ACRYLONITRILE

ACN

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
Cyanoethylene
Fumigrain
Ventox
Vinyl cyanide

Watery liquid Colorless to light yellow Irritating odor

Floats on water. Poisonous, flammable vapor is produced.

AVOID CONTACT WITH LIQUID AND VAPOR. KEEP PEOPLE AWAY.
Wear goggles, self-contained breathing apparatus and rubber overclothing (including gloves).
Shut off ignition sources and call fire department.
Stop discharge if possible.
Stay upwind and use water spray to ``knock down'' vapor.
Evacuate area in case of large discharge.
Isolate and remove discharged material.
Notify local health and pollution control agencies; protect water intakes.

Fire

FLAMMABLE.
POISONOUS GASES MAY BE PRODUCED IN FIRE.
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.
Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Combat fires from a safe distance or protected location.
Extinguish with dry chemical, alcohol foam, or carbon dioxide.
Water may be ineffective on fire.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID.

VAPOR
POISONOUS IF INHALED.
Irritating to eyes.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
POISONOUS IF SWALLOWED
Irritating to skin and eyes.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting.
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
Fouling to shoreline.
May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Contain
Collection Systems: Skim; Pump and dredge contaminated material
Clean shoreline
Salvage waterfowl
Do not burn

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 15; Subsituted allyl
2.2 Formula: CH_2=CHCN
2.3 IMO/UN Designation: 3.1/1093
2.4 DOT ID No.: 1093
2.5 CAS Registry No.: 107-13-1
2.6 NAERG Guide No.: 131P
2.7 Standard Industrial Trade Classification: 51483

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Air-supplied mask, industrial chemical type, with approved canister for acrylonitrile in low (less than 2%) concentrations; rubber or plastic gloves; cover goggles or face mask; rubber boots; slicker suit; safety helmet.
3.2 Symptoms Following Exposure: Similar to those of hydrogen cyanide. Vapor inhalation may cause weakness, headache, sneezing, abdominal pain, and vomiting. Similar symptoms shown if large amounts of liquid are absorbed through the skin; lesser amounts cause stinging and sometimes blisters; contact with eyes causes severe irritation. Ingestion produces nausea, vomiting and abdominal pain.
3.3 Treatment of Exposure: Skilled medical treatment is necessary; call physician for all cases of exposure. INHALATION: remove victim to fresh air. (Wear an oxygen or fresh-air-supplied mask when entering contaminated area.) INGESTION: induce vomiting by administering strong solution of salt water, but only if victim is conscious. SKIN: remove contaminated clothing and wash affected area thoroughly with soap and water. EYES: hold eyelids apart and wash with continuous gentle stream of water for at least 15 min. If victim is not breathing, give artificial respiration until physician arrives. If he is unconscious, crush an amyl nitrite ampule in a cloth and hold it under his nose for 15 seconds in every minute. Do not interrupt artificial respiration while doing this. Replace ampule when its strength is spent and continue treatment until condition improves or physician arrives.
3.4 TLV-TWA: 2 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by Ingestion: Grade 3; LD_{50} 50 to 500 mg/kg (rat, guinea pig)
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: Currently not available
3.10 Vapor (Gas) Irritant Characteristics: Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.
3.11 Liquid or Solid Characteristics: If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. Large amounts may be absorbed through the skin and cause poisoning.
3.12 Odor Threshold: 21.4 ppm (Sense of smell fatigues rapidly).
3.13 IDLH Value: 85 ppm.
3.14 OSHA PEL-TWA: 2 ppm.
3.15 OSHA PEL-STEL: Not listed.
3.16 OSHA PEL-Ceiling: 10 ppm.
3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: 31°F O.C. 30°F C.C.
4.2 Flammable Limits in Air: 3.05%-17.0%
4.3 Fire Extinguishing Agents: Dry chemical, alcohol foam, carbon dioxide
4.4 Fire Extinguishing Agents Not to Be Used: Water or foam may cause frothing.
4.5 Special Hazards of Combustion Products: When heated or burned, ACN may evolve toxic hydrogen cyanide gas and oxides of nitrogen.
4.6 Behavior in Fire: Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. May polymerize and explode.
4.7 Auto Ignition Temperature: 898°F
4.8 Electrical Hazards: Class I, Group D
4.9 Burning Rate: Currently not available
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: Currently not available
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): Currently not available
4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: No reaction
5.2 Reactivity with Common Materials: Attacks copper and copper alloys; these metals should not be used. Penetrates leather, so contaminated leather shoes and gloves should be destroyed. Attacks aluminum in high concentrations.
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Not pertinent
5.5 Polymerization: May occur spontaneously in absence of oxygen or on exposure to visible light or excessive heat, violently in the presence of alkali. Pure ACN is subject to self-polymerization with rapid pressure development. The commercial product is inhibited and not subject to this reaction.
5.6 Inhibitor of Polymerization: Methylhydroquinone (35-45 ppm)

6. WATER POLLUTION

6.1 Aquatic Toxicity:
100 ppm/24 hr/all fish/100% killed/fresh water
0.05-1 ppm/24 hr/bluegill/lethal/salt water
6.2 Waterfowl Toxicity: Not pertinent
6.3 Biological Oxygen Demand (BOD): 70%, 5 days
6.4 Food Chain Concentration Potential: None noted
6.5 GESAMP Hazard Profile:
Bioaccumulation: 0
Damage to living resources: 3
Human Oral hazard: 3
Human Contact hazard: II
Reduction of amenities: XXX

7. SHIPPING INFORMATION

7.1 Grades of Purity: Technical: 98-100%
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: No requirement
7.4 Venting: Pressure-vacuum
7.5 IMO Pollution Category: B
7.6 Ship Type: 2
7.7 Barge Hull Type: 2

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Flammable liquid
8.2 49 CFR Class: 3
8.3 49 CFR Package Group: I
8.4 Marine Pollutant: Not listed.
8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue).....	4
Flammability (Red).....	3
Instability (Yellow).....	2

8.6 EPA Reportable Quantity: 100
8.7 EPA Pollution Category: B
8.8 RCRA Waste Number: U009
8.9 EPA FWPCA List: Yes

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15° C and 1 atm: Liquid
9.2 Molecular Weight: 53.06
9.3 Boiling Point at 1 atm: 171°F = 77.4°C = 350.6°K
9.4 Freezing Point: –118°F = –83.6°C = 189.6°K
9.5 Critical Temperature: 505.4°F = 263°C = 536.2°K
9.6 Critical Pressure: 660 psia = 45 atm = 4.6 MN/m^2
9.7 Specific Gravity: 0.8075 at 20°C (liquid)
9.8 Liquid Surface Tension: Not pertinent
9.9 Liquid Water Interfacial Tension: Not pertinent
9.10 Vapor (Gas) Specific Gravity: 1.8
9.11 Ratio of Specific Heats of Vapor (Gas): 1.151
9.12 Latent Heat of Vaporization: 265 Btu/lb = 147 cal/g = 6.16 X 10^5 J/kg
9.13 Heat of Combustion: –14,300 Btu/lb = –7930 cal/g = 332 X 10^5 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: Not pertinent
9.16 Heat of Polymerization: Not pertinent
9.17 Heat of Fusion: Currently not available
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: 3.5 psia

NOTES

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9.20 SATURATED LIQUID DENSITY	
Temperature (degrees F)	Pounds per cubic foot
0	52.800
5	52.620
10	52.450
15	52.280
20	52.100
25	51.930
30	51.760
35	51.580
40	51.410
45	51.240
50	51.060
55	50.890
60	50.720
65	50.540
70	50.370
75	50.190
80	50.020
85	49.850
90	49.670
95	49.500
100	49.330
105	49.150
110	48.980
115	48.810
120	48.630
125	48.460

9.21 LIQUID HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
28	0.499
30	0.499
32	0.499
34	0.499
36	0.499
38	0.499
40	0.499
42	0.499
44	0.499
46	0.499
48	0.499
50	0.499
52	0.499
54	0.499
56	0.499
58	0.499
60	0.499
62	0.499
64	0.499
66	0.499
68	0.499
70	0.499
72	0.499
74	0.499
76	0.499
78	0.499

9.22 LIQUID THERMAL CONDUCTIVITY	
Temperature (degrees F)	British thermal unit inch per hour-square foot-F
75	1.150
80	1.143
85	1.136
90	1.128
95	1.121
100	1.114
105	1.107
110	1.099
115	1.092
120	1.085
125	1.078
130	1.070
135	1.063
140	1.056
145	1.049
150	1.041
155	1.034
160	1.027

9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Centipoise
	N
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9.24 SOLUBILITY IN WATER	
Temperature (degrees F)	Pounds per 100 pounds of water
70	8.000

9.25 SATURATED VAPOR PRESSURE	
Temperature (degrees F)	Pounds per square inch
0	0.193
10	0.277
20	0.390
30	0.540
40	0.735
50	0.987
60	1.306
70	1.707
80	2.205
90	2.815
100	3.558
110	4.452
120	5.520
130	6.786
140	8.274
150	10.010
160	12.030
170	14.350
180	17.010
190	20.040
200	23.480
210	27.360
220	31.710
230	36.570

9.26 SATURATED VAPOR DENSITY	
Temperature (degrees F)	Pounds per cubic foot
0	0.00208
10	0.00291
20	0.00402
30	0.00545
40	0.00727
50	0.00957
60	0.01242
70	0.01593
80	0.02019
90	0.02532
100	0.03142
110	0.03863
120	0.04707
130	0.05688
140	0.06820
150	0.08117
160	0.09594
170	0.11260
180	0.13150
190	0.15250
200	0.17590
210	0.20190
220	0.23060
230	0.26210

9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.261
25	0.270
50	0.280
75	0.289
100	0.297
125	0.306
150	0.314
175	0.323
200	0.331
225	0.338
250	0.346
275	0.354
300	0.361
325	0.368
350	0.375
375	0.382
400	0.389
425	0.395
450	0.401
475	0.408
500	0.414
525	0.420
550	0.425
575	0.431
600	0.437