Standard operating procedure (SOP) for Bismuth tri iodide

Product name=Bismuthine, triiodo-
Synonyms= No
Formula=BiI3

Precautions for safe handing

- Wear eye protection. If the powder enters your eyes, it may cause irritation. Rinse with water for several minutes. Seek medical attention.
- Transfers of powder or crystals should be carried out in a fume hood or ventilated space.
- Wear a face mask when handling powders or loaded crucibles/boats to avoid inhaling powders or vapors. In the case of inhalation, move to fresh air. If inhaled and stop breathing: Either give artificial respiration or call the physician or poison control center. Avoid using mouth-to-mouth breathing.
- Powder may cause irritation or in extreme cases, burn in the skin or eyes. Remove the powder. Rinse with water. Wash with water and soap.
- Ingestion may lead to severe swelling, damage to delicate tissues, and perforation in the stomach. Rinse your mouth. Drink plenty of water in the case of swallowing.
- According to the safety data sheet, no special respiratory protection is needed under normal conditions. Therefore, wearing an ordinary mask is enough for normal operations. Avoid contact with the powder, as it may cause respiratory irritation. Avoid creating dust when using powder.
- Do not use around strong bases and oxidizing agents.

Application

The thick layer of BiI3 will be deposited either by thermal evaporation or electron beam deposition onto the top of the glass substrate. In both cases, the powder is evaporated and dispersed all over the chamber including the upper substrate. As bismuth spread everywhere in the chamber, the chamber must be used exclusively for bismuth deposition. If it is not possible to use a specific chamber for Bi, then after the BiI3 deposition, use Al to coat the inside chamber to bury the deposited BiI3 residues. It provides a layer of protection for the following users. In addition to that, it is recommended after doing some runs (3 or 4 times) clean the inside of the chamber from deposited bismuth layers. Use a HEPA-filtered vacuum cleaner

rated for asbestos to remove the powders. In the end, use wipes to scrub the inside for further removal. Discard the wipes in specified labeled containers and avoid mixing them with other waste. Finally, remove the BiI3 crucible, cover it Al foil, and store it in specific location away from other target materials or people reach.

Storage conditions

It should be stored in a dark, inert, dry, cool, and well-ventilated atmosphere.
Exposure to moisture or light may degrade the quality of the material over time.

Disposal procedure

As wasted compounds and byproducts can linger for a long time, they should be confined to a specified labeled container. Waste materials must be disposed through the university environmental waste facility.

Usage location

Material handling and deposition preparation (crucible filling) should be carried out in fume hood or ventilated space. Use protective equipment, including gloves, safety goggles, and ordinary face masks to reduce any possible contact with dust in accidental powder spreading. The whole process must be done gently and cautiously without any haste.

Handling procedure

The BiI3 powder is inserted on the top of the crucible. To mitigate the possible spreading in air hazard, it should be done under the hood with significant care and diligence to avoid possible powder dispersion in the air. As a result, it is recommended to deliver the crucible under the hood and pour the powder there, instead of pouring the powder in the chamber. After filling the crucible, use a cover or lid to wrap the crucible. Then transport the covered crucible and insert it in its defined location inside the machine.

PPE requirement

Wear appropriate gloves, clothing, face mask, and goggles to protect your body from unintentional contact with the material.