

UCLA LAB FIRE FATALITY

(Note: the complete accuracy of this account has not been confirmed; prepared by UCSB Environmental Health & Safety on 1-27-09)

A 23 year old female research associate/laboratory technician intended to add an (unknown) aliquot of 1.6 M tertiary-butyllithium(t-bu-Li) in pentane to a round bottom flask, placed in a dry ice/acetone bath. She had been employed in the lab for about 3 months. The incident occurred on Dec. 29, during the UCLA holiday shutdown between Christmas and New Years. Researchers are granted permission to work during the shut down for "critical research needs." There were two post doctoral researchers working in the lab and the adjacent lab.

T-bu-Li is a very reactive material. It is pyrophoric, meaning that it will spontaneously ignite upon any exposure to the moisture in ambient air. The pentane solvent is also highly flammable. Typically this type of highly-sensitive material is only syringe-dispensed via a rigorous procedure that completely excludes air/moisture. For more information, see the Aldrich Technical Bulletin, *Handling Air Sensitive Reagents*:

http://www.sigmaaldrich.com/etc/medialib/docs/Aldrich/Bulletin/al_techbull_al134.Par.001.File.tmp/al_techbull_al134.pdf

The principal investigator had reportedly trained the employee to slightly pressurize the bottle (a ~ 250 ml airtight Aldrich Sure-Seal container) with argon and withdraw the desired aliquot using a 60 ml syringe, fitted with a 20 gauge needle. The PI likes to use these particular syringes because they have a tight seal. There is no evidence that the employee used this method. Speculation: she may have just tried to pull up the aliquot in the syringe. Somehow, the syringe plunger popped out or was pulled out of the syringe barrel, splashing the employee with t-bu-Li and pentane. The mixture caught fire upon contact with air. She was wearing nitrile gloves, safety glasses and a synthetic sweater. She was not wearing a lab coat. The fire ignited the gloves and the sweater.

Six feet from the fume hood was an emergency shower. When the employee's gloves and clothing caught fire, she ran from the area *away* from the shower. One of the post-docs used his lab coat to smother the flames. 911 was called. The following responded to the scene: UCLA Fire Dept. and emergency medical technicians, LA City Fire, and LA County Haz Mat. The EMTs put the employee in the safety shower for gross decontamination and then transported her to the ER. She was later transferred to the Grossman burn unit in Sherman Oaks with second degree burns on her arms and third degree burns on her hands, a total of about 40% of her body. There was very little damage to the lab. She was not interviewed after the accident because of her condition.

Cal/OSHA began their investigation on 1/5/09, asking for training records, accident reports, Chemical Hygiene Plans, etc. UCLA EH&S has begun an audit of the Molecular

Sciences Building, where the accident happened. The building is the home for much of the Chemistry Department's research, principally Organic.

Some Lessons Learned:

- 1 The extent of injuries could probably have been reduced by quickly getting under the nearby safety shower¹ rather than having a lab mate extinguish the flames. At UCSB, the emergency safety shower/eyewash units are either in the lab, or in the hallway within ~ 10 sec. travel time. Access to these must always be kept completely clear and everyone should know the location of these.
- 2 Alternatively, a fire extinguisher can be used to extinguish burning clothing. These are typically at the exit door to our labs. The recommended extinguisher for this particular material² is a dry powder (ABC) extinguisher which are found in most of our labs. Hands-on fire extinguisher training is regularly offered by EH&S as part of our Laboratory Safety Orientation. Finally, burning clothing can often be extinguished by dropping to the ground and rolling. However, given the extreme air-reactivity of this material, it is likely that it would be difficult to extinguish in this way.
- 3 Wearing a lab coat when handling such a highly flammable might have reduced the extent of injuries. She was allegedly wearing a synthetic material sweater and not a lab coat. Synthetic clothing can often burn readily and vigorously. Polyester lab coats are not the best choice when handling flammable materials for the same reason. Cotton lab coats are inexpensive and do not burn readily.
- 4 Although the exact reason why the material exited the syringe is unclear, it seems likely that the experimental technique used was crucial. Anyone handling such highly flammable or toxic materials must obviously be thoroughly-trained in proper handling techniques. Also, all lab workers should routinely do "what-if" planning that identifies the possible failure modes for the procedure and how one would react to them, e.g., "If a fire starts what would I do first, second....?"
- 5 If there were to be a serious lab-related injury here at UCSB, Cal-OSHA would likely ask the University and PI for the same documentation as at UCLA: safety training records, lab inspection records and the *Lab-specific Chemical Hygiene Plan* for the lab. If your lab does not have these documents please contact EH&S at x-4899, or David.Vandenberg@ehs.ucsb.edu

Footnotes:

1. Although the material is water-reactive, use of the safety showers is probably still the best alternative. No literature substantiating this has been found, but given the quantity of water from a shower, one would expect that it would quickly extinguish any residual t-BuLi flareup.
2. One might first think that for such a water-reactive material a Class D extinguisher (found in Chemistry Dept.) would be needed, but these are more typically for flammable metal fires like sodium, or lithium aluminum hydride.