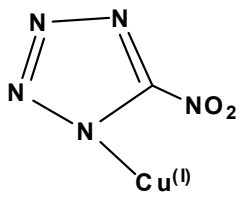
Process for Preparation of DBX-1

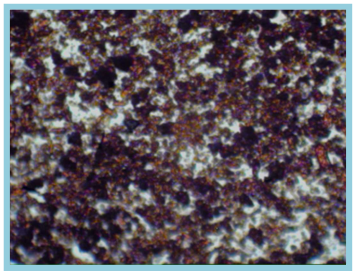
Primary explosives are sensitive explosive materials that are used as initiators (e.g. in detonators, primers, blasting caps, etc.) in relatively small quantities to initiate a secondary or main explosive charge. Many primary explosives in current use contain lead with the most well-known example being lead azide & lead styphnate (LA & LS). LA/LS contain lead, a toxic heavy metal that is released to the environment during production and use. Environmental health and safety regulations on lead containing materials are quite extensive and are likely to increase in severity in the future, along with compliance costs. Therefore, lead-free alternates to LA& LS have been sought for many years.

In search of eco-friendly, safe and storage-stable lead-free initiators, DBX-1 (Copper(I) 5-nitrotetrazoalte) has been emerged as potential replacement to bothLA/LS for initiators applications. DBX-1 is an environmentally benign copper-based primary explosive which has initiation characteristic similar to LA and sensitivity equivalent to LS. Unlike LA, DBX-1 does not decompose in non-hermetic systems and is therefore appropriate in the presence of copper components. DBX-1 has higher level of compatibility with a variety of secondary explosives and other potential ordnance materials compared to LA. DBX-1 is being studied extensively in variety of ordnance applications in world-wide especially US Army for e.g. detonators like M100 (electric), M55 (Stab) as well as in NOL-130 primer mixes are currently underway. DBX-1 filled initiators such as 25mm Mk210, M792, PGU-25; 30mm Mk266 and 40mm M430, M433, and M918 are under qualification trials by US Military.

Considering the potential scope of DBX-1 in replacing existing less storage stable, toxic lead-based (LA & LS) composition towards environmentally benign green primary explosive, High Energy Materials Research Laboratory (HEMRL) has established a cost effective, viable synthetic route for DBX-1 from 5-aminotetrazole by a two-step process. DBX-1 is fully characterized and assessed its performance as initiator in variety of initiating devices in-place LA & LS.



Molecular structure of DBX-1



Microscopic image of DBX-1 crystals