

CLEAPSS BULLETIN 106

For all technicians and teachers of science and technology

Autumn term 1999



SCHOOL SCIENCE SERVICE

Circulation list			

100%!!

We are delighted to welcome schools in Rutland. This means that every education authority in England, Wales, Northern Ireland and the off-shore islands is now a member of CLEAPSS. We hope that the effects of fair funding will not reduce this total coverage in the future.

SOLDER FUME ALERT!

The health hazards of the fumes from rosin-based solder flux have recently been reclassified. The fumes can cause asthma or make existing asthmatic conditions worse. They are sensitisers, ie, a single exposure can cause sensitisation and once asthma has developed even small amounts of fume can then lead to an attack. It is not possible to identify a safe level of exposure below which asthma will not develop.

For the first time, in the 1999 edition of *EH40, Occupational Exposure Limits* (HSE), the fumes are given a Maximum Exposure Limit (MEL) of 0.05 mg m^{-3} (long-term exposure, 8-hour reference period) or 0.15 mg m^{-3} (short-term exposure, 15-minute reference period). Relatively few substances are given MELs; Occupational Exposure Standards (OESs) are much more common. Whereas OESs represent levels to which it is believed workers can be safely exposed day after day, with no risk of ill effects, MELs represent a maximum which must never be exceeded. In addition, every effort must be made to reduce exposure to levels well below the MEL.

Exposure can be reduced by using rosin-free fluxes, by using efficient local exhaust ventilation (LEV), ie, fume extraction or by avoiding soldering altogether (eg, by reserving soldering for the final product rather than prototypes). *Risk Assessments for Technology* (CLEAPSS, 1994; p. 27) states that LEV is required if rosin-based fluxes are used. In order to take account of the changed assessment of the risk from rosin-based fluxes, this will be worded much more strongly in the next edition (due in 2000). We also intend to evaluate the suitability of various options for LEV in school technology departments, including that provided by a hearth, tip extraction, extractor fans with and without filters, etc. Science departments will already have efficient LEV, ie, fume cupboards, which perhaps technology staff and pupils might be allowed to use in the mean time.

We recommend fluxes which do not contain rosin. Alternatives are available, although care must be taken to ensure that replacements do not present similar hazards. Active fluxes (eg, containing ammonium or zinc chloride) should be avoided because they produce corrosive fumes. We have previously recommended the use of Multicore Hydro-X but Multicore Ecosol 105, available from, eg, RS or Farnell, is unambiguously identified as rosin-free. Even rosin-free solders produce fumes which will irritate the nose, throat or lungs. Therefore, where possible, LEV should be used for *all* soldering but, where this is not possible, good natural ventilation is essential. Pupils should be told to avoid inhaling fumes and also taught to solder in ways and positions which minimise the possibility of inhalation.

Please make sure that this article is drawn to the attention of staff in technology, as well as science, departments.

.... TO SLEEP, PERCHANCE TO DREAM?

One use of ethoxyethane (diethyl ether) is to anaesthetise *Drosophila* fruit flies. This, however, is EXTREMELY FLAMMABLE (a very serious fire risk) and its narcotising vapour may not just put the flies to sleep! (though a *very* high concentration in the air is needed). Some employers may have placed restrictions on the use of ethoxyethane which do pose difficulties when transferring fruit flies in setting up genetic crosses. For some time, there has been an alternative to ethoxyethane for such work: a product called 'FlyNap', but you had to purchase it from Carolina Biological in the USA. Now, however, it is being marketed in the UK by Blades Biological (tel: 01342 850242; £8.49 a kit), so we thought we'd test out a sample, courtesy of Blades.

The FlyNap kit consists of a 10 ml bottle of anaesthetic and 12 'wands' which are dipped in the anaesthetic and then inserted into the *Drosophila* culture bottle or tube by momentarily pushing aside the foam stopper. The wand is left in place for 4 minutes. The flies are anaesthetised inside their culture bottle (beware of dozy flies plunging into the food medium, from which they never escape!) and then tipped out for sexing etc. There is thus no need for that tricky operation of inverting the culture into a funnel attached to a flask (unless the food medium in the culture is sticky and fluid, in which case it is recommended that the flies are first transferred to a clean tube before anaesthetising). Flies remain anaesthetised for at least 50 minutes and often for several hours. (This could be an advantage over the use of ethoxyethane as the anaesthetic. Ever fearful of over-anaesthetising the animals, exposure to the ether is often too brief and so the flies may recover at an inconvenient moment! However, waiting for many hours while 'FlyNapped' flies regain consciousness can become rather tedious.) FlyNap is not supposed to have any ill effect on the flies, so we tried exposing them to the anaesthetic for double or even triple the recommended time. The majority of the flies *did* come round but it took well over 6 hours!

So what is in the FlyNap anaesthetic? Well, it contains 50% triethylamine (HIGHLY FLAMMABLE; CORROSIVE; HARMFUL to the eyes, in contact with the skin and if swallowed), 25% ethanol (HIGHLY FLAMMABLE) and 25% 'fragrant' (to mask the smell of the triethylamine!). This all sounds pretty horrendous but we are confident that FlyNap can be used safely; after all, students will be exposed to only a very small amount. However, FlyNap does have a distinctive odour. Gauging the 'offence rating' of an aroma will always be rather subjective but we found it decidedly unpleasant. Even a trace left on the fingers (easy to do when handling the wands) leaves a lingering smell that does not easily wash off, so we certainly recommend wearing gloves! Another problem arises when a wand is inserted into a culture tube: it is easy to contaminate the stopper with the anaesthetic, so flies may continue to receive a dose of FlyNap after the wand is removed.

The overall verdict? We do *not* consider that ethoxyethane is so dangerous that it should not be used; suitable precautions can usually be taken. FlyNap is, however, an effective and useful alternative which deserves consideration.

New Publications

EARTH IN SPACE

Our guide L194, *Earth in Space: Key Stages 3 & 4*, has recently been updated. There is not a great deal of difference compared with the 1991 edition but references to the National Curriculum have been changed (using the proposals for the revised science NC), details of equipment have been updated, new resources are described and, of course, suppliers' etc addresses have been brought up to date.

RESTATING OUR POSITION

We have also revised a number of our information leaflets (see page 4) and issued two new ones. As promised in *Bulletin 105*, we have now produced guidance (PS44) to help those using the CASE materials and summarised the current situation on refilling carbon dioxide cylinders (PS45).

FOUNDATION & VOLUNTARY-AIDED SCHOOLS

With talk about 'returning to the LEA fold', there is often some confusion about who is responsible for health & safety matters in the new foundation and voluntary-aided schools. Mostly, such schools were grant-maintained until recently and it was quite clear that the governing body, as the employer, had legal responsibility for health & safety matters. *That is still the case.* Under the new arrangements, the governors may buy services from the LEA, including, eg, health & safety advice, CLEAPSS membership etc. However, Para 15 of Schedule 17 of the *School Standards and Framework Act 1998* states:

"Where the governing body advertises the vacancy ... the person so appointed shall be employed by the governing body under a contract of employment."

Therefore, the governing body, as the employer, is responsible for health & safety in foundation and voluntary-aided schools.

On the other hand, Section 39 of the Act states:

"The governing body and headteacher of ... a community or voluntary-controlled school ... shall comply with any direction given to them by the local education authority concerning the health or safety of persons on the school's premises or taking part in any school activities elsewhere."

Thus, community and voluntary-controlled schools must do what the LEA instructs them on health & safety matters; foundation and voluntary-aided schools do not have to do so.

◆ Ex-GM schools, that paid a direct subscription to CLEAPSS but are now included in the annual subscription to CLEAPSS paid by their LEAs, should note that they are eligible for a 6-month rebate on the subscription paid for 1999. However, this rebate will only be paid *if schools write to us to request the refund.*

ALL CHANGE!

Locktronics who supplied electronic circuit construction kits to schools for many years has been taken over by TecEquipment. Irwin-Desman also ceased trading recently but its products are now being supplied by Economatics (Education) Ltd. Please amend details in the CLEAPSS *Laboratory Handbook*.

TecEquipment Ltd
Bonsall Street
Long Eaton
Nottingham NG10 2AN

Tel: 0115 954 0153
Fax: 0115 973 1520
E-mail: sales@tecquip.co.uk
Web site: www.tecquip.co.uk

Economatics (Education) Ltd
Epic House, Darnall Road
Attercliffe
Sheffield S9 5AA

Tel: 0114 281 3344
Fax: 0114 243 9306
E-mail: sales@economatics.co.uk
Web site: www.economatics.co.uk

In *Bulletin 98*, we mentioned a source of a wall-mounted storage box for *Hazcards*. Unfortunately, the company concerned, Digitech Instruments, has ceased trading. In *Bulletin 102*, we discussed *Schoolcells*, rechargeable alkaline cells, available from Curriculum Warehouse. Please note that these cells are still available but now from Commotion, at the same address.

A FUME CUPBOARD MISCELLANY

Some employers are testing fume cupboards with anemometers which are unsuitable. Some instruments give poor resolution, while others do not measure accurately at the low air speeds encountered. We even heard of a rotating-cup anemometer (for measuring wind speed out doors) being used!

The minimum face velocity for an adequate school fume cupboard at a sash opening of 400 mm is 0.3 m³. Building Bulletin 88, *Fume cupboards in schools* (DfEE, ISBN 0112710271) requires that an anemometer should have an uncertainty of 10% or less when measuring air speeds of 0.3 m³s. The anemometer should be recalibrated by the supplier at regular intervals.

The Airflow 6000RVT (tel: 01494 525252) is a suitable instrument but costs over £260; any anemometer retailing for less is likely to be unsuitable and should be viewed with suspicion.

❑ The Leeds fume cupboard supplier Holliday, Fielding and Hocking ceased trading in March, most of its staff were sacked and the business was sold. It is not yet clear whether the new owners will supply school fume cupboards. Some former employees have set up a fume cupboard testing and maintenance business as HFH 2000; tel: 0113 249 7080; fax 0113 249 7161.

❑ We have been informed by Clean Air Ltd of substantial reductions in the price of its mobile recirculatory filter fume cupboard, model SSR2000. If you have a copy of our guide R9a, *Fume Cupboards: Suppliers and Repairers* (June 1998), please make the following amendments.

The basic fume cupboard costs £2595 (£2227.50 with LEA discount) including filters, electric sockets, light and delivery. A gas supply adds £210 (£178.50 for LEAs), while water and drainage cost an extra £330 (£280.50 for LEAs). The prefilters cost £30 for 10 (down from £98) and the filter has been reduced from £219 to £120.

The frame is now made of epoxy-coated aluminium, rather than mild steel, which makes the whole cupboard much lighter. There would be an extra charge for commissioning.

..... AND A MICROSCOPE MISCELLANY

We are delighted to hear from a professional repairer that technicians are finding time to clean and maintain school microscopes. However, he also reports that eyepieces are sometimes reassembled with one lens inverted. The lenses in eyepieces are usually plano-convex and the orientation of the plane side depends on eyepiece design. The two most common designs are shown on page 1025 of the *Laboratory Handbook*. If your eyepiece is not like either of these, please ring the **Helpline**.

❑ We heard from a school that was searching for a supplier of 35 mm mirrors for old microscopes. The technician contacted a specialist glass supplier. A gimble was supplied so that a good fit could be obtained and, soon after, 10 mirrors with ground edges were despatched for a very reasonable £4.25 each. Details of the company are given below; deliveries are in the local area only but such mirrors can easily be sent by post. Other large glass companies may also be able to help.

Basildon Glass Works
12 Winstanley Road
Howard Chase
Basildon SS14 3BP

Tel: 01268 282424 Fax: 01268 532348

❑ Finally, if you are about to use a contractor to service your microscopes, rather than d-i-y, remember that costs will be reduced if you can team up with other schools in your area.

CRACKING UP

In *Bulletin 104*, we discussed the problem of crucibles that break too easily. A tip: crucibles are less likely to crack if they are left in their pipe-clay triangles and allowed to cool slowly.

Tips for Technicians

LOSING THE THREAD?

There are two ways of reconnecting the broken threads in spirit thermometers. A freezing spray can be used to cool a thermometer which lowers the thread into the bulb. Alternatively, a thermometer can be heated by placing it into a beaker of glycerol which is heated to above 100 °C. (Wear eye protection: care is required as glycerol can absorb water which begins to boil off at high temperatures.) Heat the thermometer only until the threads start to merge or the thermometer may break. Once the threads have come together, the glycerol and thermometer(s) should be allowed to cool naturally to room temperature.

AN NVQ FOR LAB TECHNICIANS

As many readers will be aware, the ASE has developed an occupational standard for school/college lab technicians and a number of colleges around the country are becoming accredited training centres for the award of an NVQ at levels 2 and 3. Currently, relatively few colleges have gained, or are seeking, approval as a centre but hopefully the number will grow. We list below the colleges that are already offering training or should soon do so. If technicians are keen to gain an NVQ but there is no college near them offering the award, start lobbying! Contact your LEA science adviser to ask if he/she can be a focus of interest. Details of the NVQ and centres are available from Greta Miller at the ASE (tel: 01707 283000).

Centre	Contact	Telephone no.
Accrington & Rossendale College, Lancashire	Catherine Hill	01254 354109
Hertfordshire Education Services	Barbara Pitcher	01582 830283
Kingston College, Surrey	Adele Smith	0208 268 3046
Newtonabbey Campus, Co. Antrim	Keith Kilpatrick	01232 855000
North East Chamber of Commerce, Cleveland	Joan Melling	01642 652222
North Trafford College, Manchester	Brian Halliwell	0161 886 7070
Oaklands College, St Albans	Vivienne Robinson	01727 737500
People's College, Nottingham	David Martin	0115 912 8599
Solihull College	Andrew Briggs	0121 678 7000
Stoke on Trent College	David Priestman	01782 208208

NEW HEALTH & SAFETY REGULATIONS

The *Provision and Use of Work Equipment* and *COSHH Regulations* were revised in 1998 and 1999 respectively.

If all the old '*Work Equipment*' Regulations were being observed, schools should not need to change any practices to meet new requirements. The essential principle remains that equipment must be safe and suitable for its intended purpose. It remains an offence to transfer an item to a new user unless it meets *all* current safety requirements (so beware of gifts). It remains true that staff must be *trained* before using most machines in a school workshop and items of science teaching equipment which may be hazardous. The only significant new feature is the requirement to inspect equipment and installations to ensure that they have been installed correctly and remain safe to use. As usual, it is the *employer* who must arrange for the inspection.

The new *COSHH Regulations* should *not* affect systems already in place to ensure that hazardous substances are handled safely.

HUNT THE URANYL NITRATE

In *Bulletin* 105, we mentioned the problem of obtaining uranyl nitrate to make protactinium generators. Unfortunately, the source we suggested, R & L Slaughter, is only able to deliver to schools in London and the surrounding area. (Orders by post or fax please.) If your school is elsewhere in the country, contact the *Helpline*; we may be able to help.

However, you should first check with other local schools to see if they have stock from which you can obtain a few grams. You must confirm that this is OK with your Radiation Protection Adviser (usually the science adviser for LEA schools), who may be able to tell you which neighbouring schools have supplies of the chemical. If you decide to collect from another school, you should provide a letter confirming how many grams you have received and keep your own copy. You must collect the uranyl nitrate yourself - do not send radiochemicals through the post. The polypropylene bottle used to make a protactinium generator is a convenient way to carry the 1.5 g of uranyl nitrate required - full instructions are on *Recipe card* 57. Normal procedures for handling open radioactive sources must be followed when transferring uranyl nitrate between containers. The bottle should be well packed within another container during transport. Store the chemical in your radioactives cupboard.

CLEAPSS COURSES COMING SOON

To give advance warning of courses up to February 2000, details are listed below. Most sessions are organised by LEAs and are for *technicians*, unless otherwise indicated. Courses in **bold** are organised by CLEAPSS, often at the request of LEA or Associate members.

Biology Safety: Godalming; Kingston/Richmond; Newport; Somerset; Suffolk.

Chemical Handling I: S Gloucestershire; Jersey; Lincolnshire; Norfolk; Sheffield; Vale of Glamorgan; Wolverhampton.

Chemical Handling II: Cambridge; Dudley; Gloucestershire; Hampshire; Salford area.

16 Banned Chemistry Experiments (Teachers/Techs): Cambridge; Norfolk.

Chemical Storage: Worcester.

Datalogging: Barking & Dagenham; Bath & NE Somerset.

First Electrical: Hampshire; Hertfordshire; Swansea.

Second Electrical: Hampshire; Sheffield.

Third Electrical: Somerset.

Electrical Safety/Testing: Devon; Herts; Newport; Sheffield.

Fume Cupboard Monitoring: at CLEAPSS.

Health & Safety: Barking & Dagenham; Doncaster area; Essex; Hampshire; Hartlepool; Lancashire; Shropshire; Suffolk.

Health & Safety Issues (HoDs & Senior techs): Bournemouth.

Health & Safety Management (Heads of Science): Brunel University; Cambridge; Essex; Hartlepool; Lincolnshire.

Microbiology: Kingston/Richmond; Newport; Somerset; Vale of Glamorgan/Swansea.

Microscope Maintenance: Norfolk; Swansea.

Radiation Protection Supervisors (Teachers): Bath & NE Somerset; Carmarthenshire; Essex; Guernsey; Gwynedd; Norfolk; Pembrokeshire; Wolverhampton.

Radioactivity (Techs/Teachers): Carmarthenshire; Guernsey (techs); Gwynedd; Norfolk; Pembrokeshire; Wolverhampton.

Risk Assessment and Safety for Science Teachers: Barking & Dagenham area (NQTs only); Lancashire; Newham.

Details of all courses can be found on our web site. For members in LEA schools, if you are interested in a listed course, please check for details with your head of science and then with your LEA. For details of the person organising the course in the LEA, please ring us and ask for Alison or Caroline. Associate members may be invited to LEA courses but will not necessarily receive priority. Invitations to courses arranged by CLEAPSS will be sent to schools in the area of the host establishment but anyone who is able to travel to the course venue is welcome to apply. *If courses of interest are not being held in your area, please contact us; we may be able to organise something.*

CLEAPSS PUBLICATIONS

Free guides and other materials

Guides with the prefix 'R' are mainly concerned with retail information about the cost and availability of resources. Some other guidance is often also given. Those requiring help with the purchase of items *not* covered by a listed guide should call our **Helpline**. Guides with the code 'L' cover specialist topics, items written since the relevant section of the *Laboratory Handbook* was completed and other information. Details of equipment may also be included. Publications with the code 'PS' are brief documents, often updated, that outline our views on topics of current interest. (Check dates; these may indicate a revision.)

Note: Some of our older or less-popular publications are no longer listed here. Details can, however, be found on our web site.

General Equipment, Labs/Workshops, Management, Safety

- R9a FUME CUPBOARD DATA SHEETS (Jun '98)
- R10 WATER PURIFICATION (Sep '95)
- R45 VACUUM PUMPS (Dec '98)
- R59a GENERAL-PURPOSE L-V POWER SUPPLIES (Apr '96)
- L77 HANDICAPPED PUPILS & PRACTICAL SCIENCE (Aug '87)
- L120 EARTH SCIENCE: KEY STAGES 3 & 4 (Sep '92)
- L127 STARTING PHOTOGRAPHY (Apr '96)
- R135 EYE & FACE PROTECTION (Apr '98)
- R142 ENVIRONMENTAL MONITORING (Jan '95; Sep '95; Jan '96)
- L164 PORTABLE LABORATORY GAS BURNERS (Sep '95)
- L196 MANAGING RISK ASSESSMENT IN SCIENCE (Jul '97)
- L214 EXAMINING AUTOCLAVES etc (Dec '96)
- L216a INSPECTING SAFETY in SCIENCE: a GUIDE for OFSTED INSPECTORS in SECONDARY SCHOOLS (Sep '96)
- L223 MODEL SCIENCE HEALTH & SAFETY POLICY (Jul '98)
- PS7 CENTRIFUGES (Sep '97)
- PS9 SCIENCE CLASS & LABORATORY SIZES: SAFETY (Feb '99)
- ★PS14 GUIDANCE ON LABORATORY DESIGN (Jul '99)
- PS16 BUNSEN BURNER TUBING (Oct '98)
- PS24 AUTOMATIC DISHWASHERS (Mar '97)
- PS25 MODEL RISK ASSESSMENTS FOR LABORATORY TECHNICIAN ACTIVITIES (Mar '97)
- PS26 CALCULATING Nos. OF SCIENCE TECHNICIANS (Feb '99)
- PS30 MONITORING THE IMPLEMENTATION OF SCIENCE SAFETY POLICIES (Sep '97)
- PS31 DISPOSAL OF WASTE IN TECHNOLOGY (Aug '97)
- PS33 MDF (Medium Density Fibreboard) (Oct '97)
- ★PS38 TRAINING FOR SCIENCE STAFF etc. (Jul '99)
- ★PS44 THE CASE PROJECT: SAFETY & RESOURCES (Jul '99)
- ★PS45 REFILLING CARBON DIOXIDE CYLINDERS (Apr '99)
- INDEX CLEAPSS BULLETIN INDEX (For issues 77 - 106)
- MICRO MICROSCOPES After a questionnaire has been returned, advice is given on suitable instruments.

Information Technology

- R170 STAND-ALONE DATALOGGERS (Aug '95)
- L210 SENSING & DATALOGGING: an INTRODUCTION (Apr '95)

Mainly Biology

- L52 SMALL MAMMALS (Apr '94)
- L62 NUTRIENT FILM TECHNIQUE (Jan '87)
- L71 INCUBATING & HATCHING EGGS (Mar '97)
- L197 GIANT AFRICAN LAND SNAILS (Apr '92)
- L201 GIANT MILLIPEDES (Dec '92)
- L206 TADPOLES (Sep '94)
- L213 SCIENCE WITH MINIBEASTS: SNAILS (Sep '95)
- L221 DEVELOPING & USING ENVIRONMENTAL AREAS (Dec '98)
- PS1 POND DIPPING & WEIL'S DISEASE (Mar '96)
- PS2 THE DISSECTION OF EYES (May '97)
- PS3 KEEPING & USING ANIMALS and PLANTS: FORMULATING a SCIENCE DEPARTMENT POLICY (Mar '96)
- PS6 CHEEK CELL SAMPLING (May '96)

- PS10 BURNING PEANUTS and ALLERGIES TO NUTS (Oct '98)
- PS11 HUMAN BLOOD SAMPLING (May '96)
- PS27 HUMAN BODY FLUIDS (Jun '97)
- ★PS34 MICROBIOLOGY WORK IN SPOTLIGHT SCIENCE (May '99)
- PS36 MICROORGANISMS FOR INVESTIGATIONS (Feb '98)

Mainly Chemistry

- L195 SUBSTITUTE CHEMICALS (Extended Sep '94)
- L202 SPECTRA (for 34 organic substances) (Mar '93)
- L215 MICROSCALE ORGANIC CHEMISTRY (Jan '96)
- PS35 HAZCARDS UPDATE '97 (Mar '98)

Mainly Physics

- R82 ELECTRONIC METERS (Apr '99)
- L93 IONISING RADIATIONS & RADIOACTIVE SUBSTANCES (Notes for Radiation Protection Supervisors & Users) (Mar '92)
- L97 DISTANCE, TIME & VELOCITY (Teaching dynamics) (Jan '90)
- L113 STRAIN GAUGES (Dec '91)
- R122s KITS FOR ELECTRIC CIRCUIT WORK (Apr '95)
- L132 SOLAR PANELS (Sep '95)
- R151 AMMETERS etc (Apr '98)
- L167 SMALL ELECTRIC MOTORS (Sep '95)
- ★L194 EARTH IN SPACE: KEY STAGES 3 & 4 (Revised; see p. 2)
- L208 DYNAMICS TROLLEYS (Jan '95)
- R209 MODEL STEAM ENGINES (Apr '95)
- PS17 VIEWING ECLIPSES (Mar '99)
- PS28 RADIANT HEATERS IN PHYSICS (Mar '98)
- PS29 RADFORD LABPACKS (Aug '97)

Repair and Maintenance

- L103 EQUIPMENT REPAIR (Apr '99)
(Sent with lists of repairers: PS40-43, updated periodically)

Materials for which there is a charge

CLEAPSS Laboratory Handbook

Replacement binder	£3.50
Binders (two) + all contents	£27.00
Individual chapters	£1.50 each

Note: One binder needed if existing binder is too full. Two binders required for all Handbook contents.

Hazcards 1998 update of 1995 edition

1 or 2 sets	£9.00 per set
3 - 9 sets	£8.50 per set
10 + sets	£8.00 per set

Recipe Cards 1999 edition

£3.00 per set

Risk Assessments for Technology

in secondary schools 1994 edition

For workshop activities with wood, metal and plastics.

Members	£3.50
Non-members	£5.25

Cheques with orders please for all priced publications, if at all possible.

Student Safety Sheets (Issues 1 & 2 combined)

For establishments which need a further set. £4.00

Hazardous Chemicals Manual (SSERC)

Invaluable for A-level chemistry, CLEAPSS members and Associates can buy this at the much reduced price of £50. *Also:* an interactive CD version for PC, Mac & Acorn computers with suitable web browsers: £75 [£35 if hard copy already purchased].

Do not use this order form or send money. Send a *separate* order to us; this will be forwarded to SSERC who will send the Manual directly to your school or college.

You can order items by letter, phone, fax, e-mail or from our web site.

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