

# **Material Safety Data Sheet (MSDS)**

## **Harmonised Version for Acrylonitrile**

### Disclaimer

The members of the Acrylonitrile Sector Group recommend that this template document be used for writing up or updating the companies' MSDS for Acrylonitrile. It contains the basic information which the Sector Group recommend to be included in any Acrylonitrile MSDS.

The information, specifications, procedures, methods and recommendations herein are presented in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. No representation, guarantee or warranty is made as to the accuracy, reliability or completeness of said information, specifications, procedures, methods and recommendations or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe patents of others or give desired results. Readers are cautioned to satisfy themselves as to the suitability of said information, specifications, procedures, methods and recommendations for the purposes intended prior to use.

# Material Safety Data Sheet (MSDS) Harmonised Version for Acrylonitrile

## Section 1 - Identification of the Substance/Preparation and Company/Undertaking

**Substance Name:** Acrylonitrile  
**Synonyms:** Vinyl cyanide, Propene nitrile  
**Intended Use:** Raw material for chemical synthesis  
**Company:** *Name of company*  
**Manufacture Site:** *Address/telephone number of manufacturing site*  
**Emergency Information:** *24-hour emergency telephone number*

## Section 2 – Composition/Information on Ingredients

Hazardous Components	Classification	Concentration	CAS-No.	EINECS-No	Chemical Formula
Acrylonitrile (stabilised)	F: R11 Carc Cat 2: R45 T: R23/24/25 Xi: R37/38, R41, R43 N: R51/53	>99%	107-13-1	203-466-5	CH <sub>2</sub> =CH-CN

## Section 3 – Hazards Identification

### **Physical & Chemical**

Highly flammable.  
May polymerise violently unless stabilised.  
May react violently with acids, alkalis or peroxides.

### **Health**

Toxic by inhalation, in contact with skin and if swallowed.  
Irritating to respiratory system and skin.  
Risk of serious damage to eyes.  
May cause sensitisation by skin contact.  
May cause cancer.

### **Environmental**

Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

## Section 4 – First Aid Measures

### **General Advice**

The ready availability of oxygen is essential for First Aid treatment in cases of acrylonitrile poisoning. Take off all contaminated clothing and shower immediately. Symptoms include headache, vomiting, dizziness, larger doses may result in unconsciousness, paralysis/cramp, cessation of breathing, death.

Anyone affected by acrylonitrile, significantly exposed to acrylonitrile but not yet showing symptoms or suspected of being significantly exposed to acrylonitrile must be referred promptly to a doctor following any necessary first aid.

First aiders must protect themselves against acrylonitrile.

Mouth-to-mouth resuscitation should not be used.

If a patient stops breathing, mechanical means should be used to inflate the lungs e.g. oxygen resuscitator.

Transfer patient to hospital.

Delayed effects may occur up to 8 hours after exposure.

#### **Inhalation**

Remove patient to fresh air.

Administer oxygen continuously even if patient appears healthy.

Keep patient quiet and warm.

Follow up with Medical treatment.

#### **Skin Contact**

Remove patient to fresh air.

Remove contaminated clothing including underwear and shoes.

Wash affected area with plenty of water until irritation has stopped.

Keep patient quiet and warm.

Follow up with medical treatment.

#### **Eye Contact**

Flush the eye immediately with plenty of water protecting the unaffected eye, until irritation has stopped.

Follow up with medical/ophthalmic treatment.

#### **Ingestion**

Conscious patients should drink at least 1 pint of water.

If patient vomits, take care to prevent inhalation of any vomit.

Keep patient quiet and warm.

Follow up with medical treatment.

*Refer to Section 16 for medical notes.*

## **Section 5 – Fire Fighting Measures**

#### **General Hazard**

Severe fire hazard.

Highly flammable and volatile liquid.

Highly flammable vapours emitted.

The vapour is heavier than air.

Vapours or gases may ignite at distant ignition sources and flash back.  
May be ignited by heat, sparks, static electrical discharge or flame.

#### **Suitable Extinguishing Media**

Dry chemical powder, alcohol foam, water spray (fog), CO<sub>2</sub>.  
After fire is extinguished re-ignition may occur from hot surfaces.  
Cool containing vessels with flooding quantities of water until well after fire is out.

#### **Extinguishing Media NOT to be used**

Water jet (solid water stream may scatter and spread fire).

#### **Special Exposure Hazards**

If involved in a fire acrylonitrile produces very toxic fumes and dense, black, acrid smoke clouds.  
Liquid will float and may re-ignite on surface water.

#### **Special Protective Equipment for Fire-fighters**

Fire-fighters must wear breathing apparatus and full chemical protection.

#### **Further Information**

Contaminated fire water must be contained and prevented from entering water courses.  
If the fire is impossible to control withdraw and let it burn.  
See sections 8 and 10.

## **Section 6 – Accidental Release Measures**

#### **General Precautions**

Inform emergency services and alert appropriate authorities.  
Avoid ignition; vapours may be contained within water spray.  
Consider evacuation for large releases.

#### **Personal Precautions**

Use personal protective equipment (see section 8) to avoid contact with skin, inhalation or ingestion.  
Keep upwind.  
Warn people downwind to remain indoors with all windows closed and forced ventilation systems turned off.

#### **Environmental Precautions**

Do not allow material to enter drains, water courses or groundwater.  
Contain and absorb with earth, sand or other suitable inert material.

#### **Methods for Cleaning Up**

Smaller spills should be absorbed in earth or sand.  
Dam-up large spills.  
Use a non-sparking or explosion-proof means to transfer into an appropriate container for disposal.  
After clean-up flush spill area with water.  
Observe regulatory requirements for discharge to drain.

## **Section 7 – Handling and Storage**

#### **Handling**

Avoid any personal exposure to vapour or liquid.  
Prevent all sources of ignition, including electrostatic discharge.  
Handle material in closed systems whenever possible.

Provide appropriately designed ventilation systems, including vent scrubbers, where closed system containment is not possible.

Facilities storing or utilising this material should be equipped with an eyewash facility and a safety shower.

See section 6 (Accidental Release Measures), section 8 (Exposure Controls and Personal Protection) and section 13 (Disposal Considerations).

### **Storage**

Keep containers tightly closed under an inert atmosphere.

Store containers in a cool, well ventilated place, away from physical damage hazards.

Store away from sources of ignition (no smoking), including electrostatic discharge.

Store in carbon steel, stainless steel or aluminium containers; the use of copper or copper containing alloys is not suitable.

Keep away from drainage systems.

Provide secondary containment, e.g. bunding for all storage vessels and kerbed contained areas for drums and IBCs.

Agitation is recommended in storage tanks.

Segregate from and avoid contact with peroxides, alkalis and oxidising agents.

The material is stabilised/inhibited against spontaneous polymerisation prior to dispatch with MEHQ (monomethyl ether of hydroquinone or p-methoxyphenol) and very small amounts of oxygen (ca. 5 ppm). A minimal content of oxygen supports maximum effectiveness of the stabiliser MEHQ. Complete removal of the oxygen content should be avoided. A scenario for complete oxygen removal could be: Long storage periods under nitrogen atmosphere together with constant stripping of the oxygen with nitrogen used for level control. In this case, the presence of oxygen should be confirmed by analysis and eventually re-established by adding dilute air. When adding air, explosion limits have of course to be respected.

If bulk volumes of acrylonitrile are stored for longer periods (about 6 weeks under normal storage conditions) without adding additional volumes of fresh product, the stabiliser content should be checked by analysis.

If stored without proper stabilisation, spontaneous polymerisation could start, detectable by turbidity, cloudiness and rising APHA (Hazen) numbers.

Avoid storage times for the material (in bulk volumes) for periods greater than 6 months.

When possible, transfer to and from tanks on a first in, first out basis.

## **Section 8 – Exposure Controls and Personal Protection**

### **Exposure Limit Values**

Workplace Exposure Limits (WELs) EH40/2005 (UK), acrylonitrile, CAS no. 107-13-1, Long-term exposure limit (8-hour TWA) 4.4 mg/m<sup>3</sup>.

### **Engineering Measures**

Use material in closed systems to avoid any exposure.

All pipework, storage vessels and process equipment should be designed to ensure total containment at all times.

Take measures against the build up of electrostatic charges.

Where total containment cannot be provided, ventilation and/or personal protective equipment should be used to prevent any exposure or ensure exposure limit is not exceeded.

Safety shower and eye wash should be continually available in working area.

### **Occupational Exposure Controls**

Avoid any exposure to liquid and vapours including contact with skin.

Atmospheric concentrations should be prevented or minimised below the occupational exposure limit.

Wear personal protective equipment (PPE) appropriate to task.

PPE manufacturers should be consulted.

### **Respiratory Protection**

Use self-contained breathing apparatus.

### Hand Protection

Chemical resistant protective gloves (EN 374). Suitable materials also with prolonged, direct contact (*recommended: Protective index 6, corresponding >480 minutes of permeation time according to EN 374*): butyl rubber (butyl) - 0.7 mm coating thickness. Supplementary note: the specifications are based on own tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined in accordance to EN 374. Manufacturer's directions for use should be observed because of great diversity of types.

### Eye Protection

Wear appropriate protective eye glasses, face shield or chemical safety goggles to European Standard EN166 (unless breathing apparatus affords full eye protection).

### Skin Protection

Wear appropriate protective clothing to prevent skin exposure (to DIN-EN 465), e.g. butyl rubber boots and neoprene suit.

Recommended material(s): >8 hours (breakthrough time); butyl rubber.

Do not wear footwear with leather soles.

### Environmental Exposure Controls

Avoid spillage to land or water. See section 6 (Accidental Release Measures), section 7 (Handling and Storage), section 12 (Ecological Information) and section 13 (Disposal Considerations).

### Occupational Hygiene

Observe good hygiene and safety practices at all times.

When using do not eat, drink or smoke.

Wash hands, forearms and face thoroughly and immediately after working with this material.

Keep away from food and drinks.

Change contaminated clothing if only lightly contaminated and wash before re-use, otherwise dispose of appropriately.

Contaminated leather items, clothing, footwear, etc. should be appropriately disposed of and not reused. See section 7 (Handling and Storage) and section 13 (Disposal Considerations).

## Section 9 – Physical and Chemical Properties

<b>Appearance</b>	Clear Liquid
<b>Colour</b>	Colourless
<b>Odour</b>	Mild/sweetish
<b>Freezing/melting point/range</b>	-83 °C
<b>Boiling point/range</b>	77 °C at atmospheric pressure
<b>Density</b>	806 kg/m <sup>3</sup> at 20 °C
<b>Vapour density (Air=1)</b>	1.8
<b>Vapour Pressure</b>	116 mbar at 20 °C 400 mbar at 50 °C
<b>Viscosity</b>	0.4 cp at 20 °C
<b>Solubility in Water</b>	Up to 73 g/l at 20 °C
<b>pH Value (at 50 g/l in H<sub>2</sub>O)</b>	7 at 20 °C
<b>Flash Point</b>	- 1 °C Tag closed cup - 5 °C DIN 51 758
<b>Auto-ignition Temperature</b>	480 °C DIN 51 794
<b>Flammability limits in air</b>	2.8% to 28% by volume
<b>Octanol/Water Partition Coefficient (log Pow)</b>	-0.37 to 0.25 (various data sources)
<b>Explosive properties</b>	None (flammable not explosive)

<b>Oxidising properties</b>	None
<b>Critical temperature</b>	263 °C
<b>Heat of combustion</b>	-33173 kJ/kg at 25 °C
<b>Surface tension</b>	0.0273 J/m <sup>2</sup> at 24 °C
<b>Solubility in solvents/fats</b>	Very soluble in acetone, benzene, diethyl ether and ethanol.
<b>Evaporation rate</b>	High
<b>Conductivity</b>	Low

## **Section 10 – Stability and Reactivity**

### **Stability**

Stable under recommended storage and handling conditions (see section 7).

Stabilisation/inhibition against polymerisation is essential for storage and transport.

Contains polymerisation inhibitors MEHQ (monomethyl ether of hydroquinone, also known as 4-methoxy phenol or p-methoxy phenol) and water, in the following concentration ranges; MeHQ: 35-45 ppm, Water: 0.2-0.5%.

### **Thermal Decomposition**

Unstable in contact with heat and light.

### **Conditions to Avoid**

Alkaline conditions (pH above 7) may result in rapid polymerisation. See section 7 Handling and Storage.

### **Materials to Avoid**

Alkalis and bases. Materials containing copper. Oxidising agents.

### **Hazardous Reactions**

Contact with strong acids, caustic, or peroxides can cause spontaneous polymerisation generating large amounts of heat. Highly exothermic; heat of polymerisation 17.3 kcal/mol. See section 7 Handling and Storage.

### **Hazardous Decomposition Products**

Hydrogen Cyanide can be produced on decomposition.

## **Section 11 – Toxicological Information**

### **Effects of Exposure**

Headache, vomiting, dizziness.

Larger doses may result in unconsciousness, paralysis/cramp, cessation of breathing, death.

The toxicity of acrylonitrile is attributed to the compound itself and its breakdown to cyanide in the body. Symptoms may not appear for up to 10 hours after exposure due to delayed breakdown of acrylonitrile to hydrogen cyanide in the body.

See section 16 - "Notes for Physician", section 4 (First Aid Measures) and section 8 (Exposure Controls and Personal Protection).

### **Inhalation**

Irritation of respiratory system, headache, vomiting, dizziness, unconsciousness, paralysis/cramp, cessation of breathing, death.

### **Skin Contact**

Irritation, rash, blistering, sensitisation, headache, vomiting, dizziness.

**Eye Contact**

Irritation, blurred vision, headache, vomiting, dizziness.

**Ingestion**

Headache, vomiting, dizziness, unconsciousness, paralysis/cramp, cessation of breathing, death.

**Acute Toxicity**

LD50 rat (oral) - 82 mg/kg  
LD50 rabbit (dermal) - 280 mg/kg  
LC50 rat (inhalation) - 946 ppm (4 hours)

**Corrosivity/Irritation**

Irritating to eyes and skin.

Contact with the skin can lead to blistering, and may cause sensitisation.

**Sensitisation**

Skin contact may cause sensitisation.

**Repeated-Dose Toxicity**

No known additional effects other than those described elsewhere in this section.

**Carcinogenicity/Mutagenicity/Reproductive Toxicity**

Known to cause cancer in animals.

Suspected human carcinogen.

No known mutagenic or reproductive toxicity effects.

**Section 12 – Ecological Information****Ecotoxicity**

*Freshwater data suggests that Acrylonitrile is of moderate toxicity to aquatic organisms with reported 48 hour LC50 values ranging from 7.6 mg/l (water flea Daphnia Magna) to 70 mg/l (Rainbow trout Oncorhynchus mykiss).*

**Mobility**

Limited solubility in water.

See Section 9 (Physical and Chemical Properties).

**Persistence and Degradability**

Standard degradation tests indicate that this material will degrade in the aquatic environment but not readily.

Acrylonitrile is readily degraded in acclimatised aerobic systems; anaerobic systems display greater sensitivity and may be inhibited.

Atmospheric degradation occurs via photooxidation.

**Bioaccumulative Potential**

Acrylonitrile is not expected to bioaccumulate due to its degradability and low octanol/water partition coefficient.

**Other Adverse Effects**

None known.

**Section 13 – Disposal Considerations****General**

Disposal must be carried out in accordance with local and national regulatory requirements. In the UK, the *Hazardous Waste (England & Wales) Regulations 2005 (SI 2005 No. 894)* and the *Environmental Protection (Duty of Care) Regulations 1991 (SI 2839)* and subsequent amendments apply.

**Material**

Handle and dispose of in compliance with current environmental waste legislation. Seek professional advice regarding disposal. Incinerate only in an appropriately licensed chemical waste incinerator. If in doubt consult the Regulator (*in the UK the Environment Agency*).

**Contaminated Material**

Empty containers may be suitable for reuse or recycling after cleaning and appropriate disposal of the cleaning liquors. Disposal method dependent upon degree and nature of contaminated material. Disposal must be carried out in accordance with local and national regulatory requirements – see *General* above. If in doubt seek professional advice or contact the Regulator (*in the UK the Environment Agency*).

**Section 14 – Transport Information**

<b>General</b>	UN No. 1093 Class 3 Subsidiary Hazard 6.1 Proper Shipping Name: ACRYLONITRILE, INHIBITED Packing Group I TREM CARD TEC(R)61
<b>CDG (UK Road)</b>	EAC 3WE
<b>ADR (European Road)</b>	Hazard Identification No 336
<b>IATA (Air)</b>	<i>Forbidden?</i>
<b>RID (Rail)</b>	Hazard Identification No 336
<b>IMDG (Sea)</b>	EmS F-E, S-D Marine Pollutant No
<b>I (Inland Water ways)</b>	ADN B2-3
<b>Channel Tunnel</b>	Not permitted

**Section 15 – Regulatory Information**

**Regulatory Information**

*Quote relevant international and national legislation/regulations.*

**Label**

F: Highly flammable  
T: Toxic  
N: Dangerous for the Environment

**Classification**

*This information already appears in section 2.*

**Risk Phrases**

R11	Highly flammable
R23/24/25	Toxic by inhalation, in contact with skin and if swallowed
R37/38	Irritating to respiratory system and skin
R41	Risk of serious damage to eyes
R43	May cause sensitisation by skin contact
R45	May cause cancer
R51/53	Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment

**Safety Phrases**

S9	Keep container in a well ventilated place.
S16	Keep away from sources of ignition – No smoking.
S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S53	Avoid exposure - Obtain special instruction before use.
S61	Avoid release to the environment. Refer to special instructions/safety data sheet.

**Section 16 – Other Information**