Safety first

Is any experiment worth your health — or your life?

Over a year has passed since the tragic death of Sheri Sangji, a 23-year-old research assistant at the University of California, Los Angeles (UCLA). She died on 16 January 2009, 18 days after suffering second- and third-degree burns on 43% of her body — burns caused by an accident involving *t*-butyllithium. The California Division of Occupational Health and Safety (Cal/OSHA) sent its findings to the Los Angeles County District Attorney in January this year, having already fined UCLA over $30,000 for laboratory safety violations.

The case has been widely reported, notably by Jyllian Kemsely from *Chemical & Engineering News*[1] (C&EN) and Kim Christensen from the *Los Angeles Times*[2]. In addition, the 'Chemjobber' blog has addressed the problem — and some of the media reporting — in a series of posts[3] from the invaluable perspective of a practising chemist.

Almost exactly a year after Sangji's death, the pages of C&EN reported another laboratory accident at a university chemistry department, this time Texas Tech[4]. A student suffered severe burns and lacerations to his face and hands when the high-energy material he was studying exploded. He was taken to hospital in a critical condition. The Chemical Safety and Hazard Investigation Board (CSB), an independent federal agency, are investigating the accident and will now start gathering information on incidents in academic laboratories in 'a more detailed way'[5].

These accidents — and lower-profile ones in UK university chemistry departments in December — serve to remind us that chemistry can be a hazardous pursuit. Most people would agree that the risk is lower now than it was in the past, thanks to an increased culture of safety no longer tolerating such ill-advised laboratory behaviour as smoking or mouth-pipetting. Nevertheless, recent accidents clearly illustrate that there is still much room for improvement and that safety must never be taken for granted or become an afterthought.

It is not just academic laboratories in which accidents can happen: seven students and their teacher were injured by an explosion in a high-school chemistry class in New York state in January this year, to give a recent example. Finally, of course, there is industry. A discussion of the safety of large-scale industrial plants — although of extreme importance in itself — would deserve more space than a brief mention in a one-page editorial. It is interesting to note, however, that James Kaufman of the Laboratory Safety Institute in Massachusetts, estimates[6] that 'academic lab accidents occur on a man-hour basis 10 to 50 times more frequently than chemical-plant accidents'.

This statistic seems to bear out the commonly held belief that standards of safety are much higher in industrial laboratories than they are in their academic counterparts. There could be several reasons for this. Perhaps it is simply that industry has a stronger and deeper culture of safety than academia, or maybe the nature of academic research means it involves greater unknowns than some industrial research. The financial implications of industrial plants or laboratories being closed for even a short time are also drastic.

Another factor to take into account is the tendency for some researchers in academic laboratories to work outside of what may be considered to be normal working hours — often on a routine basis. On the face of it, this may not pose any greater than usual risk if the appropriate safeguards are put into place, but the reality can be very different. Should disaster strike at 3 a.m., help could well be a lot further away than it would be during the middle of the day — and it is likely that every second would count in such a situation. Furthermore, if working unsocial hours means working much longer hours, then tiredness may lead to accidents. And even though the department forbids you to work alone in the lab after a certain time, who is going to find out? Whatever the perceived productivity benefits may be, they are not worth injury, or worse.

However important a PhD thesis may seem at the time, or however important gathering results for an important publication may feel, should any of these things come before the risk of serious injury or even death? Of course not. Anyone complaining of the discomfort of lab coats or safety glasses should consider the words of Barry Sharpless, who was blinded in one eye in an accident in 1970: 'My first ten days at Mass. Eye & Ear were spent totally immobilized and with both eyes bandaged. The pain was terrific, but my fear was even greater: I had been warned that when my eyes were uncovered there was a small chance I might be blind in both eyes'[7].

Workers in industrial laboratories are in general more experienced than those in academia. This is emphasised in posts on Chemjobber's blog[8], estimating that the level of experience of an individual in industry usually amounts to 'at least 10 years' — as an undergraduate, then a graduate student, plus experience in the workplace. For those still in graduate school, he estimates their level of experience as being at most 5–6 years. This, therefore, is surely a reason why a safety-conscious culture should be even more of an imperative in an academic setting.

Although legislation can put policies and procedures in place to try to minimize the safety risks in chemical laboratories, accidents will still happen and no law will prevent them. Only a wholesale acceptance of responsibility from top to bottom will do. From the top, academic departments must do more to ensure that safety comes first for all staff and students (it is noteworthy that Cal/OSHA only investigated the accident because Sangji was an employee, rather than a graduate student[1]). Faculty members should instil their groups with a strong culture of safety and be prepared for work to go a little more slowly for it to go more safely.

Post-doctoral workers must realize that their habits will be imitated by more junior members in the laboratory and so they should act accordingly and be prepared to mentor their co-workers. Finally, undergraduate and postgraduate students should exercise their right to express concern over their colleagues' practices. It must be acknowledged that safe practices are not there to make lives more difficult, but to save those lives — it is only through actively using those safety measures that accidents will be reduced to as low a level as possible. ❐

References

1. Kemsley, J. N. *Chem. Eng. News* **87,** 29–31; 33–34 (2009).
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3. http://go.nature.com/3EXqR8.
4. Johnson, J. *Chem. Eng. News* (20 January, 2010); available via <http://go.nature.com/45C5ty>.
5. http://go.nature.com/6SdT8f.
6. Johnson, J. *Chem. Eng. News* **88,** 25–26 (2010).
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8. http://chemjobber.blogspot.com/2009/06/beryl-benderlys-article-on-slate-wrong.html

Corrected online: 25 March 2010

Correction

In the Editorial *Nature Chemistry* **2,** 241; 2010, there was an error with the shortened URL for reference 8; the full web address is now provided in its place.