

Oh yes you can!

Safety! Matters

■ ASE Safeguards in Science Committee

Too often, one reads of school science experiments reportedly banned because they are deemed dangerous by health and safety officials (e.g., *Observer* 2006, *Scotsman* 2006). Unfortunately, these myths spread and teachers may restrict good practical work needlessly. The Royal Society of Chemistry (RSC) became concerned and in 2005 commissioned research by CLEAPSS into these misunderstandings. Questionnaires went to a 25% sample of secondary schools in England, Wales, Northern Ireland and offshore islands, all secondary schools in Scotland (through a collaboration with SSERC) and all local authorities responsible for education. The RSC report, *Surely that's banned*, can be found at www.rsc.org/Education/Policy/SurelyThatsBanned.asp. Paper copies of the main report were sent to all schools. The report concluded that *'There are significant misunderstandings about the chemicals and scientific activities which are banned in secondary schools and some teaching is inhibited by unjustified concerns about health and safety.'*

The modern approach to health and safety is by risk assessment. Generally, it is not *'You can't do that'*, but *'If you want to achieve that, then here's how to do it without injuring yourself or others'*. Let us look at some examples. About 14% of schools that responded to the CLEAPSS/RSC survey thought that the use of a starting pistol in 'speed of sound' demonstrations was banned. There is actually no national ban but, of course, a suitable risk assessment must be undertaken. While one can determine the speed of sound by bench methods, observing a starting pistol fired from a distance of several hundred metres on the school field brings home directly, and unforgettably, the comparative difference between the speed of light and sound. Another example of a memorable demonstration is the 'exploding can'. The teacher fills a can

with natural gas, i.e. methane (the demonstration will not work with butane or propane) and then ignites the gas as it escapes from a hole in the top. Nothing happens for some time, although air is gradually drawn in through a hole in the bottom. Then, suddenly, there is an explosion and the lid is blown off. If the volume of the can is no more than 1 litre, and the teacher and students are 2 metres away, the risks are small; those needing further guidance can obtain it from CLEAPSS or SSERC. This demonstration can form an exciting introduction to work on rates of reaction or, with more able students, lead to a discussion about the optimum amount of air for the reaction and ideas of explosion limits. However, around 10% of schools believed that this was banned and only 51% of schools carried out the demonstration on occasions. (And we wonder why children find science boring?)

There are many other examples of false national bans, such as the use of cheek-cell samples and EHT power supplies. The safety measures and experimental design may have changed over time (Borrows, 2004) and teachers need to be aware of these improvements and current risk assessments, but that is no reason for excluding such activities or equipment from science education.

If practical work is reduced and teaching occurs mainly through simulations and videos instead, then one should be aware of the message being given about the risks, e.g., of radioactivity. This may just confirm the distorted fears that many people have regarding science practical work and compound their misunderstandings about the risks of radioactivity. And – what about dispelling pupils' misconceptions? Videos and computer simulations have an important place in teaching, but are nowhere near as memorable and convincing as showing pupils directly.

There are very few national bans – the one often quoted is the ban on benzene, imposed nationally and not just in schools. It is banned for all purposes, except in motor fuels, industrial processes and research. However, CLEAPSS and SSERC have information on chemical substitutes for practical work that formerly required the use of benzene. Sometimes employers (local authorities for maintained schools) may impose a ban on a particular chemical or activity (but please note that the RSC report shows that this is much less prevalent than teachers and technicians think). Teachers will know about these because employers should have a system for issuing restrictions, in writing, and reinforcing the restrictions regularly so that new employees are also informed. Sometimes, bans originate from the school. Teachers should follow their employers' rules, but they can certainly challenge such rules in a constructive way, enlisting the help of ASE, CLEAPSS or SSERC to justify, by risk assessment, the overturning of any unnecessary restrictions.

The new edition of *Safeguards in the School Laboratory* (11th Edition 2006) is a helpful and authoritative source of advice on risk assessments for many investigations that can add colour, excitement and understanding to science teaching. Check this publication before you say you cannot do an experiment *'because of health and safety rules'*.

References

- Borrows, T.P. (2004) We don't do that – it's not safe any more! *School Science Review*, 85 (312), 121–125
- The Observer (2006) *Come on, teacher, light their fires*. McKie, 15th October 2006
- The Scotsman (2006) *Classroom health rules 'deny science pupils the chance to run experiments'*. Schofield, 12th August 2006