STANFORD UNIVERSITY

ENVIRONMENTAL HEALTH & SAFETY

Safe Laboratory Practices: Working with Air-Sensitive or Highly Reactive Compounds

In December 2008, a laboratory incident involving the use of *tert*-butyllithium resulted in severe burns to and the subsequent death of a young researcher at UCLA. A report of the incident can be found at: http://www.newsroom.ucla.edu/portal/ucla/lab-assistant-dies-of-injuries-78543.aspx

t-Butyllithium and other organometallic materials are very reactive compounds, many of which are pyrophoric (may spontaneously ignite upon exposure to air). They are often used in a flammable solvent solution, as was the case in the referenced incident above. Given the potential risks posed by such air-sensitive materials, it is most important to review and utilize procedures that help prevent accidental release. Good technical guidance on safe extraction and handling of air sensitive and pyrophoric materials can be found in Aldrich Technical Bulletins AL-134 and AL-164 (available at http://www.sigmaaldrich.com/chemistry/chemical-synthesis/learning-center/technical-bulletins.html). Additionally, researchers may view Yale University's organolithium safety video, which is available at: http://www.yale.edu/ehs/trainings/OrganoLithium/OrganoLithium.htm. It is important to note however, that this is a Yale-specific video and is to be used as a general reference for research conducted at Stanford University.

Below are some basic safe laboratory practices that will further help minimize researcher safety risks when handling reactive materials. CalOSHA regulations for Chemical Hygiene require that each laboratory have a documented plan that includes a process for review and safe management of highly hazardous substances in the laboratory. Below are highlights of the elements of such a plan.

1. Consultation with PI: For higher hazard chemicals such as highly reactive/ unstable materials, carcinogens, highly toxic chemicals, and reproductive toxins, researchers are to consult with the Principal Investigator on special safety precautions to be taken. Additional guidance can be found in the SU Chemical Safety Toolkit at http://chemtoolkit.stanford.edu/RestrictedChem.

2. Development/ Review of Standard Operating Procedures (SOPs): When dealing with higher hazard chemicals and operations, a written SOP is an effective tool for helping lab personnel clearly understand pertinent hazard information, safety precautions, proper work procedures, emergency procedures, and training requirements. Recommend that personnel review them periodically. Guidance on developing an SOP can be found at: http://chemtoolkit.stanford.edu/TemplateSOP.

3. Buddy system: When handling higher hazard chemicals, especially highly reactive/ unstable materials, never work alone. Others present in the laboratory must be familiar with the operation's hazards and specific emergency procedures.

4. Personal protective equipment: For handling hazardous chemicals, ensure that lab coats, eye protection, and appropriate chemical-resistant gloves are worn. Further guidance can be found at: http://chemtoolkit.stanford.edu/LabPPE.

5. Emergency equipment: Personnel handling hazardous chemicals must know the location of necessary emergency equipment (e.g., eyewash/ showers, fire extinguishers, etc.) and how to properly use them.

For further assistance, consult with your Principal Investigator or contact SU Environmental Health and Safety at 723-0448. Additional guidance on laboratory safety practices can be found in Stanford's Laboratory Chemical Safety Toolkit at http://chemtoolkit.stanford.edu.