SOP: Safe Use & Handling of Sensitizing Agents

Sensitizer = any chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical. The condition of being sensitized to a chemical is called chemical hypersensitivity.

Hazards:
Certain chemicals have no immediate health effects. But if you are exposed to them several times, they can make you allergic or even sensitive to other chemicals, often quite suddenly.

Once you are sensitized to a particular chemical, even minute amounts will cause symptoms. Sensitization is usually a life-long effect, best is to avoid working with such substances even if you have suffered no ill effects in the past and/or follow this SOP carefully.

Hazardous Symbols depicting Sensitizers:
The pictograms used for Category 1 skin sensitizers is an exclamation mark and for respiratory sensitizers is the health hazard symbol.


Peptide Coupling Agents (PCAs) are known to be potent immune sensitizers and are used by most organic chemists. There are reported cases where PCAs caused both skin and respiratory sensitization in the form of rashes and lesions (dermatitis); coughing, sneezing and life-threatening throat-closing (anaphylaxis) reactions.

PCAs can modify human proteins, which is the most likely mechanism through which they cause immune sensitization. Researchers should take care to avoid exposure to them (see list below) as much as possible.

List of PCAs most likely to cause an allergic reaction and/or sensitizing symptoms from most hazardous to less:

1. HATU causes skin, eye, and respiratory irritation
2. HBTU causes respiratory sensitization
3. HCTU
4. DCC causes skin rashes
5. EDCI
6. CDI

As with other standard operating procedures for handling hazardous chemicals, personal protective equipment (PPE) in the form of a lab coat, eye protection and disposable gloves should be worn at all times when handling coupling agents.

SYMPTOMS

When working with or in close proximity of PCAs or any other known sensitizing chemical. **Look out for the allergic march which begins with: 1) itching eyes followed by 2) a runny nose and many times also 3) sneezing.**

Skin symptoms include:

Type I = hive type rash within 30min – 1hour after exposure.
Type IV = delayed reaction such as eczema that appears a few hours up to 48h after exposure & usually not on the 1st exposure but only after the 2nd or 3rd.

Coughing, a tight chest, asthmatic and an anaphylactic episode usually only occurs after multiple exposures and ignoring the allergic march symptoms.

TAKE NOTE:

1. **The 1st rule is to REPORT it EARLY**!
2. When above allergic march symptoms keep recurring when working in the lab and disappear when not working in the lab or away e.g. on holiday – ASAP report it to your lab's First Aider and/or SHE Rep/s and Supervisor.
3. You need to complete the Health Questionnaire at this stage, if by chance not already completed that year as indicated below.
4. Send the completed to the Laboratory Health, Safety & Infrastructure Specialist (LHSIS) Monique Muller.

   NEW Lab Staff & Students, VAC students & Visitors may be requested to complete both the Health Questionnaire for Sensitisers (HQS) and/or a Hazardous Chemical Agents Risk Assessment (HCARA) before starting in the lab at or within one week after the Lab and General H&S safety induction was received.
   - Send the completed through to the group's/area SHE Rep.
   - The SHE Rep MUST forward the completed HCARAs, HQSs and the Induction Confirmation forms through to the LHSIS.

   ALL EXISTING Lab Staff & Students will be requested to annually; before Chemistry's General H&S Induction in February, complete both the HCARA and HQ.
   - Send it through to the group's/area SHE Rep.
   - The SHE Rep MUST forward all assessments and questionnaires to the CSO before end of February.

5. If these symptoms reoccur and confirms your suspicion that you may have developed an allergic reaction or may become sensitised towards the PCAs or any other suspected chemical inform the SHE Rep ASAP.
6. The SHE Rep together with the LHSIS must perform an investigation.
7. This investigation report together with the healthcare questionnaire for sensitisers need to be sent through to the UCT's OHS Health unit – Suzanne Key (suzanne.key@uct.ac.za).
8. The OHS Health unit will contact you i.e.:
   a. To book an appointment with you to discuss the incident/symptoms
   b. They will discuss and may have to refer you for skin prick testing (against the suspected chemicals) with UCT's Lung Institute's Allergy Clinic.
      At the Allergy Clinic you will undergo a clinical review/atopy screen and a skin prick testing to the agents @ a charge of R1000/patient.
   c. Any (if needed) ongoing medical surveillance programme.
   d. Costs for:
      i. Students = own account; medical aid
      ii. Staff = initially medical aid;

Staff remember to put in a COID claim if such an incident occurs and you have any medical expenses.

SAFE WORKING PROCEDURE with PCAs

1. Fetch both the closed PCA container from store together with a sealable weighing off container (such as a flask/bottle with a screw-on lid).
2. Transport both and place in:
   A) a fume hood with a balance or
   B) at balance on weighing off bench underneath a Nederman extraction arm.

A - Fume Hood Weighing Out Procedure

1. Ensure fume hood is extracting efficiently by checking ”tell tail”.
2. Open the PCA container ONLY inside the fume hood or you and other users will risk exposure to the PCA.
3. Weigh out the desired amount of PCA on a weighing paper and transfer it to the sealable container or safer weigh it directly into the sealable container.
4. While still in the fume hood, close the PCA chemical and “working” sealable container with the weighed off PCA.
5. Dispose of the contaminated weighing paper in the dedicated waste container inside the fume hood.
6. Do not dispose the weighing paper in a RUC as this elevates the risk of exposure to the PCAs.
7. Note: If you spill PCAs on the balance, inside fume hood, on your gloves, etc., close both the PCA containers first.
8. Clean up the spill and replace your contaminated gloves immediately.
9. Place spill, spill clean-up material and contaminated gloves in the waste container in the fume hood before removing your hands from the fume hood.
10. Transport your sealable container with coupling agent to your own fume hood or to the automated peptide synthesizer.
11. Continue performing your reactions as normal – if possible - always inside a fume hood.
12. If using an automated peptide synthesizer that is not in a fume hood, open all reagent containers as little as possible outside of a fume hood.

B - Bench Weighing Out Procedure WITHOUT Nederman Arm extraction

1. Place note at balance on bench “**Sensitizing Agent”** weighing in progress.
2. Tare a glass vial in balance on bench with a cap on.
3. Return to fume hood with tared vial.
4. Add sensitising chemical into the vial under the fume hood. Close vial.
5. Return to balance on bench.
6. Check weight on the balance.
7. If adjustments need to be made, the chemical needs to be added or removed back inside/under a fume hood.
8. Continue steps 3 – 6 until desired weight is achieved.
9. Remove note.

C – Bench Weighing Out Procedure WITH Nederman Arm extraction

1. Ensure Nederman arm is extracting efficiently by checking ”tell tail”.
2. Ensure the Nederman arm and canopy is properly position over the balance where weighing off of SA will be performed.
3. Tare a glass vial with a cap on.
4. Add sensitising chemical into the vial in balance under the Nederman extraction.
5. Once desired weight is achieved, close vial.
6. Close chemical and take back to storage.

HEALTH & SAFETY ISSUES

ENGINEERING PRECAUTIONS:

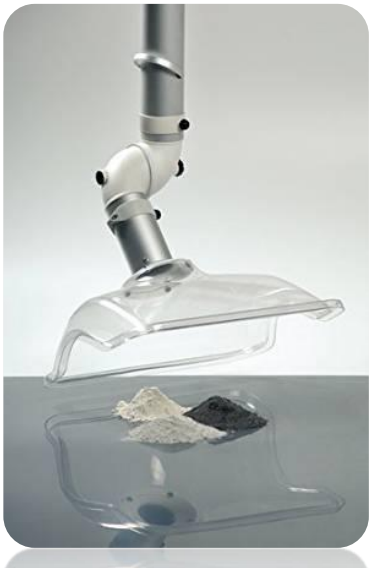
1. Every research laboratory using peptide coupling agents should have a fume hood with a balance dedicated to weighing out peptide coupling agents and other sensitizing agents.
2. The fume hood and balance should be free of debris and clutter, and any spilled reagents should be promptly cleaned up and removed.
3. The fume hood should also be equipped with a waste container dedicated to contaminated weighing paper.

SAFETY MEASURES:

1. If you have no viable substitute and you must work with a sensitizer, use a fume hood or other type of engineering control if available.
2. Wear the appropriate personal protective equipment such as gloves, safety goggles, lab coat & whenever necessary even a respirator.
3. Ensure fume hood or Nederman arm is extracting efficiently by checking ”tell tail”.
4. Ensure the Nederman arm and canopy is properly position over the balance weighing off will be performed at.
5. Ensure you clean balance properly after you weighed off any sensitizing agent.

PERSONAL PROTECTIVE EQUIPMENT

- EYE PROTECTION: Safety Glasses or Goggles, Face Shield if desired
- PROTECTIVE CLOTHING: Lab coat, Gloves: Nitrile, Latex, Long pants and closed-toe, closed-heel shoes are required.
- Respirator if desire: for fetching and placing it in fume hood or at Nederman extraction arm balance or when returning PCA to storage shelf.



NEDERMAN EXTRACTION ARM