SOP: ORDERING & STORAGE OF HYDRIDES

Metal hydrides are reducing agents that pose a potential risk of fire and/or an explosion hazard, which is associated when coming into contact with air, water, acids and/or alcohols, and can easily catch fire.

HAZARDS:

1. Sodium hydride, potassium hydride, lithium aluminium hydride **will react with water in air to release hydrogen gas, which is flammable, and potentially causing the gas to auto-ignite.**
   This can happen under incorrect storage conditions, when weighing off for a reaction or transferring the hydride into smaller containers under non-inert conditions (i.e. exposure to air).
2. Due to the fine particle size of the hydrides, a strong air flow (e.g. working in a fume hood) or high inert gas flowrate may spread the powder very quickly, resulting in the chemist losing control over the hydride.

IMPORTANT: for Quenching of hydrides study the **SOP: Quenching**.

Ordering/Purchasing of Hydrides

Prior to ordering, consult with other groups to check if they have stock already available to use.

NO MORE than 1 x 25g containers of any one hydride may be purchased.

It is recommended to divide the 25g of hydrides into smaller amounts. It is safer to do multiple transfers of small amounts than to attempt to handle larger quantities at once.

WEIGHING OFF AND STORAGE OF HYDRIDES

1. Inform everyone in the laboratory, your supervisor and especially the laboratory Fire Marshal, or a Fire Marshal on your level that you will be working with or weighing off a hydride. Furthermore, let them be on standby to assist if it auto-ignites.
2. Have a DCP fire extinguisher and a small container containing DRY sand/other non-combustible material close by.
3. ONLY use a spark proof spatula/utensils when transferring/handling the hydride.
4. Remove all flammables, combustibles, heat sources and water from weighing off area.
5. *Transferring and storage of bulk hydrides:* Carefully weigh off ±5g directly into smaller 5 x dry containers e.g. small Schott bottles, proper sealable vials with polypropylene screw caps, or Falcon tubes.
6. Purge these vials at a low flow rate with inert gas prior to use and close. Nitrogen may react with Lithium, and thus the use of Argon is recommended. Bring to balance.
7. Use a secondary container (closable, sturdy preferably plastic) to store smaller 5g quantities and ensure chemical compatibility is not compromised.
8. Ensure vials & secondary container(s) are all clearly labelled *(Hydride name, amounts, CAS number, hazards/warning signs and the date of transfer (N.B.!))* .
9. Purge a secondary container with inert gas & bring to balance.
10. Place hydride containing vials in the secondary container(s) and close it.

12. Place the secondary container(s) (containing the hydride vials) in a desiccator with dry silicate for storage.
13. Silicate = blue colour = dry
14. Silicate = pink or turning pink needs drying in a drying oven (160°C) until blue again.
15. Ensure desiccator seals well. If not, place a very thin layer of vacuum grease on both lid & bottom's edges & slide them over each other when closing to ensure a good seal.
16. Store desiccator in a water free area away from an ignition source in a cool, dry place.

If hydride auto-ignites, it is advised to rather use sand or another non-combustible material to throw over spill & to stand away from the spill. A fire extinguisher's pressure may spread hydride & fire.

FORBIDDEN

- Working or conducting any experiments with hydrides After Hours is **FORBIDDEN**.
- Use of weighing boats or paper to weigh off hydride is **FORBIDDEN**- as if not cleaned or quenched properly after use, can ignite due to trace amounts of hydride still clinging to it.
- Ensure that spatula is **IMMEDIATLEY** and properly quenched & washed after use.
- **NEVER** use metal spatulas or metal utensils.
- **NEVER** use combustible materials (paper or cloth towels) to clean up a hydride spill, as these may increase the risk of ignition during hydride clean-up.

HEALTH & SAFETY ISSUES

SAFETY MEASURES:

1. Before working, verify that there is **CLEAR ACCESS** to the eyewash and safety shower stations.
2. **ALWAYS** warn persons in laboratory and have someone ready with sand and/or DCP extinguisher in case of auto-ignition.
3. **NEVER** do this after hours or on your own.
4. **DO NOT** use water to extinguish metal hydride fire.
5. Weigh off hydride as quick as possible – **BETTER** if it can be done under inert conditions or flushing with inert gas over balance (i.e. using an inverted funnel attached to an inert gas line, with the gas flowing directly above the balance pan, creating an inert atmosphere over the weighing area) or **BEST** to use a glovebox with in an inert atmosphere.
6. Inert atmosphere gloveboxes are excellent devices for the safe handling of metal hydrides. Gloveboxes must be in good working order according to manufacturer's recommendations and be equipped with sensors for continuous monitoring of O_2 and

8. **SPILLAGE** - properly quench and clean up the hydride spillage – slowly add these solvents in following sequence:
   1) isopropanol,
   2) ethanol,
   3) methanol and
   4) water

9. Keep others from entering contaminated area (e.g. use caution tape or cones, and these can be found in chemical spill kit).
10. Double bag dry waste in transparent bags and discard as hazardous waste – if quenched in RUC.
11. When quenching, exercise extreme care to ensure that lumps or domains of the reactive substance are not protected or isolated from the quenching agent. Such mixtures must be fully quenched and pH-neutralized before transferring it to waste containers.

PERSONAL PROTECTIVE EQUIPMENT

EYE PROTECTION: Safety Glasses or Goggles, Face Shield if desired
PROTECTIVE CLOTHING: Apron or Lab coat, DRY Gloves: Nitrile, Latex, Long pants and closed-toe, closed-heel shoes are required.