Chemical safety fact sheet: New substances

Research laboratories frequently generate new substances that have unknown properties and unknown health hazards. All new compounds should be considered hazardous. When planning work with compounds that have unknown properties or unknown health hazards, adopt control measures and work practices designed to achieve effective risk mitigation and exposure control.

Precautions during the planning stage

- You must discuss the proposed project and new substance with your supervisor.
- Consult other principal investigators or lab personnel who may have worked with similar material(s).
- If available, consult multiple published papers. Pay attention to the potential safety implications of subtle changes to experimental procedures [e.g., solvent, concentration, reagent (side groups, state or form) and equipment]. Subtle changes could bring unintended consequences.
- Review other applicable EHS resources (e.g., Energetic materials).
- Conduct a chemical risk assessment, considering all reagents, reaction intermediates, possible reaction byproducts and potential unknowns. Review available Safety data sheets.

Precautions in the laboratory

- Scale down the synthesis. By minimizing the amount of material available, you reduce the risk and also increase the chance that if something goes wrong the situation will be more manageable (e.g., chemical spill or fire). When larger amounts of materials are needed, consider running smaller ‘batch’ reactions so one reaction does not contain large amounts of material.
- Work in a fume hood. The fume hood should be clear of obstructions and unnecessary chemical containers. By working in a fume hood you minimize exposure to potentially harmful gases, vapours and fumes. The sash also provides a physical barrier that can protect you from splashes and debris from a minor explosion.
- Wear personal protective equipment, including (but not limited to) a lab coat, goggles and gloves. Note: No single glove material provides effective protection for all uses.
- Assume that any chemical mixture will be more toxic/flammable/unstable than its toxic/flammable/unstable components.
- Communicate to other lab personnel what you are doing (e.g., have your name and reaction written on the fume hood sash (including reagents and reaction intermediates) and discuss your project in a weekly group meeting). Members of your lab group may be able to offer guidance or may need to take precautions themselves.

Emergency procedures

Be prepared for an incident, and know the specific actions to take in case of exposure or release. Ensure you know the location of the nearest emergency eyewash, safety shower and chemical spill kit. Inform your supervisor and complete an incident report after any incident.

Reference