INEOS Nitriles

acrylonitrile

Emergency Response and Environmental Data for Acrylonitrile

Initial Spill Response

The immediate response to any release of acrylonitrile should be to isolate the area and then to protect those downwind of the spill. Please access the following link to the US DOT *Emergency Response Guidebook Table of Initial Isolation and Protective Action Distances* referring to ID number 1093 for specific instructions:

http://hazmat.dot.gov/pubs/erg/greenpgs.htm

General response guidelines can also be found in the US DOT *Emergency Response Guidebook* by accessing the following link to Guide 131:

http://hazmat.dot.gov/pubs/erg/g131.pdf

Physicochemical Information

Common Name: Acrylonitrile [C_3H_3N]

Physical State: Clear, colorless to slightly yellow liquid

Odor: Pungent garlic type odor that most individuals cannot smell below concentrations of 13-20 ppm

Specific Gravlty/Denslty: 0.8004 (water - 1.0)

Vapor Density: 1.83 (air = 1.0)

Vapor Pressure: 100mm Hg at 23°C

Water Solubility: Moderately soluble in water (~7.35% at 20°C)

Evaporation Rate: 4.54 (butyl acetate = 1.0)

Flash Point: 32°F (0°C)

Flammability limits: 3 - 17%

General Information

Acrylonitrile is a highly toxic, flammable compound. Inhalation of vapors and direct skin contact must be avoided. Exposure to high concentrations (>100 ppm) of vapors or skin contact can result in cyanide type poisoning in humans. Exposed individuals must obtain immediate medical treatment

In any spill situation, the immediate release area and a downwind isolation zone should be established. Vapors are heavier than air and are easily ignitable at ambient temperature

conditions. Remove all sources of ignition. Avoid low spots and confined areas as they may accumulate vapors. Containers of acrylonitrile in or near a fire can BLEVE. Fire combustion products may be highly toxic and include hydrogen cyanide. Due to acrylonitrile's high vapor toxicity, fire fighters should evaluate whether to extinguish an acrylonitrile vessel fire or allow to burn out. Dry chemical, alcohol foam and carbon dioxide are recommended materials for fire fighting.

Acrylonitrile is a monomer and is inhibited to prevent polymerization. Violent polymerization with the release of heat and pressure may occur upon exposure to high heat, fire conditions, acids or alkaline materials.

Butyl rubber is the preferred material to provide protection against skin contact. Supplied-air breathing apparatus should be used until monitoring dictates a lower level of protection. Fully encapsulating vapor protecting suits (Hazmat Level A protection) should be used in the immediate release area or when vapor concentrations are unknown.

Effects of Releases to Water

Acrylonitrile is lighter than water so it will initially form a light surface sheen if spilled into water. Due to its moderately high solubility, it will quickly dissolve into the water column.

It is highly volatile (vapor pressure: 100 mm Hg. @ 23°C) with a Henry's Law Constant of 8.8 E-5 atm-m3/mole, and will volatilize from water into the atmosphere creating potential inhalation concerns in the immediate spill area.

Acrylonitrile is considered moderately toxic to aquatic organisms, freshwater and marine fish. Although aquatic toxicity is highly species and habitat dependent, one should anticipate fish kills in the concentration rage of 10-40 ppm. Extended exposure to concentrations, as low as 1 ppm, has been shown to be toxic to certain organisms including shrimp and young bluegill.

Acrylonitrile will not persist in receiving waters for more than a few weeks. In addition to volatilizing, it will slowly biodegrade in both fresh and salt water. Degradation half-life data in natural waters are very limited. Biodegradation products include ammonia and carbon dioxide. Acrylonitrile can also hydrolyze slowly in water. Hydrolysis products include acrylamide and acrylic acid.

Acrylonitrile spilled into water is not expected to adsorb to sediments or suspended particulates. Accumulation and magnification in river or lake bottoms will be insignificant.

Acrylonitrile has a very low bioconcentration factor (BCF=48) and is not expected to bioaccumulate in aquatic organisms.

Recommended Mitigation Measures for Releases to Water

Notify downstream water users and sewer and water treatment operators that a toxic volatile chemical has been released into the water and that uptake could damage boilers, industrial equipment and treatment processes. They should cease water/sewer uptake or monitor for contamination. Consider supplying impacted water users with alternate supplies of freshwater.

Containment dikes, diversion ditches and temporary impoundments can be erected in low flow streams to contain contaminated water for subsequent treatment

Recovered contaminated water can be treated by thermal, chemical or wet-air oxidative processes. Activated carbon and/or biological treatment are effective on dilute

wastewaters.

If deployed immediately after the spill, sorbent booms, pillows, etc. may contain some of the floating material. However, acrylonitrile will go into solution very rapidly. Recovery materials utilized will be contaminated and cannot be handled without appropriate personnel protective equipment.

Some acrylonitrile can be removed from water by aeration or sparging techniques. However, this will result in airborne vapor emissions that could create exposure hazards to people in the immediate area or downwind of the release site.

Remove, collect and inventory killed fish and animals for subsequent proper resource damage assessment and disposal. Establish a monitoring program to track concentrations and impact to the receiving waters.

Expected Effects of Releases to Air

Acrylonitrile is highly volatile (vapor pressure: 100 mm Hg. @ 23°C, Henry's Law Constant: 8.8 E-5 atm-mm3/mole), so will volatilize quickly from spill surfaces, soils and water into the atmosphere creating potential inhalation concerns in the immediate spill area.

Vapors are heavier than air so they will accumulate in low spots and in confined areas creating exposure, fire and explosion hazard.

Vapors are very irritating to the eyes and can cause toxic and lethal effects via inhalation and skin absorption.

The odor threshold for many individuals is 13-20 ppm which is above the workplace exposure level.

The AIHA Emergency Response Planning Guidelines (ERPG) levels for acrylonitrile are as follows:

- ERPG-3: 75 ppm
- ERPG-2: 35 ppm
- ERPG-1: 10 ppm

Vapors are sufficiently stable in air to be transported considerable distances down wind. The estimated atmospheric half-life is 9 - 10 hours.

Acrylonitrile will degrade in the atmosphere via photolysis catalyzed reaction with hydroxyl radicals. This degradation mechanism will be highly dependent on atmospheric conditions including the degree of sunlight.

Mitigation Measures for Releases to Air

After establishing an isolation zone, evaluate the need to protect individuals in down wind areas from airborne vapors. Vapors are stable in air and can travel considerable distances. Shelter in place instructions or evacuation of the affected public should be considered as conditions warrant. Conditions affecting public protection decisions include meteorological conditions, mitigation measures employed, timing and duration of release, release rate and proximity of unprotected individuals to release area.

Water fog or spray can be applied to vapors or fumes to help reduce downwind impact. Note that a water stream sprayed directly onto an acrylonitrile pool can spread contamination and accelerate vapor formation.

Alcohol foam, (preferably AFFF/ATC) can be applied to the spill surface and will substantially

reduce vapor release. If possible, use a 6% foam concentration and continue to apply as foam breaks down.

Note that both water fog and foam application will create contaminated run-off. The establishment of diversion ditches, dikes or other barriers can be used to contain contaminated water run-off for subsequent collection or disposal. Use plug rugs, plumbers putty, tarps and sand or other equipment to cover sewers and drains in the immediate spill and run-off areas.

Effects of Releases to Soil

Acrylonitrile is highly volatile (vapor pressure: 100 mm Hg. @ 23°C) with a Henry's Law Constant of 8.8 E-5 atm-m3/mole, and will volatilize from soils into the atmosphere creating potential inhalation concerns in the immediate spill area. Volatilization is expected to be the primary removal mechanism from soils.

Acrylonitrile adsorption to soils and organic sediments is expected to be insignificant.

Due to its solvent properties and insignificant adsorption to soils, released acrylonitrile is expected to have a fairly high mobility in soils. Spills and contaminated run-off, therefore, must be removed to avoid potential migration and contamination of groundwater.

Low concentrations (<100 ppm) of acrylonitrile in soils are expected to undergo biodegradation to ammonia and carbon dioxide. Transient formation of acrylamide and acrylic acid would be expected. Higher concentrations in soil are not expected to easily biodegrade due to acrylonitrile's inhibitory effect on microorganisms.

Mitigation Measures for Releases to Soil

Attempt to minimize size of spill area as vapor evolutions proportional to pool size. Build dikes, berms or run-off ditches to contain released acrylonitrile.

If possible, place impervious plastic sheeting or tarps underneath release to contain and minimize spill to soil. [Note that acrylonitrile is very flammable and that plastic sheeting is known to discharge static electricity].

Alcohol foam, (preferably AFFF/ATC) can be applied to the spill surface and will substantially reduce vapor release. If possible, use a 6% foam concentration and continue to apply as foam breaks down.

Note that both water fog and foam application will create contaminated run-off. The establishment of diversion ditches, dikes or other barriers can be used to contain contaminated water run-off for subsequent collection or disposal. Use plug rugs, plumbers putty, tarps and sand or other equipment to cover sewers and drains in the immediate spill and run-off areas.

Remove spilled acrylonitrile, contaminated water and soil as soon as possible to minimize infiltration into soils and groundwater. Accumulated liquid pools can be cleaned up by vacuum truck or by pumping into containers.

Absorbent materials such as commercial spill sorbents, spill pads, vermiculite, ground corncob, and clay, sand or saw dust can be used to remove small spills. All contaminated absorbents must be containerized for subsequent proper treatment and/or disposal.

Contaminated soil and debris can be removed by mechanical means such as bulldozer, loaders or shovel. Care must be taken to ensure that operators are wearing appropriate protective equipment and that flammable vapors that can be ignited by motorized removal equipment are not present. Also, all equipment employed during the cleanup must be decontaminated or properly disposed.

Small residual concentrations of acrylonitrile in soils can be treated via bioremediation or application of a dilute neutralizing agent such as sodium bisulfite. However, consultation with local environmental authorities is recommended prior to using these methods.

Regulatory Information
The product and uses described herein may require global product registrations and notifications for chemical inventory listings, or for use in food contact or medical devices. For further information, visit http://techservice.innovene.com.

Health and Safety Information
The product described herein may require precautions in handling and use because of toxicity, flammability, or other consideration. The available product health and safety information for this material is contained in the Material Safety Data Sheet (MSDS) that may be obtained by calling +1-866-363-2454 (Toll Free-North America), or at http://techservice.innovene.com. Before using any material, a customer is advised to consult the MSDS for the product under consideration for use.

The Material Safety Data Sheet for this product contains shipping descriptions and should be consulted, before transportation, as a reference in determining the proper shipping description. If the material shipped by INEOS Nitriles is altered or modified, different shipping descriptions may apply and the MSDS of the original material should not be used.

For additional information, on samples, pricing and availability, please contact:

INEOS USA LLC
INEOS Customer Service Center
Marina View Building
2600 South Shore Boulevard
Ste. 250
League City, Texas 77573
USA
Toll-free: +1-866-363-2454

INEOS Europe Ltd,
Clayhill,
Beechen lane,
Lyndhurst, SO43 7DD
+44 (0)2380 287265

Phone Numbers
Please use specific country number depending from where you call:

Belgium/Netherlands	+32 (0)2 711 97 00
France	+33 (0)1 55 1741 85
Germany	+49 (0)69 5007 0188
Ireland	+353 (0)1 40732 74
UK	+44 (0)207 026 8321
Rest of the World	+44 (0)207 026 8322
FAX	+49 (0)221 3555 7528

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