SAFETY DATA SHEET

URANYL NITRATE HEXAHYDRATE

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

NBL Program Office
U. S. Department of Energy,
1 Science.gov Way,
Oak Ridge, TN 37830
1-865-576-0598

Emergency Phone Numbers: 1-865-576-0596

Chemical Name: Uranyl Nitrate Hexahydrate

Other Identifiers: Certified Reference Material (CRM) standard or Safeguards Measurement Evaluation (SME) sample. Uranyl Nitrate Hexahydrate, dried. Includes depleted, natural and high enrichment (up to 97%) with U235.

Use and Restriction: This material is prepared for use as a standard or in inter-laboratory comparison programs at analytical laboratories, which routinely handle uranium. NBL Program Office (NBL PO) expects that recipients of this material are in compliance with 29 CFR 1910.1200(h) which requires employers to provide employees with effective information and training on hazardous chemicals in their work area.

SECTION 2 – HAZARDS IDENTIFICATION

Classifications/Hazards:

OSHA HAZARDS: Oxidizer. Highly toxic by inhalation. Highly toxic by ingestion. Carcinogen (ionizing radiation).

TARGET ORGANS: Kidney, Liver, Lungs, Brain.

GHS Classification
Oxidizing solids (category 2)
Acute toxicity, Oral (Category 2)
Acute toxicity, Inhalation (Category 2)
Specific target organ toxicity: repeat exposure (Category 2)
Acute aquatic toxicity (Category 2)
Chronic aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram 

Signal Word Danger

Hazard statement(s)

H272	May intensify fire; oxidizer
H300 + H330	Fatal if swallowed or inhaled
H373	May cause damage to organs through prolonged or repeated exposure
H411	Toxic to aquatic life with long lasting effects

Precautionary statement(s)

P220	Keep/Store away from clothing/combustible materials
P260	Do not breathe dust/fume/gas/mist/vapors/spray
P264	Wash hands thoroughly after handling
P273	Avoid release to the environment
P284	Wear respiratory protection
P310	Immediately call a POISON CENTER or doctor/physician if exposed

Other Hazards

Radioactive 

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 3

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 3

Calif. Prop. 65 carcinogen. Target organ(s): Kidneys. Liver.

*additional chronic hazards present.
For additional information on toxicity, please refer to Section 11.

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name: Uranyl Nitrate Hexahydrate (U02(NO3)2) ·6H2O

Molecular Weight: 502.13 g/mol

Common Names/Synonyms: Dinitratodioxouranium hexahydrate * Uranium, bis(nitrato-O)dioxo-, hexahydrate (T-4)- (9CI) *Uranium, dinitratodioxo-, hexahydrate * Uranyldinitrate hexahydrate * Uranylnitrate hexahydrate NBL ME001, low enriched UNH.

CAS#: 13520-83-7

Chemical Family: Radioactive material.

RTECS Number: YR3850000

SECTION 4 – FIRST AID MEASURES

Indication of Immediate Medical Attention: In all routes of exposure, seek medical treatment immediately. Medical problems take priority over radiologic concerns. See treatment/first-aid measures below.

Necessary First Aid Measures:

Inhalation Exposure
If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

Oral Exposure
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Dermal Exposure
In case of contact, immediately wash skin with soap and copious amounts of water.

Eye Exposure

In case of contact with eyes, flush with copious amounts of water for at least 20 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

SECTION 5 – FIRE FIGHTING MEASURES

Conditions of flammability
Not flammable or combustible.

Suitable Extinguishing Media
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

Special protective equipment for firefighters
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.

Hazardous combustion products
Hazardous combustion products formed under fire conditions – nitrogen oxides (NOx). Uranium oxides.

Further Information
Use water spray to cool unopened containers. The product itself does not burn.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Emergency Overview
Oxidizing. Highly Toxic (USA) Very Toxic (EU). Oxidizing. Dangerous for the environment.
Contact with combustible material may cause fire. Very toxic by inhalation and if swallowed. Danger of cumulative effects. Irritating to eyes, respiratory system and skin. Confirmed human carcinogen. Risk of serious damage to eyes. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Environmental Precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into environment must be avoided.

Personal Precautions
Handle as a radioactive spill. Wear respiratory protection, rubber boots, tyvek coverall and nitrile gloves.

Methods and materials for containment and cleaning up

HEPA vacuum or wet wipe spills, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure. Avoid formation of dusts and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for Safe Storage
Keep container tightly closed in a dry and well ventilated place.

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits

USA ACGIH TLV 0.2 mg/m3, STEL 0.6 mg/m3
USA OSHA. PEL TWA 0.05 mg/m3 as soluble uranium and 0.25 mg/m3 as insoluble uranium USA, NIOSH IDLH 10 mg/m3 as uranium

Ionizing radiation is a confirmed human carcinogen.

ENGINEERING CONTROLS
Use in a chemical fume hood. Safety shower and eye wash should be nearby.

WORK PRACTICES
Use with proper PPE and engineering controls.

SHIELDING:

ALPHA PARTICLES: For the energy range of alpha particles usually encountered, a fraction of a millimeter of any ordinary material or a few inches of air is sufficient for absorbance.

BETA PARTICLES: Beta particles are more penetrating than alpha, and require more shielding. Materials composed mostly of elements of low atomic number such as acrylic, and thick rubber are most appropriate for the absorption of beta particles. Uranium does not emit significant amounts of beta particles.

GAMMA RAYS: The most suitable materials shielding gamma radiation are lead and iron. These solutions do not emit significant amounts of gamma radiation. Consult a radiation protection specialist or health physicist for more information.

Personal Protective

Equipment Eye Protection
Employee must wear appropriate eye protection that will not allow the introduction of foreign material into the eyes. Contact lenses should not be worn. Safety goggles are recommended when opening ampoules or if exposure to nitric acid vapors is possible. Clothing, glove and eye protection equipment will provide protection against alpha particles, and some protection against beta particles; depending on thickness, personal protection equipment will not shield gamma radiation.

Skin and Body Protection
Laboratory uses only protective clothing is required. In the event of an accident, large-scale release or a large-scale clean-up full protective clothing will be necessary.

Hand Protection
Employee should wear appropriate protective gloves during transfer, fuming and other operations where contamination is possible. Used gloves should be disposed of as radioactive waste.

Respiratory Protection
If exposure to corrosive vapors, toxic oxides of nitrogen, or particulates of uranium material is possible, a respirator with acid and/or particulate cartridges should be used. Nitric acid is an oxidizer. Do not use cartridges containing oxidizable materials such as activated charcoal.

Hygiene Measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

SECTION 9 – PHYSICAL/CHEMICAL PROPERTIES

Physical State: Solid
Form: Crystals
pH: N/A
BP/BP Range N/A
MP/MP Range N/A
Freezing Point N/A
Vapor Pressure N/A
Vapor Density N/A
Saturated Vapor Conc. N/A
Bulk Density N/A
Odor Threshold N/A
Volatile% N/A
VOC Content N/A

Water Content N/A
Solvent Content N/A
Evaporation Rate N/A
Viscosity N/A
Surface Tension N/A
Partition Coefficient N/A
Decomposition Temp. N/A
Flash Point N/A
Explosion Limits N/A
Flammability N/A
Autoignition Temp N/A
Refractive Index N/A
Optical Rotation N/A
Miscellaneous Data N/A
Solubility N/A

N/A = not available

SECTION 10 – STABILITY AND REACTIVITY

Chemical Stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Hazardous polymerization will not occur

Conditions to avoid
No data available.

Materials to Avoid
Combustibles.

Hazardous decomposition products
Nitrogen oxides, Uranium oxides.

SECTION 11 – TOXICOLOGICAL INFORMATION

Route of Exposure
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.

Inhalation: May be fatal if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be fatal if swallowed.

Target Organs(s) or System(s)
Kidneys. Liver. Lungs. Brain.

Chronic Toxicity
Damage to the liver. Damage to the lungs. Blood effects. Symptoms may be delayed. Damage to the kidneys.

Acute Toxicity
Intraperitoneal
Rat
135 mg/KG
LD50
Subcutaneous
Chicken
299 mg/KG
LD50

Remarks: Kidney, Ureter, Bladder: Other changes. Lungs, Thorax, or Respiration: Structural or functional change in trachea or bronchi. Liver.

Carcinogenicity
Contains a radioactive isotope which may produce cancer and genetic mutation.

IARC: No chemical component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No chemical component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No chemical component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Germ cell mutagenicity
Mutagen
Species: Hamster
Dose: 180 mg/L
Cell Type: lung
Mutation test: Cytogenetic analysis

Potential health effects
Inhalation - May be fatal if inhaled. May cause respiratory tract irritation.

Ingestion – May be fatal if swallowed.
Skin – May be harmful if absorbed through the skin. May cause skin irritation.
Eyes – May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge the chemical, physical, and toxicologic properties have not been thoroughly investigation. Kidney injury may occur. Liver injury may occur. Damage to the lungs. Blood disorders. Symptoms may be delayed.

Synergistic effects
No data available.

Additional Information
RTECS: YR3850000

SECTION 12 – ECOLOGICAL INFORMATION

Toxicity
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Persistence and degradability
Not readily biodegradable.

Bioaccumulative potential
No data available.

SECTION 13 – DISPOSAL CONSIDERATIONS

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Consult local, state, and federal regulations on the disposal of radioactive waste.

SECTION 14 – TRANSPORT INFORMATION

The U.S. Department of Transportation (D.O.T.) Code of Federal Regulations (49 CFR Parts 100-185), the International Air Transportation Association (IATA), International Civil Aviation Organization (ICAO) and International Maritime Organization (IMDG) are all factored into the classification and transport of material.

Proper Shipping Name:

Hazard Class:
UN/ID Number: To be determined on a case by case basis.
Special Information:
Packing Group:

Classification of substances with multiple hazards must be determined in accordance with the criteria presented in the above mentioned regulations. Due to the various quantities/combinations of materials being shipped at one time, the information above must be determined based on the characteristics of the specific shipment.

SECTION 15 – REGULATORY INFORMATION

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: T+-R-N
Indication of Danger: Very toxic. Radioactive. Dangerous for the environment. R: 26/28-33-51/53
Risk Statements: Very toxic by inhalation and if swallowed. Danger of cumulative effects. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S: 20/21-45-61
Safety Statements: When using do not eat, drink, or smoke. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Highly Toxic (USA) Very Toxic (EU). Oxidizing. Dangerous for the environment.
Risk Statements: Contact with combustible material may cause fire. Very toxic by inhalation and if swallowed. Danger of cumulative effects. Irritating to eyes, respiratory system and skin. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: Keep away from combustible material. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap-suds. Wear suitable protective clothing and gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION
SARA 313/312 Hazards
Reactivity Hazard. Acute Health hazard. Chronic Health Hazard.

UNITED STATES - STATE REGULATORY INFORMATION
CALIFORNIA PROP - 65
California Prop - 65: California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer. California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer. Target organs: liver and kidney.

Listed Component Bis(nitrato-O)dioxouranium hexahydrate

Massachusetts Right to Know Component, Pennsylvania Right to Know Component, New Jersey Right to Know Component.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: No

SECTION 16 – OTHER INFORMATION

The information and recommendations set forth herein are presented in good faith and believed to be correct as of the revision date. However, recipients of this material should use this information only as a supplement to other information gathered by them, and should make independent judgement of the suitability and accuracy of this information. This statement is not intended to provide comprehensive instruction in developing an appropriate safety program and does not include all regulatory guidelines.

This information is furnished without warranty, and any use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

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