

**Standard Operating Procedure**  
for work with

**Chemical name/class:** Amine Coupling Reagents for SPR      **CAS #:** 25952-53-8 ; 6066-82-6  
**PI:** Mark Walters      **Date:** June 3, 2024  
**Building:** Fitzpatrick CIEMAS      **Room #:** Sample Prep and Optical Lab  
**Designated Work:** Covalent amine coupling chemistry for SPR

1. **Circumstances of Use:**

Amine coupling reagents are used in SMIF for covalent ligand immobilization on sensors for a Surface Plasmon Resonance (SPR) instrument. The amine coupling reagents used in SMIF include 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride (EDC) and N-hydroxysuccinimide (NHS).

2. **Potential Hazards:**

**Consult the Safety Data Sheet (SDS)** for particular reagent you are using

Be aware of these specific hazards:

- Acute oral toxicity. Harmful if swallowed.
- May cause serious eye irritation, pain, watering, and redness. May cause respiratory and skin irritation.
- NHS: Specific target organ toxicity (single exposure) to respiratory tract. May cause serious respiratory irritation.
- EDC: Acutely toxic in contact with skin. May cause serious irritation, allergic skin reaction, and sensitization.
- EDC: Very toxic to aquatic life with long lasting effects.

3. **Engineering Controls:**

- Always work with dry powders of amine coupling reagents in a fume hood in the Sample Preparation Lab.
- An eyewash and safety shower are available in the immediate area.
- Use the automated sampling system enclosed in the SPR for mixing EDC and NHS solutions.

4. **Work Practice Controls:**

- Use dry powders of EDC, NHS only in a fume hood. Keep containers closed as much as possible. Only open a container when it is inside a fume hood and you are wearing the proper PPE (section 5).
- Septum-capped vials of solutions may be handled outside of the fume hood.
- If possible, purchase as solution OR make the entire dry powder stock into a solution in its original bottle. Aliquot solution as single-use volumes into septum-capped vials (typically, 100 $\mu$ L aliquots).
- Contaminated items are to be disposed of properly as hazardous waste, following SMIF's hazardous waste policy (see section 7).

5. **Personal protective equipment (PPE):**

*Sample Prep Lab*

- Fastened lab coat
- Nitrile gloves
- Safety glasses or goggles

*Optical Lab\**

*\*solutions only, and must be kept in a closed container*

- Nitrile gloves
- Safety glasses or goggles

6. **Transportation and Storage:**

- Solid/Dry Powder: Store in original container at 2-8°C, protected from direct sunlight in a dry, cool and well ventilated area.
- Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Use appropriate containment to avoid environmental contamination.
- Solution: Store septum-capped aliquots of solutions frozen at -20°C. Always label containers and storage boxes.
- Wear the designated PPE (section 5) and use secondary containment when transporting.

7. **Waste Disposal:**

Dry powders, liquid powder suspensions, and solid materials that are contaminated with reagent (such as plastic vials, wipes, dispensers, etc.) 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. **Note: Never pour amine coupling reagents down the drains**

- Bagged, sealed, and labeled solid waste should be placed in the back of the acid hood for pickup by SMIF staff.
- 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

- Flush exposed eyes or skin with water for at least 15 minutes. Remove contaminated clothing.
- If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.
- Exposed persons should seek immediate medical attention at the nearest emergency department/
- 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

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*