SAFETY DATA SHEET

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24-Hour Emergency Number (CHEMTREC)
USA: 800-424-9300
International: 703-527-3887
All non-emergency numbers should be directed to Customer Service at 800-PURITY1

CAP B SOLUTION (1-METHYLIMIDAZOLE, PYRIDINE IN TETRAHYDROFURAN, 1:1:8)

SDS No. M0510A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Capping Solution (1-Methylimidazole and Pyridine in Tetrahydrofuran, 1:1:8)
Synonyms: Capping Solution
Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

4. HAZARDS IDENTIFICATION

Classification:
Flammable Liquids: GHS Category 2, H225
Acute Toxicity, Oral: GHS Category 4, H302
Acute Toxicity, Dermal: GHS Category 4, H312
Skin Corrosion: GHS Category 1B, H314
Serious Eye Damage: GHS Category 1, H318
Specific Target Organ Exposure, single exposure, Respiratory System: GHS Category 3, H335
Carcinogenicity (Category 2), H351

Label Elements
Signal Word: DANGER!
Hazard Statements:

H225 – Highly flammable liquid and vapor.
H302+H312 – Harmful if swallowed or in contact with skin.
H314 – Causes severe skin burns and eye damage.
H335 – May cause respiratory irritation.
H351 – Suspected of causing cancer.

Precautionary Statements:

P210 – Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P280 – Wear protective gloves/protective clothing/eye protection/face protection.
P284 – Wear respiratory protection.
P301+P312+P330 – IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301+ P330+P331 – IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353 – IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304+P340 – IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338+P310 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308+P313 – IF exposed or concerned: Get medical advice/ attention.
P403+P233 – Store in a well-ventilated place. Keep container tightly closed.

P501 – Dispose of contents/ container to an approved waste disposal plant.

Emergency Overview
Harmful if swallowed, inhaled, or absorbed through the skin. Causes burns or severe irritation to eyes, skin, and respiratory tract. Readily absorbs through the skin. Affects cardiovascular system, central nervous system, liver, and kidneys. Highly flammable liquid and vapor. May form explosive peroxides. Hygroscopic.

HMIS Rating:
Health – 2* Flammability – 3 Physical Hazard – 1 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

Ingredient	CAS No	Percent	Hazardous
Tetrahydrofuran	109-99-9	80%	Yes
1-Methylimidazole	616-47-7	10%	Yes
Pyridine	110-86-1	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, rinse mouth with water. 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. Persons with skin problems or liver, kidney, lung, or blood diseases may at increased risk from exposure to this product.

5. FIRE FIGHTING MEASURES

Flammability: Flammable liquid and vapor (GHS Category 2)
Auto-ignition Temperature (Tetrahydrofuran): 321º C (600º F)
Flash Point (Tetrahydrofuran): -14º C (6º F)
Flammable Limits: Lower Limit –1.8 vol %, Upper Limit – 15.7 vol %
Products of Combustion: May decompose into toxic products under fire conditions (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: THF forms peroxides of unknown stability.
Fire Fighting Media: Water may be ineffective. Use sand, dry chemical, carbon dioxide, or appropriate foam. If water is the only media available, use in flooding amounts. Cool containers with flooding quantities of water until well after fire is out.
Special Remarks: None
National Fire Protective Association: (ESTIMATED) Health - 2, Flammability - 3, Reactivity - 1
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

Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Avoid runoff into streams and sewers. Provide ventilation to the affected area and remove all ignition sources. Approach the spill from upwind and pick up absorbed material and place it in a suitable container. Always use proper personal protective equipment as described in section 8.

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 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.

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 and face shield for eye and face 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 (Tetrahydrofuran):
ACGIH – 50 ppm TWA; 100 ppm STEL; Skin – potential significant contribution to overall exposure by cutaneous route
NIOSH – 200 ppm TWA; 590 mg/m^3 TWA; 2000 ppm IDLH
OSHA Final PELs – 200 ppm TWA; 590 mg/m^3 TWA
Exposure Limits (Pyridine):
ACGIH – 1 ppm TWA;
NIOSH – 5 ppm TWA; 15 mg/m^3 TWA; 1000 ppm IDLH
OSHA Final PELs – 5 ppm TWA; 15 mg/m^3 TWA
OSHA Vacated PELs: 5 ppm TWA; 15 mg/m^3 TWA
Exposure Limits (Methylimidazole): None established

9. PHYSICAL AND CHEMICAL PROPERTIES

a) Appearance: Colorless liquid.
b) Odor: Sweetish, ethereal, possibly penetrating odor
c) Odor Threshold: Tetrahydrofuran – 2-50 ppm
d) pH: No data available
e) Melting Point/Freezing Point: No data available, Tetrahydrofuran: -108.5^o C; Methylimidazole: -60^o C; Pyridine -42^o C
f) Initial boiling point and boiling range: No data available
g) Flash Point (Tetrahydrofuran): -14^o C (6^o F)
h) Evaporation rate: No data available
i) Flammability (soldi, gas): No data available
j) Upper/lower flammability or explosive limits: Upper Limit – 15.7 vol %, Lower Limit –1.8 vol %
k) Vapor Pressure: No data available, Tetrahydrofuran - 130 mm Hg @ 20^o C; Methylimidazole – 0.478 mm Hg @ 20^o C; Pyridine - 40.9 mm Hg @ 20^o C
l) Vapor Density: No data available, (Air=1): Tetrahydrofuran – 2.5; Methylimidazole – 2.83; Pyridine – 2.73
m) Density Relative Density: 0.914 g/cm^3, Tetrahydrofuran - 0.89 g/cm^3; Methylimidazole – 1.03 g/cm^3; Pyridine - 0.9780 g/cm^3
n) Water solubility: Tetrahydrofuran is soluble; Methylimidazole is soluble; Pyridine is soluble
o) Partition coefficient: n-octanol/water: No data available
p) Autoignition temperature: No data available
q) Decomposition temperature: No data available
r) Viscosity: No data available
s) Explosive properties: Not classified as explosive
t) Oxidizing properties: None

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat, confined spaces, exposure to moist air or water, contact with water, incompatible materials.
Incompatibility With Various Substances: Strong oxidizing agents, strong acids, mineral acids, oxygen, bromine, metal halides, lithium tetrahydroaluminate, borane, sodium aluminum hydride, sodium tetrahydroaluminate, caustic alkalis, and reducing agents.
Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, carbon dioxide, toxic aldehydes.
Hazardous Polymerization: May occur in Tetrahydrofuran. Will not occur in Pyridine or Methylimidazole.

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact
Acute Exposure Hazards:

INHALATION HAZARD: May be harmful if inhaled. Causes chemical burns to the respiratory tract. May cause lung damage. Vapors may cause dizziness or suffocation. Inhalation may cause coughing, irritation of the mucous membranes and respiratory tract, difficulty breathing, and loss of consciousness. Inhalation of vapors may cause abnormal liver function as detected by laboratory results. Other symptoms reported with acute exposure to pyridine nervousness, insomnia, and loss of appetite.
INGESTION HAZARD: Causes burns to the gastrointestinal tract. May cause severe and permanent damage to the digestive tract. 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.
SKIN CONTACT HAZARD: Causes burns and irritation to skin. Tetrahydrofuran and Pyridine are not skin sensitizers in animals. May cause smarting of the skin and first-degree burns after short exposure. Material is readily absorbed through the skin causing symptoms similar to those of inhalation.
EYE CONTACT HAZARD: Contact causes severe eye irritation and burns. Vapors may cause eye irritation. May cause reversible damage.

Chronic Exposure Hazards: Prolonged or repeated skin contact with Tetrahydrofuran may cause defatting and dermatitis. May cause liver, kidney, and lung damage. Narcotic in high concentrations. Data shows carcinogenic activity in the liver and kidneys of lab animals. Kidney tumors were by a mechanism that has no relevance in humans. Exposures to pyridine that are too low to produce overt clinical symptoms can cause liver damage and repeated low-level exposures can cause cirrhosis. Feeding studies in rats produced blood effects like changes in clotting factors.
Animal Toxicity (Tetrahydrofuran):
Inhalation, rat: LC50 = 21,000 ppm/3H;
Oral, rat: LD50 = 1650 mg/kg;
Animal Toxicity (Methylimidazole):
Oral, mouse: LD50 = 1400 mg/kg;
Rabbit, eye irritation (unrinsed): corrosive.
Rabbit, primary skin irritation: corrosive.
Rat, inhalation safety screen: not lethal, sat vapor, room temp.
Rabbit, dermal LD50: 400-640 mg/kg moderately toxic.
Animal Toxicity (Pyridine):
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 28,500 mg/m^3/1H;
Oral, mouse: LD50 = 1500 mg/kg;
Carcinogenicity: THF is listed by ACGIH as an animal carcinogen with unknown relevance to humans. Methylimidazole is not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65. Pyridine is an ACGIH Confirmed animal carcinogen with unknown relevance for humans and a California: carcinogen, initial date 5/17/02.

Tetrahydrofuran
Epidemiology: No information found.
Teratogenicity: Animal data show developmental effects only at exposure levels producing other toxic effects in the adult animal..
Reproductive Effects: Animal testing for reproductive effects shows no change in reproductive performance.
Mutagenicity: THF has not produced damage in mammalian cell cultures or animals. It has not been tested for its ability to cause permanent genetic damage in reproductive cells of mammals (not tested for heritable genetic damage.
Neurotoxicity: No information available.

Pyridine
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.

Methylimidazole
Epidemiology: No information found.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Mutagenicity: No information found.
Neurotoxicity: 1-Methylimidazole produced neurological effects and convulsions in mice.

12. ECOLOGICAL INFORMATION

Ecotoxicity (Tetrahydrofuran):
Fish: Fathead minnow: 2160 mg/L; 94 Hr; flow through bioassay (pH 7.5);
Water flea Daphnia: EC50 = 5930 mg/L; 24 Hr;
Environmental Fate (Tetrahydrofuran): THF is not expected to adsorb to suspended matter in water based on its measured Koc values. This compound should volatilize from water surfaces. An estimated BCF value of 1 suggests that THF will not bioconcentrate in aquatic organisms. If released to the atmosphere, Tetrahydrofuran will exist solely in the vapor phase and is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and nitrate radicals with half-lives of about 1 and 3 days, respectively. Measured Koc values of 23 and 18 indicate that THF will have very high mobility in soil.
Ecotoxicity (Pyridine):
Fish: Fathead minnow: LC50 = 106 mg/L, 96H, flow-through, no data available.
Environmental Fate (Pyridine):
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 volatization.
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.
Environmental Fate (Methylimidazole): Not readily biodegradable.

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. Tetrahydrofuran is a "U" listed waste (U213 – ignitable waste). Pyridine is a "U" listed waste (U196).

14. TRANSPORT INFORMATION

US DOT
Proper Shipping Name: Flammable Liquid, corrosive, n.o.s. (Tetrahydrofuran, Pyridine, Methylimidazole)
Hazard Class: 3(8)
UN Number: UN2924
Packing Group: II

IMDG
Proper Shipping Name: Flammable Liquid, corrosive, n.o.s. (Tetrahydrofuran, Pyridine, Methylimidazole)
Hazard Class: 3(8)
UN Number: UN2924
Packing Group: II EMS-No: F-E, S-C

IATA
Proper Shipping Name: Flammable Liquid, corrosive, n.o.s. (Tetrahydrofuran, Pyridine, Methylimidazole)
Hazard Class: 3(8)
UN Number: UN2924
Packing Group: II

Canada TDG
Additional Information: Flashpoint -14 C

15. REGULATORY INFORMATION

US Federal Regulations:

TSCA (Toxic Substances Control Act):
CAS# 109-99-9 (Tetrahydrofuran), CAS# 110-86-1 (Pyridine), and CAS# 616-47-7 (Methylimidazole) are listed on the TSCA Inventory.
Chemical Test Rules: CAS# 109-99-9 is subject to 40 CFR 799.5115.
Section 12b: CAS# 109-99-9 is subject to the 1% de minimis rule under Section 4.
Significant New Use Rule (SNUR): None of the components have an SNUR under TSCA.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):
Hazardous Substances:
CAS# 109-99-9: Final RQ = 1000 lbs (454 kg).
CAS# 110-86-1: Final RQ = 1000 lbs (454 kg).

SARA (Superfund Amendments and Reauthorization Act):
Section 302: None of the components have a Threshold Planning Quantity (TPQ).
SARA Codes:
CAS# 109-99-9: Immediate, fire, reactive hazards.
CAS# 110-86-1: Immediate, delayed, fire hazards.
Section 313 (TRI Reporting):
Tetrahydrofuran (CAS# 109-99-9) and Methylimidazole (CAS# 616-47-7) are not subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.
Pyridine (CAS# 110-86-1) is subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.

Clean Air Act (CAA):
CAS# 109-99-9, CAS# 110-86-1, and CAS# 616-47-7 are not listed as hazardous air pollutants (HAPs).
None of the components are Class 1 or Class 2 ozone depleters.

Clean Water Act (CWA):
CAS# 109-99-9, CAS# 110-86-1, and CAS# 616-47-7 are not listed as Hazardous Substances, Priority Pollutants, or Toxic Pollutants.

OSHA (Occupational Safety and Health Administration):
None of the components are considered highly hazardous by OSHA.

US State Regulations:

Right-to-Know Lists:
CAS# 109-99-9, CAS# 110-86-1, and CAS# 616-47-7 are listed on the following state right-to-know lists: California, New Jersey, Pennsylvania, Minnesota, and Massachusetts.

California Proposition 65:
This product contains Pyridine (CAS# 110-86-1), a chemical known to the State of California to cause developmental and reproductive toxicity.
No Significant Risk Level (NSRL): Not listed.

Canada:

DSL/NDSL (Domestic Substances List/Non-Domestic Substances List):
CAS# 109-99-9, CAS# 110-86-1, and CAS# 616-47-7 are listed on Canada's DSL.

WHMIS (Workplace Hazardous Materials Information System):
This product has a WHMIS classification of B2, D1B, D2B, E.
The classification is in accordance with the hazard criteria of the Controlled Products Regulations.

Ingredient Disclosure List:
CAS# 109-99-9, CAS# 110-86-1, and CAS# 616-47-7 are listed on Canada's Ingredient Disclosure List.

16. OTHER INFORMATION

Originally Prepared: 2/11/2008
Last Revised: 03/18/2025 – Updated Formula.

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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