8/26/2024 File reviewed, more current MSDS/SDS not available. CAS

Thorium Metal SDS

Thorium metal SDS

IBI Labs — THORIUM-232

SECTION 1: CHEMICAL PRODUCTS & COMPANY IDENTIFICATION

IBI Labs

3495 N. Dixie Hwy. Unit # 8

Boca Raton, FL 33431

Emergency Phone Numbers: 561-826-0061

Chemical Name: Thorium (metal)

Other Identifiers:

Use and Restriction: This material is prepared for use at analytic laboratories, which routinely handle thorium. IBI Labs 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: Highly toxic by inhalation. Highly toxic by ingestion.

TARGET ORGANS: Kidney, liver, lungs, brain.

GHS Classification

Acute toxicity, Oral (Category 2)

Acute toxicity, Inhalation (Category 2)

Specific target organ toxicity – repeated 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)

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

H250 Catches fire spontaneously if exposed to air.

Precautionary statement(s)

P220 Keep/Store away from clothing/combustible materials

P260 Do not breath dust/fume/gas/mist/vapours/spray.

P264 Wash hands thoroughly after handling

P273 Avoid release to environment

P284 Wear respiratory protection

P310 Immediately call Poison Center or doctor/physician

Other hazards

Radioactive

NFPA Rating

Health hazard: 3

Fire 0

Reactivity 3

CERCLA Ratings (SCALE 0-3)

Health U

Fire 0

Reactivity 3

Persistence 3

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name: Thorium Metal (U) 100%.

CAS #: 7440-29-1

Chemical Family: Metal

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: Remove to fresh air. If breathing becomes difficult, call a physician.

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

SKIN CONTACT: In case of contact, immediately wash skin with soap and copious amounts of water.

EYE CONTACT: 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.

Most Important Symptoms/Effects, Acute and Delayed: Uranium is a nephrotoxin, damaging the kidneys. Uranium is a skin, eye, and mucous membrane irritant.

SECTION 5: FIRE FIGHTING MEASURES

Suitable Extinguishing Media: Dry chemical, carbon dioxide, water spray or regular foam.

Fire and Explosion Hazard: Dangerous fire hazard when exposed to heat or flame. Dangerous explosion hazard when exposed to heat or flame. Pyrophoric.

Hazardous combustion products: Thermal decomposition may release toxic and/or hazardous gases.

Special Protective Equipment and Precautions for Fire-Fighters: Move container from fire area if you can do it without risk. Wear self-contained breathing apparatus if necessary. Apply cooling water to sides of containers exposed to flames until well after fire is out. Do not move damaged containers; move undamaged containers out of fire zone. For massive fire in cargo area, use

unmanned hose holder or monitor nozzles. Contact the local, State, or Department of Energy radiological response team. Use suitable

agent for surrounding fire. Cool containers with flooding amounts of water, apply from as far a distance as possible. Avoid breathing dusts or vapors, keep upwind. Keep unnecessary people out of area until declared safe by radiological response team.

unmanned hose holder or monitor nozzles. Contact the local, State, or Department of Energy radiological response team. Use suitable agent for surrounding fire. Cool containers with floodingamounts of water, apply from as far a distance aspossible. Avoid breathing dusts or vapors, keep upwind. Keep unnecessary people out ofarea until declared safe by radiological response team.

team.

SECTION 6: ACCIDENTAL RLEASE MEASURES

Personal Precautions and Protective Equipment: Avoid contact with eyes, skin and clothing. Avoid breathing dust. Wear respiratory protection, gloves, over garment and goggles. Evacuate personnel to safe areas.

Emergency Procedures/Methods and Materials for Containment and Clean-up: Do not touch damaged containers or spilled material. Damage to outer container may not affect primary inner container. For small liquid spills, take up with sand, earth or other absorbent material. For large spills, dike far ahead of spill for later disposal. Keep unnecessary people at least 150 feet upwind; greater distances may be necessary if advised by qualified radiation authority. Isolate hazard area and deny entry. Enter spill area only to save life; limit entry to shortest possible time. Detain uninjured persons and equipment exposed to radioactive material until arrival or instruction of qualified radiation authority. Delay cleanup until arrival or instruction of qualified radiation authority. Contact the local, State, or Department of Energy radiological response team. Use suitable agent for surrounding fire. Cool containers with floodingamounts of water, apply from as far a distance aspossible. Avoid breathing dusts or vapors, keep upwind. Keep unnecessary people out of area until declared safe by radiological response team.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling: Avoid contact with skin and eyes. wash hands thoroughly after handling.

Conditions for Safe Storage: Store in radioactive materials area. Keep container tightly closed. Store separately from incompatible materials. Observe all Federal, State and local regulations when storing this substance.

SECTION 8: EXPOSURE SONTROLS/PERSONAL PROTECTION

Exposure Limits:

Thorium, INSOLUBLE COMPOUNDS (As Th):

0.2 mg/m3 OSHA TWA; 0.6 mg/m3 OSHA STEL

0.2 mg/m3 ACGIH TWA; 0.6 mg/m3 ACGIH STEL

0.2 mg/m3 NIOSH Recommended TWA; 0.6 mg/m3 NIOSH Recommended

STEL

Occupational exposure to radioactive substances must adhere to standards established by the Occupational Safety and Health Administration., 29 CFR 1910.96, and/or the Nuclear Regulatory Commission, 10 CFR Part 20. IF purchased by DOE or DOE governed facilities subject to 10 CFR 835. Subject to foreign entity radiation protection regulations.

VENTILATION: At a minimum, provide local exhaust or process enclosure ventilation.

One method of controlling external radiation exposure is to provide adequate shielding. The absorbing material used and the thickness required to attenuate the radiation to acceptable levels depends on the type of radiation, its energy, the flux and the dimensions of the source.

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 absorbency. Rubber, cardboard or any such material will suffice.

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, aluminum and thick rubber are most appropriate for the absorption of beta particles. With high-energy beta radiation from large sources, Bremsstrahlung (X-ray production) contribution may become significant and it may be necessary to provide additional shielding of high atomic weight material, such as lead, to attenuate the Bremsstrahlung radiation. In the quantities shipped, Certified Reference Materials will not emit significant amounts of beta particles.

GAMMA RAYS: The most suitable materials shielding gamma radiation are lead and iron. Normal and depleted uranium is not normally considered gamma emitters. In the quantity shipped, enriched Certified Reference Materials will pose only a negligible gamma hazard.

EYE PROTECTION: Employee must wear appropriate eye protection that will not allow the introduction of particles into the eyes. Contact lenses should not be worn.

Clothing, glove and eye protection equipment will provide protection against alpha particles.

CLOTHING: Disposable over-garments, including head coverings and foot covering, should be worn by any employee engaged in handling any radioactive substance. These garments are also recommended even if the employee is working with a “glovebox” containment system.

In the event of an accident, full protective clothing will be necessary.

GLOVES: Employee must wear appropriate protective gloves to prevent contact with this substance. Used gloves may be contaminated and should be disposed of as radioactive waste.

RESPIRATOR: The following respirators and maximum use concentrations are recommendations by the U.S. Department of Health

and Human Services, NIOSH pocket guide to chemical hazards; NIOSH criteria documents or by the U.S. Department of Labor, 29 CFR 1910 Subpart Z.

The specific respirator selected must be based on contamination levels found in the work place, must not exceed the working limits of the respirator and be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

Thorium, Insoluble compounds (As U):

AT ANY DETECTABLE CONCENTRATION:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape – any air-purifying, full-facepiece respirator with a high-efficiency particulate filer.

Any appropriate escape-type, self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS: Any self-contained breathing apparatus that has a full facepiece respirator with a high-efficiency particulate filter.

Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Potential Health Effects

Inhalation

Short Term Exposure: may cause lack of appetite, nausea, vomiting, diarrhea, dehydration, kidney damage, blood in the urine, jaundice, weakness, drowsiness, incoordination, twitching, sterility, blood disorders, convulsions and shock. Exposure to radioactive substances increases one’s risk of developing cancer.

Long Term Effects: In addition to effects from short-term exposure, anemia, cataracts and lung damage may occur.

Skin

Short Term Exposure: No information available on significant adverse effects.

Long Term Effects: May cause skin irritation.

Eyes

Short Term Exposure: May cause irritation. Additionally, eye damage, including ulcerations, may occur.

Long Term Effects: It is unlikely that long term eye contact would occur as the effects of

short term exposure, over a period of time, would result in serious eye damage. However,

if long term exposure did occur, cataracts may also occur.

Ingestion

Short Term Exposure: May cause kidney damage. May cause increased cancer risk.

Long Term Effects: Same effects as short-term exposure.

CARCINOGEN STATUS:

OSHA: N

NTP: N

IARC: N

SECTION 9: PHYSICAL AND CHEMICAL PROPERT

DESCRIPTION: grayish white, dense, silvery, radioactive solid that is strongly electropositive. On vigorous shaking the metallic particles exhibit luminescence. It is ductile and malleable and ignites spontaneously in air.

Molecular weight: 232.04

Molecular formula: Th

Boiling point: 4787 C

Melting point: 1755 C

Specific Gravity: 11.71

Water Solubility: Insoluble

Solvent Solubility: Slightly Soluble in Acid

Partition Coefficient: Data Not Available

Auto-Ignition Temperature: Data Not Available

Decomposition Temperature: Data Not Available

Viscosity: Data Not Available

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: Clean Uranium turnings or chips oxidize readily in air. If confined in a container without air movement, they can ignite spontaneously. Moisture increases this reactivity.

Uranium turnings stored in water will form a hydride and ignite during warm weather.

Possibility of Hazardous Reactions (Polymerization): No data available.

Conditions to Avoid: May ignite itself if exposed to air. May burn rapidly with flare-burning effect and re-ignite after fire is extinguished.

Incompatible Materials: See below

CHLORINE: Violent Reaction

AIR: Violent Reaction

FLUORINE: Violent Reaction

NITRIC ACID: Reacts explosively or with the formation of an explosive surface coating or residue

NITROGEN OXIDE: Ignites

DINITROGEN TETROXIDE: Explodes or forms an explosive surface coating or residue

SELENIUM: Reacts violently or incandesces

SULFUR: Reacts violently or incandesces

WATER: Violent Reaction Hazard

AMMONIA: Reacts violently or incandesces at dull red heat

BROMIUM TRIFLUORIDE: Violent Reaction

TRICHLORO ETHYLENE: Violent Reaction

NITRYL FLUORIDE: Violent Reaction or glowing or white incandescence

CARBON DIOXIDE: At 750°C Interaction is so rapid that ignition will occur with the finely divided metal, and at 800°C the massive metal will ignite.

CARBON TETRACHLORIDE: Use of a carbon tetrachloride fire extinguisher on a small uranium fire led to an explosion.

CHLORINE: Ignites at 150-180°C

BROMINE VAPOR: Ignites at 210-240°C

IODINE VAPOR: Ignites at 260°C

ACIDS: Reacts with liberation of hydrogen and formation of salts of tetravalent uranium.

Hazardous Decomposition Products: Thermal decomposition may release toxic and/or hazardous gases.

SECTION 11: TOXICOLOGY INFORMATION

Thorium

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.

CARCINOGEN STATUS: Not carcinogenic as a chemical. Ionizing radiation is carcinogenic.

The toxicity of thorium metal has not been quantified. Thorium may be a skin, eye, and mucous membrane irritant, as well as a nephrotoxin. Thorium metal usually does not constitute an external radiation exposure hazard since it emits mainly alpha-radiation at a low energy level. It may constitute an internal radiation hazard if it is absorbed into the body, thus delivering alpha emission onto tissues in which it is stored.

HEALTH EFFECTS

INHALATION

Thorium

RADIOACTIVE/NEPHROTOXIN. 30 mg/m3 immediately dangerous to life and health.

ACUTE EXPOSURE – Thorium may enter the body through inhalation of fine particles that are approximately 1 micron in diameter. Uranium poisoning is characterized by generalized health impairment. It may cause changes in the kidneys, liver, lungs, and cardiovascular, nervous, and hemopoietic systems, and disorders of protein and carbohydrate metabolism. Symptoms may include oliguria, hematuria, albuminuria, and jaundice.

CHRONIC EXPOSURE – Workers exposed to high average levels of thorium dust have not had increased mortality rates from lung cancer, leukemia, bone cancer, or diseases of the respiratory and genitourinary systems. Lung cancer in uranium miners is probably the result of inhalation of radon daughters found in these mines. Chronic poisoning gives chest findings of pneumoconiosis, pronounced blood changes and generalized injury. Cancer or lymphatic and blood forming tissues may result. See the following sections regarding the effects of inhalation of an alpha emitter.

ALPHA RADIATION:

ACUTE EXPOSURE – Alpha radiation is densely ionizing with very high energy and will kill cells immediately adjacent to the source of contact. Damaged cells may not recover or be repaired. Alpha emitters may or may not be absorbed, depending on the solubility and particle size. Insoluble compounds may remain at or near the site of deposition, and soluble compounds may rapidly enter the bloodstream. Heavier particles will be brought up to the throat by ciliary action, and may then be swallowed. The lighter particles may be lodged deep in the alveolar air sacs and remain. The damage depends on how quickly they are eliminated, and the susceptibility of the tissue in which they are stored. A single large dose of radiation may lead to increases cancer risk.

CHRONIC EXPOSURE – The effects of chronic exposure by internally deposited alpha radiation is dependent upon the dose and target organ(a). Possible disorders include lung cancer, sterility, anemia, leukemia, or bone cancer.

The delayed effects of radiation may be due either to a single large overexposure or continuing low-level overexposure and may include cancer, genetic effects, shortening of life span and cataracts. Cancer is observed most frequently in the hematopoietic system, thyroid, bone and skin. Leukemia is among the most likely forms of malignancy. Lung cancer may also occur due to radioactive materials residing in the lungs. Genetic effects may range from point mutations to severe chromosome damage such as strand breakage, translocations, and deletions. If the germ cells have been affected, the effects of the mutation may not become apparent until the next generation, or even later.

SKIN CONTACT:

THORIUM

RADIOACTIVE:

ACUTE EXPOSURE – There is no evidence that insoluble uranium compounds can be absorbed through the skin; insoluble salts produced no signs of poisoning after skin contact. Thorium may irritate the skin.

CHRONIC EXPOSURE – Prolonged skin contact with insoluble uranium compounds should be avoided because of potential radiation damage to basal cells. Dermatitis has occurred as a result of handling some insoluble uranium compounds.

ALPHA RADIATION:

ACUTE EXPOSURE – Alpha radiation is not usually an external hazard. However, local damage may occur at the site of a wound. Absorption or penetration through damaged skin may result in increased cancer risk.

CHRONIC EXPOSURE – Prolonged or repeated contact my result in increased cancer risk.

EYE CONTACT:

Thorium

RADIOACTIVE:

ACUTE EXPOSURE – Dust may be irritating to the eyes. A variety of soluble and insoluble compounds or uranium were tested on the eyes of rabbits. The insoluble compounds caused the mildest degree of injury. The effects of eye contact with any thorium compound tend to be necrosis of the conjunctivae and eyelids, and ulceration of the cornea.

CHRONIC EXPOSURE – Prolonged exposure to uranium may produce conjunctivitis, or the symptoms of radiation injury, such as cataracts. See the following sections regarding the effects of alpha radiation on the eyes.

ALPHA RADIATION:

ACUTE EXPOSURE – Radiation affects the eye by inducing acute inflammation of the conjunctiva and the cornea. The most sensitive part of the eye is the crystalline lens. A late effect of eye irradiation is cataract formation. It may begin anywhere from 6 months to several years after a single exposure. Cataract formation begins at the posterior pole of the lens, and continues until the entire lens has been affected. Growth of the opacity may stop at any point. The rate of growth and the degree of opacity are dependent upon the dose of radiation.

CHRONIC EXPOSURE – Repeated or prolonged exposure to alpha radiation may result in cataract formation, as described above. Of the well-documented late effects of radiation on man, leukemia and cataracts have been observed at doses lower than those producing skin scarring and cancer or bone tumors. The lens of the eye should be considered to be a critical organ.

INGESTION:

THORIUM:

RADIOACTIVE/NEPHROTOXIN

ACUTE EXPOSURE – Feeding studies on animals indicate that insoluble uranium is much less toxic than soluble uranium compounds. Thorium entering the bloodstream will become stored in the bone marrow, but the majority will become lodged in the kidney, which is the major site of toxicity. More than a year and a half are required to rid the body of an accidental high dose of thorium, after which time measurable uranium is present in the bone and kidney.

CHRONIC EXPOSURE – The toxic action of thorium resides more in its chemical action on the renal tubules, rather than radiation effects. Rats injected with thorium metal in the femoral marrow developed sarcomas, whether this was due to metallocarcinogenic or radiocarcinogenic ingestion of alpha emitters. Also see the first aid section for uranium compounds.

ALPHA RADIATION:

ACUTE EXPOSURE – The fate of ingested alpha emitters depends on their solubility and valence.

CHRONIC EXPOSURE – Repeated ingestion of alpha emitters may increase cancer risks.

FIRST AID FOR THORIUM COMPOUNDS: Although chelating agents act on uranium, they should not be used because the increased migrant fraction leads through renal precipitation to a greater kidney burden than would be received if there were no treatment at all; there is thus the risk of serious toxic nephritis. The basic treatment should be administration of a bicarbonated solution given locally and in intravenous perfusion (one bottle of 250 ML at 1.4%).

SECTION 12: ECOLOGICAL INFORMATION

Environmental Impact Rating (0-4): No data available

Acute Aquatic Toxicity: No data available

Degradability: No data available

Log Bioconcentration Factor (BCF): No data available

Log Octanol/water partition coefficient: No data available

SECTION 13: DISPOSAL INFORMATION

Observe all Federal, State and local Regulations when disposing of this substance.

SECTION 14: TRANSPORTATION 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

TSCA STATUS: Y

CERCLA SECTION 103 (40 CFR 302.4): N

SARA SECTION 302 (40 CFR 355.30): N

SARA SECTION 304 (40 CFR 355.40): N

SARA SECTION 313 (40 CFR 372.65): N

OSHA PROCESS SAFETY (29 CFR 1910.119): N

CALIFORNIA PROPOSITION 65: N

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21)

ACUTE HAZARD: Y

CHRONIC HAZARD: Y

FIRE HAZARD: Y

REACTIVITY HAZARD: Y

SUDDEN RELEASE HAZARD: Y

SECTION 16 OTHER INFORMATION

This material is prepared for use as a standard or in interlaboratory comparison programs at analytical laboratories, which routinely handle THORIUM. IBI Labs assumes that recipients of this material have developed internal safety procedures, which guard against accidental exposure to radioactive and toxic materials, contamination of the laboratory environment, or criticality. IBI Labs further expects that personnel who handle radioactive materials have been thoroughly trained in the safety procedures developed by and for their Laboratory.

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.

Creation Date: September 20, 1993 Revision Date: July 14, 2014

Edit

```
=============  Disposal Considerations  ====================

Waste Disposal Methods:DISPOSE OF IAW LOCAL, STATE & FEDERAL
    ENVIRONMENTAL REGULATIONS (TITLE 10 CFR).
 Disclaimer (provided with this information by the compiling agencies):
 This information is formulated for use by elements of the Department
 of Defense.  The United States of America in no manner whatsoever,
 expressly or implied, warrants this information to be accurate and
 disclaims all liability for its use.  Any person utilizing this
 document should seek competent professional advice to verify and
 assume responsibility for the suitability of this information to their
 particular situation.
```

ADDRESS:

International Bio-Analytical Industries, Inc. (IBI Labs)
3495 N. Dixie Hwy. Unit # 8
Boca Raton, Florida 33431 USA

CONTACT:

Phone: 561-826-0061
Fax: 561-892-8450

© 2014 IBILABS.com. All Rights Reserved.
by International Bio-Analytical Industries Inc. (IBI)