

To Vice-Presidents/Deans, Heads of Schools, HoFAs
From Dr Melanie Taylor
Date 5 March 2009
cc Prof M Case, Dr S A Robson, Dr D Barker, School Safety Representatives
Reference Safety Circular 2/2009

Use of pyrophoric substances in laboratories

Action : HOSs are asked to ensure that all research staff and students using pyrophoric substances are informed of this circular, and that the recommendations included below are fully implemented.

On 29 December 2008, a researcher died from burns whilst using tert butyl lithium in the Chemistry Department, University of California, Los Angeles. Fortunately, these tragic events are rare in higher education, but lessons can be learned from them. Some information is available at <http://www.rsc.org/chemistryworld/News/2009/January/23010903.asp> and no doubt a formal investigation report will become available in due course. In brief, it appears that as she was using a syringe to withdraw tert butyl lithium from a bottle, the plunger came out of the syringe barrel. The substance ignited, and the subsequent fire burned synthetic outer clothing and gloves she was wearing. She was working alone.

Pyrophoric chemicals ignite spontaneously when in contact with air. When they are used in chemical procedures, the main risk is obviously from fire. Some are supplied in solution with hydrocarbon or ether solvents, and the pyrophoric hazard increases with concentration. The more commonly used examples include arsene, alkyl lithiums, trialkylaluminium reagents and alkylboranes. t-BuLi is the most pyrophoric of the lithium reagents but n-BuLi is also pyrophoric as a concentrated solution i.e. ~ 10M.

The following controls should already be in place for any hazardous substance, but schools will no doubt want to review their current arrangements in light of this accident.

- The COSHH and risk assessments must clearly describe the hazards and the relevant control measures, and these must be drawn to the attention of all those using the substance in a format that they understand. The assessments must be checked and signed by the senior researcher and up-to-date.
- Any training needs identified in the assessments must be met, and records kept. Where relatively inexperienced people are using the substances, the appropriate level of supervision should be determined as part of the risk assessment, and fully implemented.

- “Appropriate” protective clothing must be worn at all times. Where there is a risk of fire, lab coats made from many synthetic materials or blends will increase the risk of serious burns, as the material melts onto the skin and cannot easily or quickly be removed.
- Lone working will NOT normally be appropriate. See http://www.campus.manchester.ac.uk/healthandsafety/CoPs&Guidance/lone_working-p.pdf
- Work should be carried out in a fume cupboard, with the sash pulled down as far as possible.
- Select the container and syringe with care, as all-glass syringes can leak and seize up, as can teflon tipped plungers used with cold solutions. All plastic disposable syringes appear to be associated with fewer such difficulties.
- Users of specialist containers such as Sure/Seal bottles from Aldrich and syringes need to be aware of the correct procedures for using them with air-sensitive chemicals. Aldrich’s technical bulletin AL134 is attached, for information.

The School of Chemistry have already circulated information but it is possible that researchers in other schools may use these substances. The School of Chemistry Safety Advisor is also preparing specific advice on procedures, and may be able to assist in more detailed enquiries. Dr Elaine Armstrong can be contacted at elaine.armstrong@manchester.ac.uk, or 5-7851.

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