

CLEAPSS BULLETIN 131

For all technicians and teachers of science and design & technology

Spring term 2008



Supporting practical science & technology
- in schools & colleges

Circulation list: Science and D & T				

The 2008 Science Publications CD-ROM

By the time you read this, you *should* have received (or will do so shortly) our new CD-ROM. The old CD will stop working after January 31st. If you have not received your CD by half term, please contact us so that we can help you track down where it has gone!

The CD is for **teachers as well as technicians** and can be copied onto your secure staff network, any computer within the science department and home computers of science staff. Before handing it over to the IT department, **make a back-up copy** or you may never see it again!

See the back page for details of what is new on this year's CD.

The art of practical science

We are pleased to offer an exciting opportunity for up to twenty new(ish) teachers to take part in a **hands-on, residential** course in **practical science**. The course will take place in July 2008 in the new CLEAPSS laboratory on the Brunel Science Park and will cover practical techniques in all of the sciences (at KS3, KS4 and post-16 levels).

We are planning to include sessions on chemistry demonstrations, microchemistry, microbiology and aseptic technique, analytical techniques (eg, titration), gas preparation, dissection, radioactivity and other physics practicals and demonstrations. It may be possible to respond to teachers' requests for additional, 'tailor-made' sessions. Participants will also have the opportunity to explore the full range of CLEAPSS resources and to discuss any practical science teaching issues with our advisers.

The course is primarily aimed at recently-qualified teachers, especially those who are teaching outside their subject specialism or are required to teach across all the sciences.

The course starts at midday on Monday 14th July and ends at 3.30 pm on Wednesday 16th. Accommodation, meals and refreshments will all be provided at Brunel University and are included in the course cost of **£340**.

If you wish to take part in this course, please contact CLEAPSS with your details (01895 251496; science@cleapss.org.uk). Places will be allocated in order of application receipt, with an initial limit of one teacher per school.

Fume-cupboard foul-up

A teacher prepared chlorine in a fume cupboard for a class. However, the gas escaped into the laboratory, requiring the room to be evacuated, and some children were affected. Apparently, work had been carried out on the school roof involving the removal of the extractor fans from three fume-cupboard flues. Unfortunately, only two fans were replaced!

If a fan is removed from a fume cupboard for any reason, the cupboard *must* be retested before it is used again. Also, it is useful to attach a piece of thin plastic to the sash to show the air flow and confirm that a fume cupboard is working. We have even heard of extractor fans fitted incorrectly so that they blow rather than suck!

The new Hazcards

You should all have them by now! Let us know if you haven't received your free set yet. Extra sets can now be purchased for £10 or less (see page 4).

The new *Hazcards* **do** look very different. So much additional information has been squeezed onto the cards that we had to do some rearranging. The unfamiliar appearance means that these *Hazcards* may *initially* be a little more difficult to use. So here are a few hints and tips to help you find your way round them.

▲ **Index cards.** *Using these is vital!* Although the numbering system for the new *Hazcards* is essentially the same as before, there has been some movement of information from one card to another. Check the index to find the card (or cards) for the chemical of interest. The same chemical will be listed under its alternative names where these are in common use. Note too that many *activities* are indexed. So if, for example, you are doing the cracking experiment with liquid paraffin, you could locate *Hazcard* 45B by looking for 'paraffin' or 'cracking hydrocarbons'.

▲ **Emergency card.** To make room for all the new material, we removed the repetitive information about emergency procedures from individual cards and created the separate 'E' card. The 'E' card provides information on *immediate remedial measures, spills and gas/vapour leaks*. Additional information, specific to particular chemicals, is given on individual *Hazcards*. The spill information should be read in conjunction with section 7.7 of the *Laboratory Handbook*.

▲ **Waste.** The separate 'W' card provides general guidance on waste disposal. Codes W1 to W8 outline the different procedures for disposing of chemical waste. Each chemical listed in the *Hazcards* will have one (or more) **W** codes shown on the front of the card. In addition, you may see '**Wspec**' on some *Hazcards* - this gives disposal instructions *specific to that substance*.

For example, barium nitrate(V) has the codes W1, W7 and Wspec. Large amounts of solid barium nitrate(V) should be stored for disposal by a Registered Waste Carrier (W1). Small amounts of the *solid* can be disposed of by following the Wspec instructions. Small(ish) volumes of *solutions* of barium nitrate(V) can be diluted to *at least* the concentration given (approximately!) and flushed down a foul-water drain (W7).

▲ **WEL values.** The Workplace Exposure Limits are given for specific chemicals where appropriate. Exposure to the relevant chemicals will be kept below the WEL values if the risk assessment guidance provided on the *Hazcards* is followed.

▲ **Risk Assessments.** The reverse of each *Hazcard* has model risk assessments for many of the experiments and demonstrations commonly carried out in schools & colleges. Where appropriate, WEL values have *already been taken into account* in devising these risk assessments. The amounts, procedures and control measures stated on the cards are based on 15 pairs of students carrying out practical work in a 'normal-sized' laboratory. It is, of course, essential that these model risk assessments are consulted and adapted to local conditions (eg, smaller-sized rooms, labs with windows that only open a little, etc).

Join the club!

If science technicians feel somewhat isolated and would value talking to others, visit www.scientechtechnician.com and sign up to join the Scitech discussion group and Scitech Forums. In addition, there is www.techknow.org.uk - a great free web site for laboratory technicians and also another science technicians' discussion forum at <http://groups.yahoo.com/group/Scitech>.

Calling all technician groups

We would like to compile a list of technician groups in order to provide some information directly to technicians, such as news about courses in their area. If you coordinate such a group, please send us the technicians' group name and the geographical area covered, together with a contact person's name, school and e-mail address. Please e-mail: techgroups@cleapss.org.uk.

Another new technicians' course

We are now offering a new course for technicians, *Working with Glass*. This is a practical, one-day course that will provide technicians with the skills to make most glass bends and other common items used in schools and show them how some broken equipment can be repaired. We welcome enquiries from schools who would like to host this course.

Improving technicians' conditions

CLEAPSS continues to support science technicians in their pursuit of improved conditions and professional status. Guide L228, *Technicians and their jobs*, is still relevant and employers are urged to adopt the guidance contained in it. Work is also now in progress on writing a new guide: *Improving technicians' conditions*, which will provide advice on how to promote the need for improved conditions for science technicians. We hope that this guide will be published some time in 2008.

Technician CPD

As well as being interested in technician training, we are also keen to promote the status of technicians and their career development (see above). Recently, we looked at how our courses might be best used to support continuing professional development (CPD) for technicians. The results, including some potential gaps, are described in the table below. We hope that this information will help a school science technician to plot her/his own programme of professional development, not just to cover areas where greater experience or expertise is needed but also to meet the needs of promotion or career advancement. The courses in *italics* do not currently exist but we are considering developing them if a need is expressed. Please let us know what you think.

Possible scheme of developmental technician training using CLEAPSS courses

Basic skills, for new and inexperienced technicians	Basic chemical & general skills	Basic physics skills	<i>Basic biology and microbiology skills</i>	<i>Basic health & safety and using the CLEAPSS CD-ROM</i>
More-advanced courses for those with some experience and wishing to develop their expertise	Chemical handling 1	Making simple science equipment	<i>More-advanced microbiology</i>	Microbiology (current course)
	Chemical handling 2	Physics training for science technicians	Microscope maintenance	
Training for senior technicians or others with considerable experience and aspiring to become a senior technician	Fume-cupboard monitoring	Electrical testing Glass working	Running a prep room	Health & safety for (experienced) science technicians

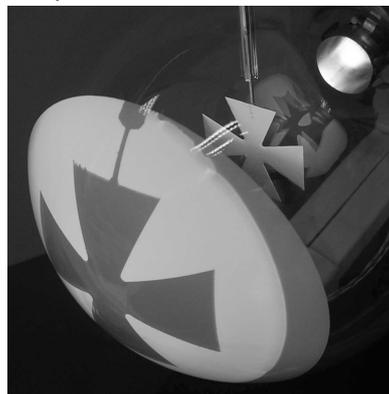
A SAPS goldmine

Of course, all science teachers and technicians must by now know about SAPS (Science and Plants for Schools) and its web site. But in a busy department, perhaps there just isn't enough time to explore thoroughly all the resources available? For example, have you looked at the *Curriculum Support* part of the SAPS web site: www.saps.plantsci.cam.ac.uk/pub_support.htm? Type this URL into your browser (or use the 'Links' page on our web site) and scroll down to find the materials available for secondary school pupils.

You might not have seen the Survival Guides on *Symbols & Units* and *Concentrations & Dilutions*. You will also find a marvellous collection of practical ideas to make investigations of photosynthesis more interesting and successful. (Why *do* so many schools study photosynthesis in the winter when plants shut down for the season?) For example, have you tried using the suggested alternatives to the dreaded *Elodea*: practicals using algal balls or another pond weed called *Cabomba*? And when you have sampled these delights, don't stop there; also have a look at the collection of *Student Sheets* for simple practical investigations or read in the *Osmosis* newsletters about the use of a carbon dioxide sensor to measure directly the progress of photosynthesis and/or respiration.

Use your particle accelerators!

Electron-beam tubes are miniature particle accelerators. The tubes designed for science investigations, eg, the Teltron Maltese cross tube shown below, enable the properties of electrons to be demonstrated in fascinating ways. Unfortunately, the use of such equipment in schools has declined. Many tubes are tucked away in their cardboard boxes but are still perfectly fit for use. Our new leaflet PS 76, *Electron-beam tubes - an introduction*, is designed to provide easy, step-by-step guidance to encourage science teachers and technicians to put an electron-beam tube back into operation. PS76 is on the 2008 CD-ROM or can be downloaded from our members-only web site.



Tips for Technicians

Screen test

White polypropylene sheet (*Corriflute*) can be used to make screens for optical investigations. *Corriflute* is lightweight, fairly non-reflective, cheap and, unlike paper/card screens, can be wiped clean with a damp cloth. Large sheets can be used with projectors etc, for demonstrations. Small pieces can be cut and glued to wood battens or square-section electrical trunking, to be used free standing on a bench with ray boxes etc. *Corriflute* is sold by most county suppliers and is usually found in the arts & crafts section of catalogues.

In a lather?

For hard-water determinations, the following has been suggested as an alternative to the information on *Recipe Card 60* or buying Clarke's or Wanklyn's solution. Tesco's 'Value' soap (19p for three bars) was warmed with pure water to dissolve it. A 0.3% solution worked well; stronger solutions were too 'gloopy' and weaker solutions required more than a burette full of soap solution to obtain an acceptable result. A 10 cm³ sample of water was used in a conical flask and a titration carried out to determine how much soap solution was required (after shaking) so that 70% of the surface remained covered in bubbles for at least 10 seconds. The volume of water used will depend on geographical location. In a soft-water area, 20 or 40 cm³ of water may have to be used. Comparisons can be made between tap, boiled and distilled water, bottled waters and water from pupils' homes or from distant relatives they have visited. (Note: *Recipe Card 60* uses ethanol to dissolve soap in order to cut down on the amount of foam in the original solution.)

Go with the (D & T) flow

In *Bulletin 129*, we mentioned an anemometer to measure the face velocity of a fume cupboard. Design & Technology departments may be interested to hear that the same instrument (Airflow Instruments LCA 301, £260 from TSI Instruments Ltd) can also be used to check the face velocity of a fume-extraction hood. TSI instruments also supplies a probe (thermal) anemometer (model TA410, £335) for flow-rate measurements in small inlets and digital micromanometers for static pressure measurements, eg, model PVM610 (£275).

TSI Instruments Ltd	Tel: 01494 459200
Lancaster Road	Fax: 01494 459700
Cressex Business Park	E-mail: info@airflowinstruments.co.uk
High Wycombe HP12 3QP	Web site: www.airflowinstruments.co.uk

We would be grateful if science departments would bring this information to the attention of their D & T colleagues.

Something nasty in their pockets?

Several schools have reported chemicals or equipment going missing after lessons. Alkali metals are among the more-tempting items after pupils have seen their spectacular reaction with water, though one school noticed its stocks of phenolphthalein (LOW HAZARD but known to have laxative effects) were becoming depleted.

All chemicals with a hazard classification must be stored securely and handled properly. Similar care should be taken with equipment. Staff are responsible for ensuring the security of hazardous materials at all times - being delivered to labs, during lessons and on return to prep rooms - and a full assessment of risks should consider this whole process. There is no need, for example, to put out a whole bottle of potassium when only one or two pieces will be used in a demonstration. In any case, chemicals and equipment should be counted out, and back in, before the end of a lesson. Teachers don't have eyes in the backs of their heads so, with some classes, it is wise for a technician to bring in a chemical just before it is needed and take away the remains before the class leaves. A departmental system for issuing materials and returning them to secure storage is good practice and can prevent theft.

If something hazardous (or expensive) nevertheless slips through the net, you must try to retrieve it. If the loss is discovered before a class has left the room, insist that pupils search their bags in your presence and do not release them until the item is found. Retrieving an item after a class has left is harder; if pupils are still in school, a thorough search is the first step, and the offer to accept a stolen item anonymously may encourage its return. Children (and their parents if the item has not reappeared before the end of the day) need to be alerted to the hazards and risks of the item and told what to do if it is found. Ask parents to search their children's bags and pockets and tell them what to look for. Cleaners need to be warned in case something has been secreted in the toilets or bins and the local police can keep an eye out if they are told what has happened. There will almost certainly be disciplinary issues and the involvement of senior management to help resolve the problems.

Supporting effective science teaching

The Secondary National Strategy is publishing further guidance to help science teachers improve their classroom practice. Under the general title of *Interactive Teaching*, there are guides on purposeful practical work in science and effective demonstrations. These materials will be freely available on DVD early in 2008. Look out for them or ask your local authority science consultant.

CLEAPSS courses coming soon

Details of our courses, up to half term in May 2008, are listed below. Most sessions are for *technicians*, unless otherwise indicated.

Basic General & Chemical Skills: Cheshire; Kent.

Basic Physics Skills: Birmingham; Cheshire; Science Learning Centre (SLC) Southampton.

Biology Safety (+ teachers): Gloucestershire.

Chemical Handling I: Newcastle-upon-Tyne; Salford; SLC Bristol & London.

Chemical Handling II: Salford area; SLC Hertfordshire, London & Southampton; Surrey; Windsor & Maidenhead.

Electrical Inspection & Testing: SLC Southampton; W. Yorkshire.

Fume Cupboard Monitoring: at CLEAPSS.

Health & Safety: Cheshire; Devon; Gloucestershire; Shropshire; SLC Durham, London & Southampton; Staffordshire; Wirral.

Health & Safety (NQTs): N. Wales.

Health & Safety Management (Heads of Science): Cornwall; Northamptonshire; N Yorkshire; N Wales; Staffordshire.

Making Simple Science Equipment: Hounslow; Warwickshire.

Microbiology (+ teachers): Essex; Salford area; SLC Southampton; Warwickshire.

Microscale Chemistry (+ teachers): Kent; SLC London & Southampton.

Microscope Maintenance: SLC London, Surrey.

Physics Training: Birmingham; Kent; SLC London; Suffolk.

Radiation Protection Supervisors (Teachers): Kent; Lancashire; Salford area; SLC Durham & Nottingham; Suffolk.

Running a Prep Room: Hounslow; SLC Bristol; Warwickshire.

Surely it's banned? (+ teachers): Kent; SLC Southampton.

For the most up-to-date information on courses being offered, visit our web site; this indicates the items that participants should bring with them for a particular session. Courses are usually publicised to schools and colleges in the locality of the host establishment but are open to anyone willing to travel. Contact us (ask for Alison or Caroline) for an application form or, for a Local Authority-organised or Science Learning Centre (SLC) course, for details of the contact person. For such courses, you will need to book directly with the Local Authority or SLC. Some Local Authorities give priority to their own schools. **If courses of interest are not being held in your area, please contact us; we may be able to organise something.**