SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product: **TRI Reagent, TRI Reagent LS, TRI Reagent BD, TRI Reagent RT**
Cat. Nos. **TR 118, TS 120, TB 126, RT 111**

Molecular Research Center, Inc.
5645 Montgomery Rd.
Cincinnati, Ohio 45212
USA 1-888-841-0900
Fax: 513-841-0080

Product Name: Tri Reagent, TRI Reagent LS, TRI Reagent BD, TRI Reagent RT
Application: Nucleic acid extraction solution for tissue, cells, liquids and blood.
Synonym: Phenol solution
Chemical Formula: A formulation
Molecular Weight: A formulation

CHEMTREC EMERGENCY NUMBER: Only in the event of an emergency involving a spill, leak, fire exposure or accident. USA & Canada: 1-800-424-9300; International: +1-703-527-3887.

For research use only.

2. HAZARD IDENTIFICATION

GHS - Classification

Signal Word: **Danger**


Health Hazard

Hazard Class	Hazard category	Code	Health Hazard Statements
Acute toxicity, oral	Category 4	H302	Harmful if swallowed
Acute toxicity, dermal	Category 4	H312	Harmful in contact with skin
Acute toxicity, inhalation	Category 4*	H332	Harmful if inhaled
Skin/Eye Corrosion/irritation	Category 1B	H314	Causes skin burns and eye damage

*Minimal inhalation hazard when used in fume hood or well-ventilated room. Prolonged inhalation of high concentrations of phenol fumes can be hazardous.

Precautionary statements

Code	Prevention precautionary statements
P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P261	Avoid breathing dust/fumes/gas/mist/vapors/spray
P264	Wash…thoroughly after handling
P270	Do not eat, drink or smoke when using this product
P271	Use in a well-ventilated area
P273	Avoid release to the environment
P280	Wear protective gloves/protective clothing/eye protection/face protection
P301+P312	If Swallowed: Call a POISON CENTER or doctor/physician if you feel unwell
P301+P330+P331	If Swallowed: Rinse mouth. Do not induce vomiting
P302+P361+P352	If on skin: Remove/Take off all contaminated clothing. Wash with plenty of soap and water.
P306+P363	If on clothing: Wash contaminated clothing before reuse.
P304+P340	If Inhaled: Remove victim to fresh air and keep at rest in a comfortable position for breathing
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P303+P361+P353	If on skin or hair: Immediately take off all contaminated clothing. Rinse skin with water/shower.
P309+P311	If exposed or you feel unwell: Call a POISON CENTER or doctor/physician.
P403+P233	Store in well-ventilated location. Keep container tightly closed.

Potential Routes of Exposure and Resulting Health Effects

EYES Eye contact may be corrosive to tissue, may cause blindness. Acute exposure may result in tearing, conjunctiva swelling, loss of sensation and blurred vision. Chronic exposure or repeated and prolonged exposure to fumes/ vapors may cause corneal ulceration, permanent damage or blindness.

SKIN Dermal contact may irritate/inflame the skin, with burning sensation or localized loss of feeling (sensitizer, permeator). Skin is a principal route of entry and toxic quantities may be rapidly absorbed. The amount of tissue damage depends on the duration of exposure to the skin. Prolonged exposure can cause severe chemical burns. On skin, there is an initial local anesthesia followed with a white discoloration. Burns may be severe, but painless due to damage to nerve endings. Itching, scaling, reddening and occasionally blistering can characterize skin exposure. Vapors and liquids may be readily absorbed through the skin to cause systemic effects as detailed in acute inhalation exposure. Chronic, long-term exposure may cause dermatitis, and skin sensitization. Pathologic findings include congestion of the lungs, liver, spleen, and kidneys.

INHALATION Prolonged exposure may cause respiratory tract irritation, injury or arrest. Symptoms of chronic phenol poisoning may include vomiting, difficulty swallowing, diarrhea, anorexia, headache, vertigo, muscle weakness and pain, mental disturbances, dark or smoky urine and possible skin eruptions. Extensive damage to the liver and kidneys may be fatal.

INGESTION May cause severe burns to the mouth or throat and severe abdominal burning sensation. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

HMIS Classification

Health Hazard 3
Chronic Health Hazard *****
Flammability 1
Physical hazards 0
PPE = D

NFPA Rating

Health Hazard 3
Fire 1
Reactivity 0

3. COMPOSITION/Information on Ingredients

Component		Concentration
Phenol	CAS No. 108-95-2 EINECS No. 203-632-7	<50 %
Thiocyanic acid, Compound with guanidine	CAS No. 593-84-0 EINECS No. 209-812-1	<30%

4. FIRST AID

SKIN CONTACT: Rescuers should wear protective clothing and gloves while treating patients whose skin is contaminated with phenol. Remove contaminated clothing rapidly and irrigate or wipe exposed areas immediately and repeatedly with low-molecular-weight polyethylene glycol (PEG 300 or PEG 400) which can be diluted to 50% for easier application. Treatment should be continued until there is no detectable odor of TRI Reagent. If PEG is not available, a glycerin solution, olive oil or vegetable oil can be used instead. If these liquids are not available, irrigation with a high-density shower will reduce phenol uptake, but lesser amounts of water will merely dilute the phenol and expand the area of exposure. After treatment with the high-pressure shower, the skin should be washed with soap and water for at least 15 minutes. **Decontamination must begin as soon as possible to minimize phenol absorption**. In case of chemical burns, cover area with sterile, dry dressing, bandage securely, but not too tightly. Get medical attention immediately. Double-bag contaminated clothing and personal belongings. See the attached link for additional information (Phenol | Toxic Substances | Toxic Substance Portal | ATSDR (cdc.gov).

EYE CONTACT: Wash eyes immediately, for at least 15 minutes, with large amounts of water, holding upper and lower lids open. Remove contact lenses, if present and it is easy to do so. Get medical attention immediately.

INGESTION: Wash out mouth if vomiting occurs, have person lean forward with head down to avoid breathing in vomit. Seek immediate medical attention. Do not induce vomiting unless directed to do so by medical personnel. Have conscious person drink several glasses of milk or water. Seek immediate hospital medical attention.

INHALATION: Remove from exposure to fresh air immediately. If breathing has stopped, give artificial respiration. Maintain airway and blood pressure and administer oxygen if available. Treat symptomatically and supportively. Oxygen should be administration by qualified personnel. Get medical attention immediately.

Note to attending physician: No known specific antidote. Areas of skin contact smaller than 100 cm^2 may cause a minor health hazard. Systemic doses less than 1 gm may cause a minor health hazard although individual sensitivity may vary. For ingestion exposure: give castor oil or other vegetable oil. Give charcoal slurry if conscious. Treat symptomatically. Observe for 24 hrs. Be prepared for emergency cardiovascular intervention. See the following link for additional information (http://www.cdc.gov/niosh/docs/81-123/pdfs/0493.pdf).

5. FIRE FIGHTING MEASURES

Moderate fire hazard when exposed to heat or flame. Vapor-air mixtures are explosive above flash point. Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Fires involving phenol should be fought upwind from the maximum distance possible. Emergency personnel should stay away from low areas and ventilate closed spaces before entry.

Flash point: 110º C D93 Method A

EXTINGUISHING MEDIA: Use Class B extinguishers (oils, hydrocarbon liquids.) Dry chemical, carbon dioxide, halon, water spray or standard foam (1987 Emergency Response Guidebook, DOT P 5800.4) for larger fires, use water spray, fog or standard foam (1987 Emergency Response Guidebook, DOT P 5800.4)

FIREFIGHTING: Evacuate area. Wear positive pressure self-contained breathing apparatus. Extinguish using agents indicated. Phenol is combustible and containers may explode in fire. Avoid breathing toxic fumes produced under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

Note that accidental releases may be subject to special reporting requirements and other regulatory mandates. Check and comply with local applicable laws and regulations.

PERSONAL PROTECTIVE EQUIPMENT: Use gloves, boots, Tyvek suit or other impervious covering to avoid skin contact. Use chemical goggles, face shield, or other appropriate eye protection. Ensure adequate ventilation.

SPILL AND LEAK PROCEDURES: Restrict persons not wearing protective equipment from area. Remove all ignition sources. Neutralize spill with inert absorbent materkal. Collect powdered material and deposit in sealed containers and dispose as hazardous waste. Isolate area and deny entry.

U.S. DOT EMERGENCY GUIDE # 60
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK # 153

ENVIRONMENTAL PRECAUTIONS: Prevent product from entering drains or ground water systems.

7. HANDLING AND STORAGE

Observe all Federal, state, and local regulations when storing or disposing of this substance. Store in an area appropriate for flammables; a cool, dry, well-ventilated location, away from direct sunlight, heat or sources of ignition. Avoid contact with hypochlorite, strong oxidizers such as chlorine and bromine. Use personal protective equipment.

Applications: For research use only.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Phenol OSHA PEL - 5 ppm (19 milligrams per cubic meter) 8-hour TWA; OSHA PEL (Ceiling) – none; ACGIH OEL (TWA) – none; ACGIH OEL (STEL) – none. **Thiocyanic acid, compound with guanidine** OSHA PEL, OSH PEL Ceiling), ACGIH OEL, ACGIH (STEL) – none.

Use engineering measures to ensure adequate ventilation.

GENERAL PROTECTION AND PRECAUTIONS

PROTECTIVE MEASURES: Do not touch unprotected skin. Do not wear contact lenses while handling this product. Do not pipette by mouth. Area ventilation is generally adequate; use fume hood if available.

AIR PURIFYING RESPIRATOR CANISTERS / CARTRIDGES: Stacked cartridge for organic vapors (black ANSI color code, NIOSH approved) plus dust, mist (red ANSI color code, NIOSH approved).

GLOVES AND PROTECTIVE CLOTHING: User must wear appropriate (impervious) clothing and gloves (rubber or neoprene rubber) to prevent any possibility of skin contact with this substance.

EYE PROTECTION: Tightly sealing safety goggles as minimum eye protection.

EMERGENCY WASH FACILITIES: Eyewash and quick drench shower recommended.

ROUTINE OPERATIONS: Lab coats, safety glasses with side shields and gloves should be considered minimum body protection. Wash hands thoroughly after using the reagent and never eat, drink, use tobacco products, apply cosmetics or take medications where solution is handled, processed or stored. Always wash hands after using the reagent.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Liquid
Description:	Red to maroon color with a characteristic sweet, medicinal or tar-like odor.
Boiling point:	110 C
Melting point:	Not applicable
Vapor pressure:	>0.35 mmHg@25C
Evaporation rate:	Not determined
Solvent solubility:	Soluble in water, methanol and glycerol; relatively soluble in aqueous alkali hydroxides, and dimethyl sulfoxide.

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressures.

INCOMPATIBILITIES: Acetaldehyde: violent reaction.
Aluminum and alloys: may corrode.
Aluminum chloride + nitrobenzene: violent explosion.
1, 3-butadiene, boron trifluoride, and diethyletherate: possible explosion
Calcium hypochlorite: exothermic reaction with possible ignition.
Formaldehyde: possible exothermic reaction.
Lead and alloys: may corrode.
Magnesium and alloys: may corrode.

OXIDIZERS: (strong) Fire and explosion hazard.
Peroxodisulfuric acid: possible explosion.
Peroxomonosulfuric acid: explosion.
Plastics and rubber coatings: may corrode.
Sodium nitrate + trifluoroacetic acid: violent exothermic reaction.
Sodium nitrite: may explode.
Zinc and alloys: may corrode.

DECOMPOSITION: Thermal decomposition products may include toxic oxides of carbon.
Polymerization: Hazardous polymerization has not been reported to occur under normal temperatures and pressures.

CORROSIVITY: Slightly corrosive in the presence of stainless steel. Non-corrosive in glass.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Human: (phenol) 10 mg/kg oral LDLO. **Rat:** (phenol) 317 mg/kg oral LD50; (TRI Reagent) 673 mg/kg acute oral LD50; >1000 mg/kg acute dermal LD50. (TRI Reagent BD) 534 mg/kg acute oral LD50. (TRI Reagent RT) 1620 mg/kg acute oral LD50. (Guanidine thiocyante) 593 mg/kg oral LD50. **Mouse:** (phenol) 270 mg/kg LD50 oral.

TRI Reagent products: DOT Dermal Toxicity Test, 49CFR 173.137, Class 8, Packing Group II.

PRINCIPLE ROUTES OF EXPOSURE:
Acute toxicity: Harmful if swallowed. Harmful if inhaled. Harmful in contact with skin.
Skin/eye corrosion/irritation: Causes skin burns and eye damage.
Respiratory or skin sensitization, Single exposure STOT, Repeated exposure STOT, Carcinogenicity, Germ cell mutation, Reproductive toxicity, Aspiration hazard: Not classified based on available data.

12. ECOLOGICAL INFORMATION

TOXICITY:
Product. Toxicity to fish, algae, bacteria; no data available.
Phenol. Toxicity to fish, bacteria; no data available. Toxicity to algae; Desmodesmus subspicatus EC50 187-279 mg/L (72 h), Pseudokirchneriella subcapitata EC50 46 mg/L (96 h). Toxicity to daphnia and other aquatic invertebrates; Daphnia magna EC50 4-11 mg/L (48 h).
Thiocyanic acid, compound with guanidine. Toxicity to algae, fish, bacteria, invertebrates; no data available.

MOBILITY IN SOIL, PERSISTENCE AND DEGRADABILITY, BIOACCUMULATION, RESULTS OF PBT AND vPVb ASSESSMENT: No information available.

13. DISPOSAL CONSIDERATIONS

EPA WASTE NUMBER (RCRA HAZARD CLASS) UN1760, 8. All waste disposal activities are subject to federal, state and local laws and regulations. Handle as hazardous waste. Dispose of contents/containers according to local institutional regulations. Minimize waste generation.

14. TRANSPORTATION INFORMATION

IATA / ADR / DOT-US / IMDG
UN or ID Number: UN1760
UN Proper Shipping Name: Corrosive Liquid, N.O.S. (Phenol – Guanidine Thiocyante Solution)
Transport Hazard Class: 8
Packing Group: II

Transport in bulk according to Annex II of MARPOL and IBC Code: Not applicable as supplied.

15. REGULATORY INFORMATION

OSHA: Classified as a HAZARDOUS CHEMICAL@ under US OSHA HAZCOM REGULATION.
TSCA: Some constituents of this product included in US EPA Toxic Substance Control Act (40 CFR part 710).
SARA SECTION 302 Threshold Planning Quantity: 500/10,000 lbs.
CERCLA SECTION 103 Reportable quantity: 1000 lbs.
SARA SECTION 304 Reportable quantity: 1000 lbs.
SARA 311/312 Fire hazard, acute health hazard, chronic health hazard
SUBJECT TO SARA SECTION 313 Annual toxic chemical release reporting.

CLEAN AIR ACT. Section 112 Hazardous Air Pollutants. Phenol is present.

Massachusetts, New Jersey, Pennsylvania. Right to Know. Phenol listed.
Vermont, Washington. Chemicals of High Concern. Phenol listed.
California. Hazardous Substances and Permissible Exposure Limits for Chemical Contaminants. Phenol listed.

MAC (GERMANY): 5 ppm phenol in air, 19 mg/m3 phenol with skin warning. EINECS # 2036327.

RISK PHRASE: R20/21/22. Harmful if inhaled. Harmful in contact with skin and if swallowed. R34, R41. Causes burns, risk of serious damage to eyes.

SAFETY PHRASE: S28. After contact with skin, wash immediately with plenty of detergent and water. S45. In case of accident, or if you feel unwell, seek medical attention.

SAFETY SYMBOL: CORROSIVE, HARMFUL

16. OTHER INFORMATION

Reviewed by	BW, SP
Creation date	9/01/94
Revision date	10/16/2023 SP

Reason for Revision: Incorporate Globally Harmonized System of Chemical Classification.

This information is believed to be accurate and represents the information currently available to us. However, we make no warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.