

## Health and safety situations - answers

**1. False** (Always use a CO<sub>2</sub> extinguisher to tackle laboratory fires)

The primary objective is to save lives and this usually means evacuating the building. Fires should only be tackled if they are small and easily extinguished. Most small fires in the laboratory are best dealt with by covering with a fire blanket, by placing a heat-resistant mat over the mouth of the container or simply letting them burn out.

**2. False with qualification** (A teacher could be prosecuted if a pupil's eyes were splashed with a chemical just after the pupil removed his or her eye protection to record results.)

If a teacher insists on pupils following the rule of wearing eye protection whenever the eyes are at risk and regularly enforces this rule, it is extremely unlikely that he or she could be prosecuted if an isolated incident occurs. Clearly, reasonable steps need to be taken to enforce good practice and discipline.

**3. False** (Attending a training course is always required before you can use radioactive substances)

For the types of sealed sources used in schools, many Physics teachers will already have used these while studying for their degrees and therefore have appropriate experience of their safe use. For other staff, in-house training will normally be sufficient. However, a few employers, especially in Scotland, may require that teachers attend a training course.

**4. Probably true** (It is safer to use saliva for enzyme practicals than to make up a solution of amylase.)

There may be a slight danger of infections being spread from saliva but there have been reported incidents in which staff became sensitised to enzymes such as diastase. The risk is to those preparing the enzyme solution and is very low for pupils using the dilute solution. So either the solution can be prepared with great care or saliva can be used, with each pupil providing his or her own sample and afterwards all glassware placed into a solution of *Virkon*. The balance of risk lies with the use of pupils' own saliva.

**5. Usually true** (A small length of rubber tubing attached to a laboratory cold water tap is a better means of washing alkali out of eyes than using eyewash bottles.)

Generally, using a short length of rubber tubing attached to a tap is better in that it can provide the continuous flow for the longer period of time that is needed to wash eyes, especially after a splash of alkali. Several bottles of sterile saline would be needed to achieve the same irrigation and may not be as easy to use as the rubber tubing. The financial demands of replenishing the eyewash bottles may perhaps lead to a situation in which insufficient bottles are available when needed. However, poor-quality water from taps not fed by mains water may require schools to consider using wash bottles despite their disadvantages.

**6. False** (It would be unwise to use *E. coli* bacteria in class practicals because of the danger of pathogenic strains growing in the cultures.)

The strain of *E. coli* used in school microbiology practicals (usually the K12 strain) is not known to be harmful to humans.

**7. True with qualifications** (If a pupil steals a chemical and then later becomes injured when using them outside, then it is only the pupil's fault.)

If the school has a lax system for storing chemicals, eg the store is often left unlocked or hazardous 'attractive' chemicals (such as magnesium ribbon) are left out in the prep room, then clearly the system of working would be regarded as being unsafe and the school would almost certainly bear much of the blame. However, if the chemicals have been securely stored and the method of distribution to the laboratory is well controlled, ie, chemicals are not left out in the presence of pupils without a teacher present, no blame should rest with the school.

**8. False, with qualification** (You are only allowed to carry out those experiments listed on the teaching scheme given to you by your head of department.)

All your activities must have been subject to an appropriate risk assessment. If you have any interesting ideas for activities, it is essential that they are not rejected simply because they are absent from the scheme of work. Do not perform any new or modified activity without thinking first about possible risks, consulting your head of department and trying it out in the presence of a colleague. Teacher demonstrations often involve activities with greater risks. Check if the activity conforms to model risk assessments and, if there are no relevant models, request a special risk assessment, in consultation with the head of department. Even if on first sight the activity appears to be too hazardous, very often careful consideration will identify ways of reducing the risks sufficiently, thus enabling the new activity to be added to the scheme.

**9. Debatable** (Pupils are safer if the teacher demonstrates an experiment than if they carry it out on a smaller scale.)

This clearly depends on the experiment, and the teacher. Many of the reported serious accidents in science have occurred during teacher demonstrations. Large spectacular demonstrations, such as the thermite reaction can obviously be carried out more safely by the teacher on account of his or her experience and knowledge and because of the controls he or she puts in place. On the other hand, since it is the more hazardous activities which carry a greater risk that are demonstrated by the teacher, it follows that if something goes wrong, the severity of the accident is greater.

**10. Debatable** (It is not permissible to bring in mains-powered equipment from home for use in the laboratory, eg, hair dryers for class investigations on paper chromatography.)

This will depend on whether the equipment is suitable for the planned use in the lab. Using a hairdryer for 5 minutes to dry hair at home is not the same as running it continuously for an hour to powerhome made wind turbines or dry pupil's paintings. In addition, most employers will require any such electrical equipment to be checked by a competent person before it can be used. A few prohibit the use of such equipment.

**11. True** (Your employer is required by law to provide you with appropriate health & safety training and instruction.)

This is required by several pieces of legislation, in particular the Management of Health and Safety at Work Regulations. This states that every employer shall ensure that employees are provided with adequate health & safety training on recruitment and on exposure to increased risks because of changed responsibilities, new equipment or new technology. Much training can, however, be in-house delivered by an appropriately experienced colleague.

**12. True, but...** (Students, planning their own science activity, should be taught to assess the risks involved in the procedure.)

The duty to see that suitable assessments of risk are carried out belongs to the employer. Teachers have an important role to play in ensuring that risks are managed appropriately in their lessons. Asking students to carry out assessments of their own planned practical work can be an important part of the students' education but their assessments are not a substitute for the assessment carried out by the teacher.

**13. False** (Pond dipping is now inadvisable because of the risk of catching Weil's disease.)

However, sites should be carefully chosen and good hygiene practice followed, cover cuts and grazes and wash hands afterwards. In addition, keep eating or drinking separate from fieldwork activities and encourage pupils not to touch their faces with wet hands. The disease is relatively rare and provided these precautions are taken the risks are slight.

**14. True** (The use of air rifles is permitted in energy conservation and change of momentum experiments.)

The rifle should be bolted to a support and a suitable backstop, such as a cardboard box with soft lining material, placed behind the target to catch any pellet which misses. Teacher and pupils should wear appropriate eye protection and the pupils should be positioned behind the gun and in such a position that the target is viewed from behind a screen. It is *not* recommended that teachers bring in a rifle from home. However, the employer may have banned the use of air rifles so it will be important to check for any local restrictions before doing this activity. Note the use of replica pistols that resemble real guns or blank firing pistols (such as some types of starting pistol) that could be converted to live firing is prohibited by law.

**15. False, but ...** (When incubating Petri dishes, you should seal them with adhesive tape, to prevent pupils opening them)

It is important to prevent the lid falling off, so 2 or 4 short pieces of tape should be used. However, if the dish is completely sealed by wrapping tape all the way round the periphery there is the risk of promoting the growth of anaerobic pathogens that pose a greater risk to humans. However, **after** incubation, it is often wise to make it difficult for pupils to be able to open the dish, by wrapping tape all the way round the periphery. This will depend on your risk assessment of the extent to which you can trust the class.

**16. True but...** (A laser pointer can be used for optics demonstrations.)

Any laser device used in school should be class 2 less than 1 mW. If a department plans to use a laser pointer it must be no more than Class 2 and purchased from a reputable supplier. Pointers obtained from other, possibly more dubious, sources may be Class 3. A reputable supplier should be able to provide a certificate showing that the product has been tested and shown to be class 2. Make sure any certificate you are sent dose this and ensure that the certificate matches the product as supplied. Keep it securely under lock and key when not in use.