Chemical safety in the classroom - helping your students understand what it is all about

Hugh Cartwright

Chemistry Department
Oxford University, England.
Outline

- Why is safety important?
- How should we teach safety?
Safety is important because... (1)

Laboratories are dangerous places

The methanol flame test
Safety is important because...

(2)

- Through safety we can teach science

  - Why is methanol dangerous?
    - it burns
    - it has a non-luminous flame
    - it is very volatile, so dangerous levels of vapour can build up
Safety is important because...

(3)

A proper understanding of chemical properties is crucial (particularly for adults!)

Phenylimidazopyridine
Acetaldehyde
Sudan I
Principles of teaching safety

- 1. Do not put students off
- 2. Do impose a requirement of safe working
- 3. Be cautious about a standalone safety course
More principles

4. Safety is crucial from the moment that an experiment begins
Preparation

- 5. Offer students information, but encourage them to research safety data for themselves. This must be recorded before the experiment begins.

- Is a new chemical or just ?

TOXIC
HARMFUL

ChemEd 2005
Vancouver, Canada
More preparation

6. Spread the burden of preparing safety notes among students

7. Tailor your approach to each group
Background

- 8. Explain at an early stage that everything is chemical.
Safety and demonstrations

9. Give every demonstration a scientific justification
Scientific debate

- 10. Environmental debates can be helpful. Encourage students to take sides, but conduct the debates in an unbiased fashion.
Safety and the environment

11. Encourage students to recognize the links between environmental and ethical issues...

12. ...and to appreciate that environmental issues are often complex
13. Relate the hazards posed by a chemical to its position on the periodic table and to the behaviour of similar chemicals.
14. Demonstrate that both the properties of chemicals and those of processes may present hazards.
Sources of safety information

- HSci chemical safety database
  - http://ptcl.chem.ox.ac.uk/~hmc/hsci

- Physical & Theoretical Chemistry Lab, Oxford University, Safety database
  - http://ptcl.chem.ox.ac.uk/MSDS

- Chemical suppliers (e.g. Sigma Aldrich)
  - http://www.sigmaaldrich.com/