text of P precautionary statements see section 16.

2.3 Other hazards

All known hazards are described by this Safety Data Sheet.

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substance

Substance name : Acrylonitrile

Index Number from Annex VI (Part 3) of Regulation (EC) No 1272/2008 : 608-003-00-4

Classification and Labelling Inventory Number : Not applicable

Authorisation Number : Not applicable

EC Number : 203-466-5

CAS Number : 107-13-1

REACH Registration Number : 01-2119474195-34-####

Purity : ≥ 99.4 %

Inhibitor : 4-methoxyphenol (MEHQ) [EC Number 205-769-8; CAS Number 150-76-5]

Impurities or other constituents contributing to substance classification : Not applicable

4. FIRST AID MEASURES

First responders

Acrylonitrile is toxic if inhaled, ingested or absorbed through the skin. Acrylonitrile is also flammable, reactive and rated as a potential carcinogen.
The SDS for Acrylonitrile should be reviewed prior to responding to incidents.
Do not enter “hot zone” unless HAZMAT Trained and properly protected with positive pressure Self-contained Breathing Apparatus with Level A or B HAZMAT Chemical-protective equipment.
Hot and cold zones should be defined with Acrylonitrile dragger tubes or another approved detection device.
Acrylonitrile odour does not provide an adequate warning of exposure to vapour and olfactory fatigue develops rapidly.
Vapour is heavier than air and may accumulate in low lying areas.
Remove patient from contaminated area as quickly as possible. Responders should be in the proper PPE for treatment.
Decontamination of patient is essential by rinsing exposed areas, skin and hair, with a large amount of fresh water for at least 15 minutes prior to first aid or medical treatment. Avoid exposure of eyes, mouth and uncontaminated skin. Contact with even dilute aqueous solutions of Acrylonitrile (200 to 400 ppm) can cause skin effects. Double bag all clothes and leather articles and dispose as contaminated hazardous chemical waste. Contaminated clothing is a fire hazard.
First responders should call for urgent medical assistance.

First Aid

First aid should only be given once decontamination is complete to prevent re-exposure of patient and exposure of first aid responders.

First aid should be given by trained personnel until trained medical personnel arrive. Check medical staff are alerted and en route. All suspected cases of exposure to Acrylonitrile must be assessed by medical personnel prior to release back to work.

Acrylonitrile is metabolised to release Cyanide. Symptoms of Cyanide toxicity can take several hours to develop following exposure to Acrylonitrile. Symptoms may persist for up to thirty six hours after exposure.
Cyanide toxicity typically affects the Central Nervous System causing a decreased level of consciousness (weakness, dizziness, drowsiness, confusion or incoherence, headaches or hallucinations, loss of consciousness).

Acrylonitrile exposure can induce cardiovascular effects which may occur as irregular heart beat (palpitations) or low blood pressure. Establish IV access as soon as possible under medical supervision. Difficulty increases as blood pressure decreases and IV access is a critical requirement for more aggressive antidote regime.

Give mildly symptomatic patients oxygen to combat any effects on metabolic processes.

4.1 Description of first aid measures

Eye contact
Follow decontamination process using copious amounts of fresh water. If eye contact is known or suspected get medical attention immediately. Irritation and corneal damage are typical. If symptomatic of cyanide exposure treat as described under inhalation.

Skin contact
Follow decontamination process using copious amounts of fresh water. Skin exposure could result in absorption and systemic cyanide poisoning. Acrylonitrile can cause burns forming vesicles resembling secondary thermal burns. Appearance may be delayed. If patient becomes symptomatic of cyanide exposure, treat as described under inhalation and get immediate medical attention.

Inhalation
Once decontaminated, place exposed person in fresh air, well away from exposure source. If patient is breathing, administer oxygen as quickly as possible and in parallel with decontamination. Patient should be monitored for signs of Cyanosis such as blue fingernails or toenails, blue lips, bloodshot eyes, shortness of breath or feelings of anxiety. If consciousness deteriorates (dizziness, becomes drowsy, shows signs of confusion, incoherent, headache, irritable) seek medical assistance as soon as possible. Symptoms can develop over a number of hours. Oxygen administration is the primary requirement if symptoms of toxicity become evident, followed by antidote treatment if needed. Keep the affected person warm and at rest whilst medical attention arrives. If not breathing, ensure clear airway and institute cardiopulmonary resuscitation (CPR). Do not perform mouth to mouth resuscitation. Use mouth to mask ventilation with one way valve to exhaust victim's exhaled air away from rescuer. Use of an Ambu bag or pressure demand valve with face mask is acceptable. If patient still exhibits symptoms consider using IV antidote under medical supervision.

Ingestion
Get immediate medical attention. Rinse mouth and spit out copious amounts of fresh water. Avoid further ingestion of even dilute solutions. Do not wait for symptoms to develop. Do not induce vomiting. If conscious give activated charcoal slurry. If unconscious, begin resuscitation. If not breathing, ensure clear airway and institute cardiopulmonary resuscitation (CPR). Do not perform mouth to mouth resuscitation. Use mouth to mask ventilation with one way valve to exhaust victim's exhaled air away from rescuer. If breathing is difficult, ensure clear airway and give oxygen.

See Section 11 for more detailed information on health effects.

4.2 Most important symptoms and effects, both acute and delayed

Causes severe eye irritation. Causes skin irritation. Symptoms and signs of acute acrylonitrile intoxication include excitation, agitation, lacrimation followed by a tranquil phase follows and cholinergic symptoms, such as salivation, lacrimation, urination and defecation occur.
Next there is a convulsive phase. The terminal stage preceding death is a paralytic phase. Early signs of salivation, lacrimation, miosis, diarrhoea, polyuria and peripheral vasodilation peak within 60 minutes of dosing. Other signs of toxicity include flushing of the face, ears and extremities. The early phase is followed by a delayed phase (>4hours) which includes central nervous system effects such as respiratory depression, convulsions and death. Signs of neurotoxicity are noted to be dose-dependent, regardless of the route of administration.

4.3 Indication of any immediate medical attention and special treatment needed

Medical Treatment on site

Check that decontamination of patient is complete before treating.

Conscious patients;

If patient is conscious, lucid and able to communicate, then significant poisoning may not have occurred. Mildly symptomatic patients who remain alert may be successfully managed by First Aid measures, oxygen and supportive care. However blood cyanide concentration peaks 1 to 2 hours post exposure. Severity of symptoms may progress for hours after exposure or onset of symptoms. Onset of symptoms is dependent upon exposure concentration and duration of exposure. The onset of symptoms is observed sooner where levels of exposure are highest. Symptoms can be latent for up to 6 hours after low level exposure. Where exposure is suspected, a 12 hour observation period is recommended for onset of symptoms. An oximeter can be used by appropriately trained staff to monitor blood gases until trained medical help arrives. Exposed personnel should be transferred to the hospital and monitored for continuing symptoms.

Unconscious patients:

After decontamination follow the standard rules of resuscitation (ABC); clear Airway, check Breathing and Circulation. If breathing, administer oxygen. Where patient is not breathing, begin CPR following First Aid guidance for Inhalation. DO NOT ATTEMPT DIRECT MOUTH TO MOUTH RESUSCITATION. For all unconscious patients, establish IV access as soon as possible for any available IV Cyanide antidote treatment on site. Arrange transport to hospital for Emergency Medical Treatment, for potential full antidotes regime and intensive medical care. Send details of antidotes used with patient.

In remote locations or at sea where there is a risk of exposure to Acrylonitrile, access to IV antidote and medical personnel or trained individuals able to administer IV antidotes is essential. AN oral antidote is available but is only suitable for treating conscious patients and is not internationally recommended.

Eye Contact Any facial exposure to Acrylonitrile should be regarded as serious as it causes burns, is an eye irritant, is a sensitizer and readily reacts with proteins. Eye exposure may result in corneal damage and should be referred to an ophthalmologist. It can also be absorbed and metabolised to release cyanide, requiring treatment with antidote.

Skin contact Exposure of skin to liquid or concentrated vapour can cause burns. These should be treated as thermal burns and may develop over time. Monitor for systemic toxicity as skin adsorption can occur followed by metabolism to cyanide, requiring treatment with antidote.

Inhalation Acrylonitrile is a respiratory irritant and concentrated vapours may corrode or damage respiratory tissue. This may impede breathing creating chest discomfort, wheezing, coughing or tearing. Additionally Acrylonitrile vapour is rapidly absorbed via respiratory tissue. Monitor for systemic toxicity, as metabolism to cyanide may be rapid requiring treatment with IV antidote regime. Shortness of breath, “air hunger”, gasping respiration or feelings of suffocation are symptoms of exposure. Maintain First Aid treatment with oxygen, until IV antidotes can be administered. Where patient is not breathing begin CPR following first aid guidance. It is essential to avoid mouth to mouth resuscitation.

Ingestion Acrylonitrile will cause gastrointestinal tissue burns as well as being potentially fatal after ingestion. If a patient is conscious, wash mouth with plenty of water and spit out. Give charcoal slurry to decrease intestinal adsorption. Monitor for progression of symptoms of cyanosis. If unconscious, do not give anything by mouth. Immediately establish IV antidote treatment and arrange for transfer to hospital. Where patient is not breathing begin CPR following first aid

guidance. It is essential to avoid mouth to mouth resuscitation.

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

5.5.1 Suitable extinguishing media

Use water spray (fog), foam, dry chemical or carbon dioxide. AFFF foam is most effective while protein foam may be ineffective.

5.1.2 Unsuitable extinguishing media

Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards :

Highly flammable liquid and vapor. May explode when heated.
Explosive in the presence of open flames, sparks and static discharge. Vapors may cause flash fire. Vapors may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Collect contaminated fire-fighting water separately. It must not enter the sewage stream.

Runoff to sewer may create fire or explosion hazard. Excessive heat above 500°F (260°C) may trigger exothermic reaction. May re-ignite itself after fire is extinguished.

Combustion Products :
Thermal decomposition products may include oxides of carbon (carbon monoxide, carbon dioxide), nitrogen oxides (NO, NO2) and hydrogen cyanide. Evolves toxic fumes when heated to the decomposition state. When heated to decomposition it emits acrid smoke and irritating fumes.

5.3 Advice for fire fighters

Firefighters should wear Personal Protective Equipment which includes an approved positive pressure self-contained breathing apparatus (SCBA) and full turnout gear. Wear butyl rubber boots and full chemical protective suit if exposures are likely exceed the Short Term Exposure Limit or liquid splash potential exists. Firefighters should work in two man teams. In case of fire, use water spray (fog), foam, dry chemical or carbon dioxide. AFFF foam is most effective while protein foam may be ineffective. Do not use water jet. Cool vessels with flooding quantities of water until well after the fire is out. May re-ignite itself after the fire is extinguished. Apply water from a safe distance to a cool container and protect surrounding area.
DO NOT FIGHT FIRE WHEN IT REACHES MATERIAL. Withdraw from the fire area and let it burn. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate surrounding area. Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (See Section 8 “exposure Controls/Personal Protection). Follow all fire fighting procedures (See Section 5 “fire-fighting Measures”. Do not enter scene without proper Personal Protective Equipment. Contain and absorb using earth, sand or other inert material. Dike large spills and use non-sparking or explosion proof means to transfer material to an appropriate container for disposal.

Wear splash goggles, full suit, vapour respirator or self-contained breathing apparatus (SCBA), protective chemical boots, gloves (**Butyl Rubber is suitable; Nitrile is not suitable**). For large spills,

suggested protective clothing might not be adequate. Consult a specialist in this situation.

6.2 Environmental precautions

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

6.3 Methods and material for containment and cleaning up

If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use non-sparking or explosion proof means to transfer material to a sealed, appropriate container for hazardous material disposal. For large spills dike spilled material or otherwise contain material to ensure that runoff does not reach a waterway. Place spilled material in an appropriate container for hazardous material disposal. Avoid contact of spilled material with soil and prevent runoff entering surface waterways. See Section 13 for Waste Disposal information.

6.4 Reference to other sections

Refer to Section 8 for personal protective equipment, Section 13 for disposal information, and Section 15 for Release Reporting information, if applicable.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Use suitable protective equipment (See Section 8 “Exposure Controls/ Personal Protection). Avoid breathing vapors of this product. Do not ingest. Do not get in eyes, on skin or on clothing. Use only with adequate ventilation. Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks, and flame. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. To prevent leaks, pressure test lines before the introduction of acrylonitrile. Use explosion proof electrical (ventilating, lightening and material handling) equipment. Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities

Store in segregated and approved area. Store in a cool, well-ventilated area away from incompatible materials and ignition sources. Suitable storage materials are mild steel and stainless steel. Do not store in copper and its alloys. Keep containers tightly closed and sealed until ready to use. This product must be kept in a secure storage area so that only trained authorized personnel have access. Inhibit with p-Methoxyphenol (MEHQ). To maintain inhibitor activity, oxygen must not be eliminated from the atmosphere above the product. If the explosion risk posed by storing under air is unacceptable, use oxygen depleted air (5% oxygen minimum, no greater than 8%). Check inhibitor level periodically. See Section 10: Stability and Reactivity.
Empty containers may contain toxic, flammable and explosive residue or vapors. Do not cut, grind, drill, weld or reuse containers unless adequate precautions are taken against these hazards.

Packaging Materials : Use original container.

7.3 Specific end uses(s)

Industrial uses :

The use of acrylonitrile in industrial applications is performed outdoors or indoors in a closed or

partially closed system. In the case of the partially closed system, local exhaust ventilation is used. Uses identified include the manufacture of acrylonitrile, use as a monomer in the production of acrylic and modacrylic textile fibres, acrylonitrile-butadiene-styrene (ABS) and styrene- acrylonitrile (SAN) plastics, production of nitrile rubbers, and intermediate for the manufacture of bulk chemicals, materials and resins. Workers involved in the production, handling, sampling and transfer of materials are well-trained in these procedures. Dermal exposure should be controlled by the use of appropriate PPE (gloves and clothing with long sleeves and long legs and faceshield) and good industrial hygiene and inhalation exposure should be controlled by the use of appropriate respiratory protection in order to minimise exposure. For operations with potential exposure to workers, use of respiratory protection or local exhaust ventilation (LEV) will be required to ensure that risks to workers are adequately controlled with acceptable margins of safety.

Professional uses :

Acrylonitrile is used as a laboratory reagent. Workers are well-trained in these procedures and both local exhaust ventilation and good work practices are employed. Dermal exposure should be controlled by the use of appropriate PPE (gloves and clothing with long sleeves and long legs and face shield) and good industrial hygiene and inhalation exposure should be controlled by the use of appropriate respiratory protection in order to minimise exposure.

Refer to attached exposure scenario for requirements for specific uses and processes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational exposure limits

Country	Exposure Limit	Legal Basis
ACGIH	Limit value – 8h TWA 2 ppm (4.3 mg/m3)skin	2010
EU IOEL	Not established	EU OEL (Europe, 12/2009).
Germany	Skin Sh	DFG MAKs
UK OEL	Limit value – 8h TWA 2 ppm skin	

8.1.2 Recommended monitoring procedures

Use absorption on tubes to trap acrylonitrile from the air, desporption, and subsequent analysis by gas chromatography.

8.1.3 Occupational exposure limits and/or biological limits for air contaminants

None established

8.1.4 DNEL values

8.1.4.1 Workers

Acute-local effects Inhalation 4.6 ppm
Long-term systemic effects Dermal 1.4 mg/kg bw/day
Long-term systemic effects Inhalation 1.26 ppm
Long-term – local effects Inhalation 0.8 ppm

8.1.4.2 General population

Acute-systemic effects Inhalation 1.5 ppm
Acute-local effects Inhalation 1.5 ppm
Long-term systemic effects Dermal 0.009 mg/kg bw/day
Long-term systemic effects Inhalation 0.06 ppm
Long-term systemic effects Oral 0.009 mg/kg bw/day
Long-term – local effects Inhalation 0.03 ppm

8.1.5 PNEC values (Predicted No Effect Concentration) for the Environment

PNEC Water (fresh and marine)	PNEC Sediment	PNEC Soil	PNEC Sewage Treatment Plant	PNEC oral (secondary poisoning)
17 µg/L	0.0188 mg/kg	0.00268 mg/kg	5 mg/L	Exposure is not Predicted

8.2 Exposure controls

Recommended Monitoring Procedures :

Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

8.2.1 Appropriate Engineering Controls :

Handle only in totally enclosed systems. Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits. Use explosion-proof ventilation equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

8.2.2 Individual protection measures, such as personal protective equipment (PPE)

Personal Protective Measurers

Eye/face Protection :

Do not get in eyes. Wear chemical splash safety goggles. Wear full face respirator for eye protection if exposures are likely to exceed the Short Term Exposure Limit or significant liquid splash potential exists. Ensure that eyewash stations and safety showers are close to the workstation location. A respirator is not needed under normal and intended conditions of product use as defined under Engineering Controls.

Skin Protection :

Do not get on skin or clothing. Butyl rubber is the protective material of choice. Protective clothing must be made from materials specifically recommended for protection against acrylonitrile penetration. Consult your local safety specialist for a list of recommended materials. Wear butyl rubber boots and full chemical protective suit if exposures are likely to exceed Short Term Exposure Limits or significant liquid splash potential exists. Do not use protective clothing made of leather, natural or nitrile rubber. If such clothing is contaminated with acrylonitrile, it should be double bagged and stored properly and treated as hazardous waste. Note that contaminated clothing may be a fire hazard. Wash thoroughly after handling. Ensure that eyewash stations and safety showers are close to the workstation location.

Hands :

Wear gloves that cannot be penetrated by chemical or oil. Suggested protective materials: Butyl rubber gloves 0.05 mm –Breakthrough time >= 4 hours.
The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Respiratory Protection :

Use only with adequate ventilation.
Ensure ventilation is adequate if there is a risk of aerosol formulation or vapor build-up. Wear special protective clothing and a full face respirator or a positive pressure, self-contained breathing apparatus (SCBA). Do not breathe vapor or mist. Keep container closed.

Other protection :

Ensure that eyewash stations and safety showers are close to the workstation location.

Hygiene Measures :

Wash hands after handling this material and before eating, smoking, using lavatory and at the end of the day. Ensure that eyewash stations and safety showers are close to the workstation location.

8.2.3 Environmental Exposure Controls:

Avoid contact of spilled material with the soil. Contain any spilled material so that it does not enter a waterway.
Emissions from ventilation or work process equipment should be checked to ensure they comply

with the requirements of environmental legislation. In some cases, fume scrubbers, filters or engineering modifications to process equipment will be necessary to reduce emissions to acceptable levels.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance: Clear, colorless liquid

Odour Threshold: 13 ppm

Melting/Freezing Point: -83.5°C

Flash Point: -1.1℃ (c.c)

Lower Flammability Limit: 3%

Upper Flammability Limit: 17%

Vapor Density(Air=1): 1.83

Solubilities: 7.3% @ 20°C in water

Autoignition Temperature: 481°C(898℉)

Viscosity: 0.34 mPa.s @ 25°C

Oxidizing Properties: Not applicable

Odor: Pungent odor.

pH: 6.0-7.5 (5% aqueous solution)

Boiling Point: 77.3°C

Evaporation Rate: 4.54 (butyl acetate = 1.0)

Vapor Pressure: 11.5 kPa @20°C

Relative Density: 0.806 g/m3 @20°C

Octanol/Water Partition Coefficient

: log Kow:0.08-0.25@25°C

Decomposition Temperature: Not applicable

Explosive Properties: Not applicable

SAPT(Self-Accelerating Polymerization Temperature) : 〉75℃

9.2 Other information :

None available/

10. STABILITY AND REACTIVITY

10.1 Reactivity

Not reactive under normal handling and storage.

10.2 Chemical stability

Acrylonitrile must be inhibited to prevent hazardous polymerization. Stable under recommended storage and handling conditions (See Section 7: Handling and Storage). Subject to violent polymerization in absence of oxygen, exposure to light, heat, pressure or in the presence of strong acids, bases, peroxides or other initiators. Color is normally water-white, a hazy or yellow color is a potential indicator of instability.

10.3 Possibility of hazardous reactions

Product stabilized but may polymerize readily. Avoid depletion of inhibitor. Inhibit with p-Methoxyphenol (MEHQ). Check inhibitor level periodically. Maintain inhibitor level at 35-45 ppm and water 0.2 to 0.5%.

10.4 Conditions to avoid

Keep away from heat and direct sunlight. Avoid all source of ignition (spark or flame).
Avoid depletion of inhibitor, p-Methoxyphenol (MEHQ). Maintain inhibitor level at 35-45 ppm and water 0.2 to 0.5%

10.5 Incompatible materials

Highly reactive with oxidizing agents, reducing agents, acids and alkalis. This product may polymerize with explosive violence. May polymerize on exposure to sunlight, absence of oxygen and contact with peroxides, alkalis, amines, strong acids, ammonia, bromine, copper and copper alloys.

10.6 Hazardous decomposition products

Thermal decomposition products may include oxides of carbon (CO, CO2), nitrogen oxides (NO, NO2) and hydrogen cyanide (HCN). Evolves toxic fumes when heated to the decomposition state. When heated to decomposition it emits acrid smoke and irritating fumes.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity :

Acute Oral Toxicity	LD50 rat 81 mg/kg
Acute Dermal Toxicity	LD50 rabbit >200 mg/kg (148 –693 mg/kg)
Acute Inhalation Toxicity	LC50 rat 946 ppm/4 hr (by nose/sinuses) (2.05 mg/L); LCLo rat >1008 ppm/1 hr.

Skin Irritation/Corrosivity : Irritating in rabbits. Not corrosive.

Serious eye irritation/damage : Caused irritation that persisted up to 21 days in rabbits.

Respiratory Irritation : Long-and short-term studies in a range of species indicate that acrylonitrile has irritant effects on the upper respiratory tract. Occupational exposure has also been reported to result in respiratory irritation; this is confirmed by observations in worker monitoring and volunteer studies.

Respiratory Sensitization : The inhalation toxicity of acrylonitrile has been extensively investigated in animal studies with exposures of up to two years; local irritant effects on the respiratory tract were noted, however, there is no indication from the results of these studies that acrylonitrile has the potential to cause respiratory sensitisation. There is no indication from experience of use and from worker monitoring studies that acrylonitrile has the potential to cause respiratory sensitisation (occupational asthma).

Skin Sensitization : Acrylonitrile has been reported to have skin sensitization potential when tested by the following procedures – Guinea pig maximisation test. Workers with dermatitis have tested positive in a patch test with acrylonitrile.

Germ Cell Mutagenicity : Acrylonitrile is shown to be weakly DNA-reactive and genotoxic in assays in vitro with metabolic activation. Studies in reliable mammalian models in vivo do not show any evidence of genotoxicity. Based on the large body of available information, acrylonitrile is not classified with regard to germ cell mutagenicity. Studies of genotoxic effects in exposed workers have reported mostly negative results; studies that have produced indications of effects have limitations which argue against their use for classification decisions. Adequate in vivo experimental data exist to support the classification of acrylonitrile. All published peer reviewed studies of mutational effects in mammalian studies have reported negative results, including studies of germ cell mutagenicity. These include investigations of both chromosome aberrations and micronucleus inductions in rat and mouse somatic cells and studies of heritable chromosome level changes, such as dominant lethal effects, in both species, and chromosome level changes in murine spermatocytes. These studies were conducted independently by several laboratories, spanned a period of over 20 years, and involve exposure by a variety of routes including inhalation, oral and intraperitoneal injection. Acrylonitrile exposure concentrations (although not durations) were at levels comparable to or greater than those that have produced cancer in the various bioassays available. There are unpublished reports of slight increases in Hprt mutant frequencies in lymphocytes of rats and mice treated with acrylonitrile. These results warrant verification given that negative results for LacZ mutations were published from the same mice. Somatic cell mutations and male germ cell aneuploidy have been reported in Drosophila at very high exposure levels, while a third mutational endpoint evaluated in Drosophila, i.e. that reflecting sex-linked recessive lethal heritable mutations, has been negative as were tests of induction of reciprocal translocations. Nitriles and a wide range of other chemicals have been shown to induce aneuploidy in Drosophila sperm. This finding does not appear to correlate with other genotoxicity findings or to be relevant to carcinogenicity.

Carcinogenicity : Acrylonitrile is carcinogenic in numerous tissue types in rodent bioassays: all rodent studies demonstrate a positive response. In contrast, the weight of evidence from numerous epidemiological studies does not support an association between worker exposure to acrylonitrile and increased cancer risk. The reason for the marked difference between occupationally exposed humans and the results of the animal studies is unclear, however this could be due to either the MoA in rats not being relevant to humans, or that acrylonitrile carcinogenicity is a threshold effect and human exposure does not exceed this threshold. Acrylonitrile is classified as 2B (possible for human) by IARC, as MAK-2 (considered carcinogen in humans based on sufficient evidence in animals) by German MAK, as Reasonably Anticipated to be a Human Carcinogen by US NTP and as A3 (confirmed animal carcinogen with unknown relevance to humans) by the ACGIH.

Reproductive Toxicity : An evaluation of developmental toxicity and malformations in eight animal studies leads to the conclusion that very high maternally toxic exposures to acrylonitrile results in foetotoxicity, and may result in teratogenicity. Teratogenicity appears to be most likely following oral gavage exposure, which is not a relevant route of exposure to humans for acrylonitrile. The studies considered to be of highest quality do not show clear evidence of teratogenicity. The Saillenfait et al. (1993) rat inhalation developmental toxicity study (which tested to the highest inhalation concentration) showed decreased foetal body weights at a maternally toxic dose, but no exposure-related malformations. The Nemec et al. (2008) rat inhalation reproductive toxicity study showed only a single

high-dose malformation, considered at most equivocally related to treatment. There was no evidence of developmental toxicity in any study in the absence of maternal toxicity.

STOT - single exposure : Acrylonitrile is a Cat 3 respiratory tract irritant and is classified as category 3. Acrylonitrile is classified as acutely toxic by all routes of exposure; effects seen at high levels of exposure in single dose studies are manifestations of the same toxicity, therefore additional classification is not proposed.

STOT - repeat exposure : In addition to local irritant effects at the site of contact, repeated oral exposure to acrylonitrile results in damage to the gastrointestinal tract and central nervous system. The respiratory tract is also affected following repeated exposure by inhalation. For repeated dose toxicity by the oral route, the key study is the F344 rat drinking water study of Johannsen & Levinskas (1980), from which a NOAEL of 3 ppm (equivalent to average daily dose levels of 0.25 mg/kg bw/d in males and 0.36 mg/kg bw/d in females) was derived. For repeated dose inhalation toxicity, the key study is the 2-generation rat study of Nemec et al, from which a LOAEC of 5 ppm (11 mg/m³) was determined based on irritant effects on the nasal mucosa.

Oral NOAEL: 0.25 mg/kg bw/d. Target organs: neurologic: central nervous system. Inhalation LOAEC: 11 mg/m³ Target organs: respiratory: nose; neurologic: central nervous system. No classification is required, based on the results of repeated dose oral and inhalation toxicity studies. Acrylonitrile is classified as and irritant and as acutely toxic by all routes of exposure; effects seen at high levels of exposure in repeated dose studies are manifestations of the same toxicity, therefore additional classification is not proposed.

Aspiration hazard : Not available

11.2 Other Information

Routes of Exposure: Dermal, eye, inhalation and ingestion

Potential Health Effects:

Eye Contact : Corrosive. Causes severe eye irritation. Liquid will cause severe conjunctival irritation and corneal damage. Vapor may cause conjunctival irritation.

Skin Contact : Toxic if absorbed through the skin. Causes skin irritation. May cause severe allergic reaction. Liquid or vapor may be absorbed in toxicologically sufficient amounts. Skin absorption may be a significant route for exposure. Absorption will be rapid. Effects will be similar to those resulting from ingestion. Contains material which may cause cancer.

Inhalation : Toxic if inhaled. Cause respiratory tract irritation. May cause headache, weakness, dizziness, shortness of breath, cyanosis, rapid heart beat, unconsciousness and possible death. Odor does not provide reliable warning of exposure. Contains material that may cause cancer.

Ingestion : Toxic if swallowed. Causes severe irritation of the mouth, throat and esophagus. May cause headache, weakness, dizziness, shortness of breath, cyanosis, rapid heart beat, consciousness and possible death. Ingestion may irritate the gastrointestinal tract and may cause nausea and vomiting. Contain material which may cause cancer. May cause damage to the following organs: Central Nervous system, Respiratory System and Hearing.

Symptoms related to the physical, chemical and toxicological characteristics :

Causes severe eye irritation. Causes skin irritation. Symptoms and signs of acute acrylonitrile intoxication include excitation, agitation, lacrimation followed by a tranquil phase follows and cholinergic symptoms, such as salivation, lacrimation, urination and defecation occur. Next there is a convulsive phase. The terminal stage preceding death is a paralytic phase.

Early signs of salivation, lacrimation, miosis, diarrhoea, polyuria and peripheral vasodilation peak within 60 minutes of dosing. Other signs of toxicity include flushing of the face, ears and extremities. The early phase is followed by a delayed phase (>4 hours) which includes central nervous system effects such as respiratory depression, convulsions and death. Signs of neurotoxicity are noted to be dose-dependent, regardless of the route of administration.

Delayed and immediate effects as well as chronic effects from short and long-term exposure :

Upon absorption and metabolism acrylonitrile immediately begins release of cyanide, which can continue for several hours. The toxic effects and associated clinical signs of cyanide poisoning may therefore be delayed.

Interactive effects : No applicable data is available on interactive effects.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Acute Toxicity to Fish : 96-hour LC50 8.6 mg/L Cyprinodon variegatus (Sheepshead minnow).

Acute Toxicity to Aquatic Invertebrates	: 48-hour EC50 7.6 mg/L Daphnia magna
Toxicity to Algae	: 72–hour EC50 (growth rate) 14.1 mg/L algae (Skeletononema costatum)
Chronic Toxicity to Fish	: NOEC freshwater fish 0.17 mg/L
Chronic toxicity to Aquatic Invertebrates	: NOEC freshwater invertebrates 0.5 mg/L
Toxicity to Algae	: NOEC marine water algae 0.41 mg/L

12.2 Persistence and degradability

Acrylonitrile does not meet the criteria for readily biodegradable, but can be considered inherently bio-degradable based on the results of experimental studies. In practice, rapid biodegradation of acrylonitrile is noted in acclimated WWTP. Biodegradation of acrylonitrile by soil bacteria is also noted.
Acrylonitrile is hydrolytically stable. Acrylonitrile is labile in the atmosphere, due to rapid photodegradation.

12.3 Bioaccumulative potential

No data are available for bioaccumulation, however physicochemical properties (water solubility, log Kow) of the substance and experimental evidence suggest that acrylonitrile is unlikely to bioaccumulate in exposed biota.

12.4 Mobility in soil

Overall significant accumulation in the soil or sediment compartments is not anticipated due to the rapid biodegradation of low levels of acrylonitrile by bacterial strains including *Corynebacterium hoffmanii* and *Arthrobacter flavescens*.

12.5 Results of PBT and vPvB assessment

The data show that the properties of acrylonitrile do not meet the specific criteria detailed in REACH Annex XIII or do not allow a direct comparison with all the criteria in Annex XIII but nevertheless indicate that acrylonitrile would not have these properties and the substance is not considered a PBT/vPvB.

12.6 Other adverse effects : May be toxic to terrestrial wildlife, however, exposure is limited.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Dispose of contents/container in accordance with local/regional/national/international regulations.

Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Comply with all local, regional and national laws pertaining to waste management. Clean up and disposal contractors should be trained in acrylonitrile safe storage and handling practices.

Consult your local or regional authorities.

Chemical additions, processing or otherwise altering this material may make waste management information presented in the MSDS incomplete, inaccurate or otherwise inappropriate.

14. TRANSPORT INFORMATION

	14.1 UN Number	14.2 UN Proper Shipping Name	14.3 Hazard Class(s)	14.4 Packing Group	14.5 Environmental Hazards
US DOT	UN1093	Acrylonitrile, Stabilized	3 (6.1)	PG I	Applicable
Canadian TDG	UN1093	Acrylonitrile, Stabilized	3 (6.1)	PG I	Applicable
EU ADR/RID	UN1093	Acrylonitrile, Stabilized	3 (6.1)	PG I	Applicable
IMDG	UN1093	Acrylonitrile, Stabilized	3 (6.1)	PG I	Applicable
ICAO/IATA	UN1093	Acrylonitrile, Stabilized	3 (6.1)	PG I	Applicable

14.6 Special precautions for user : None

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Ship type 2, Pollution category Y.

15. REGULATORY INFORMATION

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

International Inventories

AUSTRALIAN INVENTORY (AICS) : Listed
CANADA INVENTORY (DSL) : Listed
CHINA INVENTORY (IECS) : Listed
EU INVENTORY (EINECS/ELINCS) : Listed
JAPAN INVENTORY (ENCS) : Listed
KOREA INVENTORY (ECL) : Listed
PHILIPPINE INVENTORY (PICCS) : Listed
UNITED STATES (TSCA) : Listed
TA Luft : 5.2.7.1.1.II
Classification of Substances Hazardous to Water (WGK): 3

15.2 Chemical safety assessment

A chemical safety assessment has been performed.

16. OTHER INFORMATION

16.1 Indication of changes

- The Safety Data Sheet has been reviewed and the data therein were revised and laid out according the requirements of the Commission Regulation (EU) No. 2015/830

NOTICE : This Safety Data Sheet is based upon data considered to be accurate at the time of its preparation. Despite our efforts, it may not be up to date or applicable to the circumstances of any particular case. We are not responsible for any damage or injury resulting from abnormal use, from any failure to follow appropriate practices or from hazards inherent in the nature of the product.

16.2 Abbreviations and acronyms

BCF	Bioconcentration factor
CLP	Classification, labelling and packaging (Regulation (EC) 1272/2008)
DNEL	Derived no effect level
DSD	Dangerous Substances Directive 67/548/EEC
ECHA	European Chemicals Agency
EC_{50}	Median effect concentration
LC50	Median lethal concentration
NOAEL	No observed adverse effect level
PBT	Persistent, bioaccumulative and toxic
PNEC	Predicted no effect concentration
REACH	Registration, evaluation, authorisation and restriction of chemicals (Regulation (EC) 1907/2006)
STOT	Specific target organ toxicity
STP	Sewage treatment plant
vPvB	Very persistent and very bioaccumulative

16.3 Key literature references and sources for data

This Safety Data Sheet has been prepared in accordance with Commission Regulation (EU) No 2015/830. The information provided is based on data considered to be accurate at the time of document preparation. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. Information relates only to the specific material and processes designated in the text and may not be valid for other materials or processes. Responsibility cannot be accepted for damage or injury resulting from hazards inherent to the product, from abnormal use, or from failure to follow appropriate practices.

16.4 Classification procedure

The mixture classification has been derived based on the classification of the individual components in accordance with the rules set out in Regulation (EC) No 1272/2008 (CLP) as well as the translation tables in Annex VII to the same regulation.

16.5. Training advice

- Not applicable

16.6. Further information

- The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.
- 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.
- Contact a poison control centre, List of Telephone Numbers : AUSTRIA (Vienna Wien) +43 1 406 43 43; BELGIUM (Brussels Bruxelles) +32 70 245 245; BULGARIA (Sofia) +359 2 9154 409; CZECH REPUBLIC (Prague Praha) +420 224 919 293; DENMARK (Copenhagen) 82 12 12 12; ESTONIA (Tallinn) 112; FINLAND (Helsinki) +358 9 471 977; FRANCE (Paris) +33 1 40 0548 48; GERMANY (Berlin) +49 30 19240; GREECE (Athens Athinai) +30 10 779 3777; HUNGARY (Budapest) 06 80 20 11 99; ICELAND (Reykjavik) +354 525 111, +354 543 2222; IRELAND (Dublin) +353 1 8379964; ITALY (Rome) +39 06 305 4343; LATVIA (Riga) +371 704 2468; LITHUANIA (Vilnius) +370 5 236 20 52 or +370 687 53378; MALTA (Valletta) 2425 0000; NETHERLANDS (Bilthoven) +31 30 274 88 88; NORWAY (Oslo) 22 591300; POLAND (Gdansk) +48 58301 65 16 or +48 58 349 2831; PORTUGAL (Lisbon Lisboa) 808 250 143; ROMANIA (Bucharest) +40 21 3183606 SLOVAKIA (Bratislava) +421 2 54 77 4166; SLOVENIA (Ljubljana) + 386 41 650 500; SPAIN (Barcelona) +34 93 227 98 33 or +34 93 227 54 00 bleep 190; SWEDEN (Stockholm) 112 or +46 8 33 12 31 (mon-fri 9.00-17.00); UNITED KINGDOM (London) 112 or 0845 4647 (NHS Direct).