SSR in Depth

The ASE's academically reviewed journal for science education 11–19

October 2022, **104**(386)

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Contributing to *SSR in Depth*

We welcome contributions for all sections of *SSR in Depth*. For reference, a full page of A4 text in the journal is about 800–850 words; including two small figures on a page would bring that down to about 600 words. Articles should be no longer than 4000 words in total, including references.

These can be emailed to The Co-editor, ssreditor@ase.org.uk, or posted to The Co-editor, *SSR in Depth*, ASE, College Lane, Hatfield, Herts AL10 9AA. Detailed advice on the submission of articles and *Science notes* is available on the ASE website at: www.ase.org.uk/submission-guidelines.

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Health & Safety

For all practical procedures described in *SSR in Depth*, we have attempted to ensure that:

- the requirements of UK health & safety law are observed;
- all recognised hazards have been identified;
- appropriate precautions are suggested;
- where possible procedures are in accordance with commonly adopted model risk assessments;
- if a special risk assessment is likely to be necessary, this is highlighted.

However, errors and omissions can be made, and employers may have adopted different standards. Therefore, before any practical activity, teachers and technicians should always check their employer's risk assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in *SSR in Depth*.

Unless the context dictates otherwise it is assumed that:

- practical work is conducted in a properly equipped laboratory;
- any mains-operated and other equipment is properly maintained;
- any fume cupboard operates at least to the standard of CLEAPSS Guide G9;
- care is taken with normal laboratory operations such as heating substances or handling heavy objects;
- eye protection is worn whenever there is any recognised risk to the eyes;
- good laboratory practice is observed when chemicals or living organisms are handled;
- fieldwork takes account of any guidelines issued by the employer;
- pupils are taught safe techniques for such activities as heating chemicals or smelling them, and for handling microorganisms.

Readers requiring further guidance are referred to:

Safeguards in the School Laboratory, 12th edn, ASE, 2020.
Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-year-olds, 4th edn, ASE, 2011.
Topics in Safety, ASE, latest version on the ASE website: www.ase.org.uk/resources/topics-in-safety (login required).
Hazcards, CLEAPSS, latest version, and other relevant publications, on the CLEAPSS website: www.cleapss.org.uk (almost all schools, colleges and teacher training establishments in the UK outside Scotland are members, as are many overseas).
Hazardous chemicals database, SSERC, latest version on the SSERC website: www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/ (schools, colleges and teacher training establishments in Scotland).
Preparing Risk Assessments for Chemistry Project Work in Schools & Colleges, SSERC, 2020.

Editorial

We are already reaching half term in an academic year that promises to be free from the disruptions caused by COVID-19 and lockdowns. There is a widespread view that if we cannot avoid it, we have to learn to live with it. But despite the efforts of teachers and parents, there will be gaps in student knowledge and development. A challenge for teachers will be finding ways to help to fill different holes for different children. Once things have settled down, it is to be hoped that teachers will have a little more spare time. Then if new effective techniques have been established, leading to successful progress, this can be shared through our pages.

A consequence of the current pressures on teachers is that all our *Science notes* have come from long-since-retired teachers, who have all contributed to *SSR* many times in the past. John Potter shows how different physics concepts, from Archimedes' principle to resistivity, can be explained using toy bricks. Randal Henly has developed an effective a way to illustrate the magnitude of the molar volume – a concept in chemistry that students learn (for use in calculations) but perhaps never fully visualise. Then Iain MacInnes provides two ideas. The first is to illustrate a logical path for solving mathematical problems. The second suggests an end-of-term activity that can challenge students to write poems about science. Considering that one is in Ireland, one in Scotland and one on the south coast of England, it seems that the same concerns exist in all areas of our country (and perhaps throughout the world).

For the first of our main articles, another geographic link, in this case between Cornwall and Jersey, has provided an entertaining way of developing learning in biology through the use of a game. This links to ecological surveys in outdoor coastal settings. It is a good way to develop learning about their own environment, but not so readily available to schools in inland areas. However, the methods could be adapted for use in your own environment.

Next, Andy Markwick explains ideas for studying luminescence in nature. He provides a very thorough explanation of the process creating luminescence and shows it can be replicated by man-made sources such as highlighter pens.

In his article, Peter Lang provides an explanation of ionisation energy at the atomic level and its effect on electrical properties. This leads on to information about the attraction and repulsion of atoms in explaining the formation of chemical compounds.

In recent years, beyond the many concerns about the coronavirus, there have been constant debates about climate change. Very often, statements have been made in the media (and repeated by others as presumed truth) without being backed up by clear scientific explanations. 'The greenhouse effect' is mentioned continually but do people generally understand what it is and what causes it? Mike Follows has produced a very full and clear explanation of how energy in sunlight can be absorbed by certain molecules, and how that absorption means a rise in temperature. Due to its molecular structure, carbon dioxide is a very effective example. However, we have to remember that its density is about 50% greater than that of nitrogen and oxygen. So it will not linger in the upper atmosphere. It is essential for the growth of plants and yet is in our atmosphere in a much smaller proportion than nitrogen and oxygen.

Very often, in broadcast media and in print, people use the phrase 'carbon emissions' when the probably mean carbon dioxide. Carbon emissions can be seen as grey smoke from vehicle exhausts, although that is now very rare. Another possible source is burning wood on open fires or stoves, and garden bonfires. Coal was once the fuel used in almost all homes and factories in the UK, which attracted the phrase 'dark satanic mills'.

The final article, from Michael Loughlin, explains concerns about misinformation and now to avoid it. He considers that there are perhaps too many sources of information, not only in print, but television and radio, and, since the mid-1980s, the rise of the internet accessed via computers or smartphones.

With such a variety of articles, there is surely something for everyone in this issue.

Geoff Auty
Co-editor, *SSR in Depth*

SSR in Practice

Don't forget to look at October's *SSR in Practice*, the practitioner-focused 'other half' of *SSR*!

This issue of *SSR in Practice* features a leadership article on health and safety for Heads of Science, along with the regular sections of case studies, practical ideas, real-world science, careers, inclusion, learning from primary, SEND and a talking point piece on teacher-retention payments. Click here to access your copy: www.ase.org.uk/ssr-in-practice/issue-386