VANDERBILT UNIVERSITY

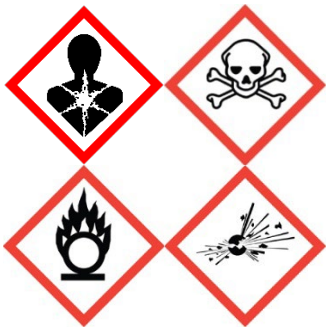
Principal Investigator: Date Approved:

This document covers basic chemical safety protocols (CSP) for tetranitromethane (TNM) and supplements the laboratory Chemical Hygiene Plan as appropriate. Additional lab-specific safety operating procedures for TNM may also be required. The use of any TNM is subject to pre-approval by the Principal Investigator (PI) and/or the designated Laboratory Responsible Safety Person. DO NOT USE ANY TNM UNTIL YOU HAVE OBTAINED THE NECESSARY PRE-APPROVAL AND TRAINING.

Tetranitromethane

Tetranitromethane (TNM, $C(NO_2)_4$) is a light yellow, oxidizing liquid with a high potential for causing fires or explosions. Inhalation of this toxic substance causes the lungs to fill with fluid, which can be fatal (LC50 = 18 ppm). It is also anticipated to be carcinogenic. The likelihood of TNM detonating is greatly increased in the presence of impurities - even at low concentrations - or when combined with equal parts fuel. At high pH and moisture levels TNM converts to trinitromethane - which then reacts with metals to form highly unstable and explosive salts.

TNM is used in laboratory settings as a nitrating reagent or to test for the presence of double bonds in organic compounds.



Personal Protective Equipment & Personnel Monitoring

Lab Coat

Flame-resistant lab coat.

Gloves

Nitrile or neoprene gloves.

Eye Protection

Face Shield

ANSI Z87.1-compliant safety glasses or safety goggles. Consider using a face shield and/or blast shield for extra protection, especially if heating.

Labeling & Storage

Store tightly sealed at 2 - 8 °C in an explosion-proof refrigerator. Do not store with flammables, combustibles, reducing agents, bases, metals, or organic materials. Keep away from heat, light, and any potential initiating mechanisms. Each container's label must include pictograms identifying the material as potentially explosive, acutely toxic, and a carcinogen. Containers of TNM must be stored in leak-proof secondary containment within a designated area. The secondary container's label must include appropriate pictograms and identify the material as potentially explosive, acutely toxic, and a carcinogen. Also, if not plainly visible (e.g., through a cabinet window), labelling must be applied to storage locations where these are stored to avoid an inadvertent encounter.

Engineering Controls, Equipment & Materials

Fume Hood	Work in a chemical fume hood whenever possible. Keep the sash at the lowest practical height while working, and close the sash when the fume hood is not in use. If your protocol does not permit the handling of this chemical in a fume hood, contact the Department of Environmental Health, Safety and Sustainability (EHSS) to determine whether additional respiratory protection is warranted.

Blast Shield	When working with TNM the use of a portable blast shield inside the fume hood is highly recommended.

Cautions and Considerations

Initiating Mechanism	Before working with tetranitromethane, remove from the work area all items that could inadvertently lead to an explosion via friction, impact, flammability/combustibility, light, or heat. Also consider working with equipment that cannot generate static electricity or sparks.

Housekeeping

Spills	Notify others in the area of the spill, including your PI/Responsible Safety Person. If it is a small spill that you can easily handle, use the contents of your lab spill kit to clean it up. If it is a large spill, then evacuate the area where the spill occurred. Call Vanderbilt University Public Safety (VUPS) at 615-421-1911 or use the VandySafe app on your smart phone. Report any exposure through Risk and Insurance Management's Origami portal and mark that it occurred in research when prompted. Both VUPS and the Origami system will notify EHSS of the incident. Remain on site at a safe distance to provide detailed **explosion risk** information to first responders.
Decontamination	Decontaminate equipment and work surfaces which may have come into contact with TNM using soap and water.
Waste	Collect spent material in sealed containers protected from light and heat to dispose of as hazardous waste. Refer to the laboratory *Chemical Hygiene Plan* (Section 6.7) for information on proper chemical waste disposal procedures.

First Aid & Emergencies

Skin Contact	Immediately remove contaminated clothing and shoes; wash skin with soap and plenty of water. Get medical attention immediately.
Eye Contact	Immediately flush eyes with water for at least 15 minutes. Get medical attention immediately.
Inhalation	Without putting yourself at risk, move person into fresh air. Get medical attention immediately.
Ingestion	Rinse mouth with water for at least 15 minutes. Get medical attention immediately.

Name	Signature	Date