

Standard Operating Procedure

for work with

Chemical name/class: Sodium Borohydride Powder

CAS #: 16940-66-2

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Date: 9/23/2022

Building: Fitzpatrick CIEMAS

Room #: Sample Prep Lab

Designated Work Area: Vitrobot Hood in Sample Prep Lab

1. Circumstances of Use:

All chemicals in powder form are to be used only in the SMIF sample prep lab. They should never be used or stored in the SMIF cleanroom.

2. Potential Hazards:

- Sodium Borohydride is a particularly hazardous substance (PHS)
- Sodium Borohydride should be protected from accidental contact with water, as it may react violently with water and emit flammable gasses
- Sodium Borohydride is acutely toxic if ingested. Acutely toxic powders can cause death or systemic toxicity
- Sodium Borohydride is reproductive toxic
- Exposure to Sodium Borohydride can also cause serious eye damage

3. Engineering Controls:

Sodium Borohydride powder must be handled in the Vitrobot chemical fume hood in the sample prep lab. You should also follow all practices outlined in the [information sheet on Working Safely with Toxic Powders](#) that is posted in the Sample Prep lab.

4. Work Practice Controls:

- The appropriate PPE must be worn at all times when handling powders
- Avoid contact with incompatible materials.
- Use bench pads or wipes to cover areas that may become contaminated with powder or suspensions for easy clean-up.
- If weighing dry powders:
 - 1) Move the top loading balance into VitroHood1.
 - 2) Adjust the balance so that it is level.
 - 3) Weigh out powder chemicals using a weigh boat.
 - 4) Place chemical into solution inside of the hood.
 - 5) Once in solution, the chemical should be stored in appropriate area.
 - 6) Return the balance to its original place.
- If making an aqueous solution using Sodium Borohydride, and, for example, PBS, ASSURE THAT THE SOLUTION IS NOT ACIDIC. The solution will be more stable (i.e., less vigorous bubbling) if made with a strongly basic solution (at or above pH 10). This can be achieved using a 1.0 N NaOH solution. (See, for reference, <https://cameochemicals.noaa.gov/chemical/7788>.) Ideally, cool the solvent using an ice-water bath before adding granulated NaBH very slowly while continually stirring. It is recommended that a wide-mouth flask or beaker is used that is at least double the volume of solution being made.
- Change gloves regularly (at least every two hours) and wash hands at the time of the glove change.
- Keep containers closed as much as possible.
- Keep away from heat and flame.

5. Personal protective equipment (PPE):

- Standard nitrile laboratory gloves, safety glasses or goggles, and a fully buttoned lab coat with sleeves extending to the wrists should be worn when handling powders and powder suspensions in solvent solutions.

6. **Transportation and Storage:**

- Dry powders must be in sealed shatter-resistant containers during transportation and storage . If the container is not shatter-resistant, use a secondary container.
- Powders are stored in the N2 purged cabinet in the sample prep lab.
- Store away from heat and flame.

7. **Waste Disposal:**

- Dry powders and liquid powder suspensions should be disposed of in a sealed container as solid waste following standard SMIF practices as follows:
The sealed container should be packed into a zip lock bag and properly labeled with the type of waste, your name, and date. The waste bag should be completely sealed. Waste bags containing solvent waste are placed in the designated contaminated solvent waste container. Waste bags containing acid waste should be left in the back corner of the acid hoods. SMIF staff will regularly pick up the chemical waste bags for transport to OESO for proper disposal. Chemical waste bags should never be placed in a regular trash container.

8. **Exposures/Unintended contact:**

Contact Employee Occupational Health and Wellness (EOHW) at 919-684-3136 for medical advice on occupational chemical exposures. For an actual chemical exposure

- Remove contaminated clothing. Flush exposed eyes or skin with water for at least 15 minutes, then seek medical attention.
- For situations with risk of inhalation exposure (including spills of powder outside of a chemical fume hood), remove all persons from the contaminated area and contact the OESO spill team.
- Call 911 from a campus phone or 919-684-2444 from any phone to request assistance if needed. Contact Employee Occupational Health and Wellness at 919-684-8115 for exposure-related advice.

The work-related injury or illness report found at:

<http://www.hr.duke.edu/benefits/medical/workcomp/report.php> should be completed within 24 hours. Follow-up medical attention should be sought through Duke Employee Occupational Health and Wellness (919-684-3136).

9. **Spill Procedure:**

In the event of a spill, follow SMIF spill procedures and immediately contact SMIF staff. Only SMIF staff and/or appropriate OESO personnel should clean up spills

Spills Contained Inside a Chemical Hood

- Avoid breathing vapors from the spill and leave the immediate area of the chemical hood
- Alert people in the immediate area of the spill
- Notify SMIF immediately by calling emergency numbers posted near the phone
- Wait for instructions from SMIF or for SMIF personnel to arrive to complete the clean-up of the affected area.

Spills Outside of a Chemical Hood

- Attend to injured or contaminated persons and remove them from exposure
- Press the closest manual alarm button (blue box) and evacuate the lab

Make yourself available to the SMIF staff and/or emergency responders and be prepared to tell the following:
What chemical(s) are involved, how much was spilled, where the spill is located, nature of any injuries

For spills of Sodium Borohydride powders in a chemical fume hood or other enclosure, wipe up the powder using a cloth dampened with a compatible solvent, like PbS, and then wipe with a dry cloth. Place any clean-up materials into a bag and seal, then submit as hazardous chemical waste (see waste disposal section above) through OESO Environmental Programs (call 919-684-2794 with questions).

10. **Training of personnel:**

- All personnel are required to complete the SMIF General Lab Safety session and the SMIF Chemical Safety and Wet Hood training session.
- All personnel shall read and fully adhere to the ***Wet Hood Operating Procedure*** and the ***SMIF Lab Safety and Procedures Manual***
- All personnel shall read and fully adhere to this laboratory-specific SOP for Sodium Borohydride powders.