

SAFETY DATA SHEET



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ACTIVATOR SOLUTION (0.5M ETT AND 1M PYRIDINE IN ACETONITRILE) SDS No. M0502A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Activator Solution (ETT and Pyridine in Acetonitrile)

Synonyms: ETT Activator solution, 5-Ethylthio-1H-Tetrazole and Pyridine in Acetonitrile

Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

2. HAZARDS IDENTIFICATION



Classification:

Flammable Liquids: GHS Category 2

Skin Irritation: GHS Category 4

Eye Damage: GHS Category 1

Specific Target Organ Toxicity for single exposure: GHS Category 3

Label Elements

Signal Word: DANGER!

Hazard Statements:

H225 – Highly flammable liquid and vapor.

H302 – Harmful if swallowed.

H312 – Harmful in contact with skin.

H319 – Causes serious eye damage

H332 – Harmful if inhaled.

H360 – May damage fertility or the unborn child.

Precautionary Statements:

P210 – Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

P280 – Wear protective gloves/clothing/eye protection/face protection.

P301+P310 – IF SWALLOWED: Immediately call POISON CENTER or a doctor/physician.

P303+P361+P353 – If on skin or hair: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P341 – IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

Emergency Overview

Causes severe eye and skin irritation with possible burns. Causes respiratory tract irritation. May be fatal if swallowed, inhaled, or absorbed through the skin. Affects cardiovascular system, central nervous system, liver, and kidneys.. May metabolize to cyanide in the body. Highly flammable liquid and vapor!.

HMIS Rating:

Health – 2* Flammability – 3 Physical Hazard – 0 PPE – User supplied

NOTE: HMIS ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. These ratings are based on the inherent properties of this chemical under expected conditions of normal use and are not intended to be used in emergency situations. PPE is determined by the user based on their needs and conditions.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

<u>Ingredient</u>	<u>CAS No</u>	<u>Percent</u>	<u>Hazardous</u>
Acetonitrile	75-05-8	>80%	Yes
Pyridine	110-86-1	<10%	Yes
5-Ethylthio-1H-Tetrazole	89797-68-2	<10%	Yes

4. FIRST-AID MEASURES

Inhalation: If inhaled, remove to fresh air. If breathing is labored or with coughing, give 100% supplemental oxygen. If not breathing, begin artificial respiration, but DO NOT give mouth-to-mouth resuscitation.

Ingestion: If swallowed, get medical attention immediately; DO NOT induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. If not breathing, begin artificial respiration. DO NOT give mouth-to-mouth resuscitation.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover irritated skin with an emollient or anti-bacterial cream. Soap and cold water may be used. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Check for and remove contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Notes to Physician: Treat symptomatically and supportively. Exposure should be treated as a cyanide poisoning. Effects may be delayed. For methemoglobinemia, administer oxygen alone or oxygen with Methylene Blue depending on the methemoglobin concentration in the blood. May be partially metabolized in the body. Always have a cyanide antidote kit on hand when working with cyanide compounds.

5. FIRE FIGHTING MEASURES

Flammability: Highly flammable liquid and vapor (GHS Category 2)

Auto-ignition Temperature (Pyridine): 482° C (899.6° F)

Flash Point (ACN): 2° C (35.6° F)

Flammable Limits: Lower Limit – 1.8 vol %, Upper Limit – 16.0 vol %

Products of Combustion: May decompose into toxic products under fire conditions (hydrogen cyanide, nitrogen oxides, carbon monoxide, carbon, dioxide).

Specific Fire Hazards: As in any fire, always wear self-contained breathing apparatus in pressure-demand (MSA/NIOSH approved or equivalent), and full protective gear. Use water spray to keep fire exposed containers cool. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Specific Explosion Hazards: Containers may explode under fire conditions.

Fire Fighting Media: Solid streams of water may be ineffective and spread the fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam. Cool containers with flooding quantities of water until well after fire is out.

National Fire Protective Association (Estimated): Health - 2, Flammability - 3, Reactivity - 0

NOTE: NFPA ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. They are for use by emergency personnel to address the hazards that are presented by short term, acute exposure to this product under fire, spill, or similar emergencies. Ratings involve data and interpretations that may vary from company to company.

6. ACCIDENTAL RELEASE MEASURES

Use water spray to reduce vapors. Water spray may reduce vapors but still not prevent ignition in closed spaces. Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Use spark-proof tools. Provide ventilation to the affected area and remove all ignition sources. Evacuate unnecessary personnel and approach the spill from upwind. Pick up absorbed material and place it in a suitable container. Always use proper personal protective equipment as described in section 8. Collect run-off and isolate for proper disposal.

7. HANDLING AND STORAGE

Precautions: Always use proper personal protective equipment as described in section 8. Wash thoroughly after handling. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Remove contaminated clothing and wash before reuse. Empty containers contain product residue (liquid and vapor) and can be dangerous. Keep container tightly closed and away from heat, spark, and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks, or open flames. Use with adequate ventilation. Avoid breathing vapor or mist.

Storage: Keep in a flammables area away from direct sunlight and all sources of ignition and oxidizing materials. Keep in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture and oxidizing materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or using the material should be equipped with eyewash station and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Personal Protection: Wear protective chemical goggles or appropriate eye protection. Use appropriate protective gloves and protective clothing to prevent skin exposure. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever possible. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Exposure Limits (ACN):

- ACGIH – 20 ppm TWA; Skin – potential significant contribution to overall exposure by cutaneous route
- NIOSH – 20 ppm TWA; 34 mg/m³ TWA; 500 ppm IDLH
- OSHA Final PELs – 40 ppm TWA; 70 mg/m³ TWA

Exposure Limits (Pyridine):

- ACGIH – 1 ppm TWA;
- NIOSH – 5 ppm TWA; 15 mg/m³ TWA; 1000 ppm IDLH
- OSHA Final PELs – 5 ppm TWA; 15 mg/m³ TWA
- OSHA Vacated PELs: 5 ppm TWA; 15 mg/m³ TWA

Exposure Limits (ETT): None

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance: Clear, colorless to very pale yellow liquid.

Odor: Sweetish, ethereal odor but may have slight stench of pyridine

Odor Threshold: 170 ppm for acetonitrile, 0.4 to 20 ppm for pyridine

pH: Not available for acetonitrile; 8.5 (0.2 M aqueous solution) for pyridine.

Auto-ignition Temperature (Pyridine): 482° C (899.6° F)

Flash Point (ACN): 2° C (35.6° F)

Flammable Limits: Lower Limit – 1.8 vol %, Upper Limit – 16.0 vol %

Boiling Point (acetonitrile): 81.6° C @ 760 mm Hg

Freezing/Melting Point (Pyridine): -42° C

Decomposition Temperature (acetonitrile): > 500° C

Specific Gravity: 0.7810 g/cm³ for acetonitrile; 0.9780 g/cm³ for pyridine.

Vapor Density (Air=1): >1 for acetonitrile; 2.73 for pyridine

Vapor Pressure (ACN): 88.8 mm Hg @ 25° C for acetonitrile. 40.9 mm Hg @ 20° C for pyridine.

Viscosity: 0.36 cP 20° C for acetonitrile; 0.95 mPa at 20° C for pyridine

Solubility: Soluble

10. STABILITY AND REACTIVITY

Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat, exposure to moist air or water.

Incompatibility With Various Substances: Strong oxidizing agents, strong reducing agents, strong acids.

Hazardous Decomposition Products: Hydrogen cyanide, nitrogen oxides, carbon monoxide, carbon, dioxide.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact

Acute Exposure Hazards:

INHALATION HAZARD: Inhalation of high concentrations may cause central nervous effects characterized by nausea, headache, dizziness, unconsciousness, and coma. Can irritate respiratory tract or possibly cause lung damage. Acetonitrile breaks down slowly in the body releasing cyanide ions and very high concentrations may produce cyanide poisoning. Symptoms are usually delayed several hours and include stomach or intestinal upset (nausea, vomiting, diarrhea) irritation (nose, throat, airways), headache, central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), muscle weakness, kidney effects, effects on heart rate, loss of coordination, cyanosis (causes blue coloring of the skin and nails from lack of oxygen), lung edema (fluid buildup in the lung tissue). Victims may have an irregular heartbeat and feel tightness in the chest. Severe overexposure may result in death.

INGESTION HAZARD: May cause gastrointestinal irritation with nausea, vomiting, and diarrhea. May cause liver and kidney damage. May cause central nervous system depression with excitement followed by headache, drowsiness, nausea, and vomiting. Advanced stages may cause collapse, unconsciousness, coma, and possible death. Effects may be delayed. May cause tissue anoxia with symptoms of dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness, effects on heart rate, loss of coordination, cyanosis (causes blue coloring of the skin and nails from lack of oxygen), and coma. Severe overexposure may result in death.

SKIN CONTACT HAZARD: Causes mild skin irritation. May be harmful if absorbed through the skin. Effects may be delayed. May cause smarting of the skin and first-degree burns after short exposure. Material is readily absorbed through the skin. Absorbed material may be metabolized into cyanide which inhibits cytochrome oxidase impairing cellular respiration.

EYE CONTACT HAZARD: Contact may cause severe eye irritation and possible burns. May cause reversible damage.

Chronic Exposure Hazards: Repeated or prolonged exposure may cause dermatitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion. May cause liver and kidney damage. Exposures to pyridine that are too low to produce overt clinical symptoms can cause liver damage and repeated low-level exposures can cause cirrhosis. Acetonitrile is toxic to blood kidneys, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, skin, eyes, and central nervous system. It may be toxic to the reproductive system. Repeated or prolonged exposure can produce target organ damage. Repeated exposure may produce general deterioration of health in target organs. Acetonitrile may be metabolized to cyanide in the body which inhibits cytochrome oxidase impairing cellular respiration. Classified as a toxin to the female reproductive system. Suspected of being a toxin to the male reproductive system. Animal studies demonstrate that cyanide would cause toxic effects in the fetus at exposure levels that would be toxic to the parent.

Animal Toxicity (ACN):

Draize test, rabbit, eye: 100 uL/24H Moderate;

Inhalation, mouse: LC50 = 2693 ppm/1H;
 Inhalation, rabbit: LC50 = 2828 ppm/4H;
 Inhalation, rat: LC50 = 7551 ppm/8H;
 Oral, mouse: LD50 = 269 mg/kg;
 Oral, rabbit: LD50 = 50 mg/kg;
 Oral, rat: LD50 = 2460 mg/kg;
 Skin, rabbit: LD50 = 2000 mg/kg;

Animal Toxicity (Pyridine):

Draize test, rabbit, skin: 500 mg/24H Mild;
 Inhalation, rat: LC50 = 28,500 mg/m³/1H;
 Oral, mouse: LD50 = 1500 mg/kg;
 Oral, rat: LD50 = 891 mg/kg;
 Skin, rabbit: LD50 = 1121 mg/kg;
 Skin, rabbit: LD50 = 1 g/kg;

Carcinogenicity:

ACGIH: Confirmed animal carcinogen with unknown relevance for humans
 California: carcinogen, initial date 5/17/02
 Not listed as carcinogens by IARC and NTP.

Epidemiology: No information found.

Teratogenicity: Pyridine cause muscle/skeleton effects when injected into developing chickens but was not teratogenic in frogs at sub lethal doses. The relevance of these studies to human reproduction is unclear.

Reproductive Effects: No information found.

Mutagenicity: Pyridine's mutagenicity potential is equivocal. It was reported to be both positive and negative in Salmonella typhimurium strains. It was not mutagenic in tests for chromosome aberrations, but it did give weak positive results in tests that detect sister chromatid exchanges.

Neurotoxicity: No information found.

Animal Toxicity (ETT):

Chemical properties have not been fully investigated.

Carcinogenicity: Neither component is listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65

Epidemiology: Three volunteers were exposed to ACN for 4 hours at 40, 80, and 160 ppm acetonitrile. At 40 ppm, odor was detected, after which olfactory fatigue was noted. At this concentration, two persons had no signs of response, including no appreciable blood or urinary cyanide or thiocyanate. The third person experiences slight tightness in the chest that evening. A sensation of cooling in the lungs was observed and persisted for 24 hours. Traces of urinary thiocyanate were recorded.

Teratogenicity: In most of the available assays, ACN teratogenicity was associated with maternal toxicity. In a well conducted study, rats exposed by inhalation to acetonitrile did not result in significant fetal effects, even in concentrations that were overtly toxic to the dam. In this study, a maternal NOAEL of 1200 ppm and NOAEL of 1200 ppm with respect to developmental toxicity were established. A case-control study of pregnancy outcome among Finnish lab workers revealed no association between exposure to acetonitrile and increased risk of spontaneous abortion in mothers, or malformation and birth weight in their children.

Reproductive Effects: In relation to fertility, there is no information available in humans and there are no animal studies specifically investigating such effects.

Mutagenicity: No information available.

Neurotoxicity: No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity (Acetonitrile):

Fish: Fathead minnow: 1150 ppm; 24 Hr; TLm (hard water);
 Fish: Fathead minnow: 1000 mg/L; 96 Hr; TLm (soft water);
 Fish: Bluegill/Sunfish: 1850 mg/L; 96 Hr; TLm (soft water);

Fish: Fathead minnow: 1640 mg/L; 96 Hr; LC50 (flow-bioassay);

Fish: Fathead minnow: 1640 mg/L; 96 Hr; EC50 (flow-bioassay) No data available;

Environmental Fate: Estimated Koc value = 16. Acetonitrile is expected to weakly adsorb to most soils based on the Koc value. Volatilization from soil surfaces and leaching into ground water is expected to be significant. Estimated BCF value = 0.3. This value indicates that acetonitrile will not significantly bioconcentrate in aquatic organisms or adsorb to suspended solids and sediments in water. Acetonitrile is unreactive towards photochemically-generated free radicals and direct photolysis in the gaseous phase.

Special Remarks: Acetonitrile is biodegradable

Ecotoxicity (Pyridine):

Fish: Fathead minnow: LC50 = 106 mg/L, 96H, flow-through, no data available.

Environmental Fate:

Terrestrial: Should have very high mobility. It is absorbed to acid clay to a moderate extent. Complete degradation in one soil occurred in less than 8 days.

Aquatic: Should biodegrade after an acclimation period and can be lost through volatilization.

Atmospheric: Exists in vapor phase based on a vapor pressure of 20.8 mm Hg and reacts slowly with photochemically produced hydroxyl radicals with experimental half-lives of 32 and 16 days in clean and moderately polluted atmospheres, respectively. Bioconcentration in aquatic animals should not be significant.

No information available for ETT.

13. DISPOSAL CONSIDERATIONS

Material that cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Processing, use or contamination of this product may change the waste management options. Waste generators must decide if discarded material is a hazardous waste. State and local disposal regulations may differ from federal disposal definitions found in 40 CFR 261.3. Dispose of container and unused contents in accordance with federal, state and local requirements. Pyridine is a "U" listed waste (U196).

14. TRANSPORT INFORMATION

US DOT, IATA, IMO

Proper Shipping Name: Flammable Liquid, n.o.s. (Acetonitrile, Pyridine)

Hazard Class: 3

UN Number: UN1993

Packing Group: II

Canada TDG

Additional Information: Flashpoint 6 C

15. REGULATORY INFORMATION

US Federal Regulations:

TSCA: CAS# 75-05-8 and CAS# 110-86-1 are listed on the TSCA Inventory.

Health and Safety Reporting List: CAS# 75-05-8 – Effective 10/4/82, sunset 10/4/92; CAS# 110-86-1: Effective 10/4/82, Sunset 10/4/92.

Chemical Test Rules: CAS# 75-05-8 – 40 CFR 799.5115

Section 12b: CAS# 75-05-8 – Section 4, 1% de minimis rule

TSCA Significant New Use Rule: Does not have an SNUR under TSCA.

CERCLA Hazardous Substances: CAS# 75-05-8 – 5000 lb final RQ; 2270 kg final RQ; CAS# 110-86-1– 1000 lb/454 kg final RQ.

SARA Section 302: No component has a TPQ

SARA Codes: CAS# 75-05-8 and CAS# 110-86-1– immediate, delayed, fire

Section 313: Acetonitrile (CAS# 75-05-8) and Pyridine CAS# 110-86-1 are subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.

Clean Air Act: CAS# 75-05-8 is listed as a hazardous air pollutant (HAP). It is not a Class 1 Ozone Depleter. It is not a Class 2 Ozone Depleter.

Clean Air Act: CAS# 110-86-1 is not a hazardous air pollutant (HAP). It is not a Class 1 Ozone Depleter. It is not a Class 2 Ozone Depleter.

Clean Water Act: This material contains no Hazardous Substances. It is not a Priority Pollutant. It is not a Toxic Pollutant.

OSHA: Neither component is considered highly hazardous by OSHA.

US State Regulations:

CAS# 75-05-8 and CAS# 110-86-1 can be found on the following state right-to-know lists: California, New Jersey, Pennsylvania, Minnesota, and Massachusetts

California Prop 65: This product contains pyridine, a chemical known to the state of California to cause developmental reproductive toxicity. California No Significant Risk Level: Not listed

Canada:

DSL/NDSL: CAS# 75-05-8 and CAS# 110-86-1 are listed on Canada's DSL list.

WHMIS: This product has a WHMIS classification of B2, D1B, D2B. This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and this MSDS contains all the information required by those regulations.

Ingredient Disclosure List: CAS# 75-05-8 and CAS# 110-86-1 are listed on Canada's Ingredient Disclosure List.

DSCL (EEC):

Hazard Symbols: Xn; F

Risk Phrases: R11 – Highly Flammable; R20/21/22 – Harmful by inhalation, in contact with skin, and if swallowed; R34 – Causes burns; R36 – Irritating to eyes

Safety Phrases: S16 – Keep away from sources of ignition-no smoking; S26 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S28 – After contact with skin, wash immediately with plenty of water; S36/37 - Wear suitable protective clothing and gloves.

WGK (Water Danger/protection): CAS# 75-05-8 and CAS# 110-86-1: 2

16. OTHER INFORMATION

Originally Prepared: 1/1/2006

Last Revised: 4/1/2013 – Updated for 0.5M ETT and 1M Pyridine blend.

The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

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