


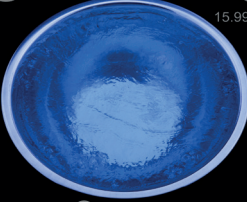



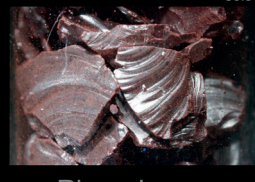







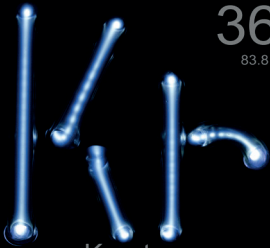


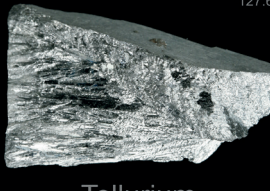
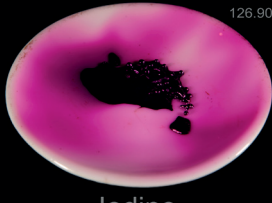

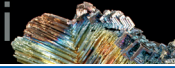






## The periodic table

The periodic table					 Helium
 6 12.011	 N 7 14.007	 O 8 15.999	 F 9 18.998	 10 20.180	
 14 28.085	 P 15 30.974	 S 16 32.065	 Cl 17 35.453	 18 39.948	
 32 72.64	 As 33 74.922	 Se 34 78.96	 Br 35 79.904	 36 83.8	
 50 118.71	 Sb 51 121.76	 Te 52 127.6	 I 53 126.90	 54 131.29	
 82 207.2	 Po 83 208.98	 At 84 209	 Fr 85 210	 Rn 86 222	

ASE Annual Conference 2019

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All **5** practical endorsement criteria assessed

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**3** different ecosystems studied

**36** hours of teaching

Just **5** days off the school timetable

**FSC**

# School Science Review

*The ASE's journal for science education 11–19*

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Front cover image: Photographic periodic table and element images © 2019 Theodore Gray from *The Elements: A Visual Exploration of Every Known Atom in the Universe* periodictable.com

## Health & Safety

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

- 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 should always check their employer's assessment. Any local rules issued by their employer must be obeyed, whatever is recommended in SSR.

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;
- good laboratory practice is observed when chemicals or living organisms are handled;
- eye protection is worn whenever there is any recognised risk to the eyes;
- 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:

*Hazcards* (CLEAPSS, 2016 and updates)

*Topics in Safety, 3rd edn* (ASE, 2001; updates available at [www.ase.org.uk/resources/topics-in-safety](http://www.ase.org.uk/resources/topics-in-safety))

*Safeguards in the School Laboratory, 11th edn* (ASE, 2006)

*Preparing COSHH Risk Assessments for Project Work in Schools* (SSERC, 1991)

SSERC hazardous chemicals database ([www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem\\_database-2/](http://www.sserc.org.uk/health-safety/chemistry-health-safety/hazchem_database-2/))

*Be Safe! Health and Safety in School Science and Technology for Teachers of 3- to 12-Year-olds*, 4th edn (ASE, 2011)

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# Contributing to SSR

We welcome contributions for all sections of *School Science Review*. 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.

These can be emailed to The Editor, [ssreditor@ase.org.uk](mailto:ssreditor@ase.org.uk), or posted to The Editor, *School Science Review*, 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/content/submission-guidelines](http://www.ase.org.uk/content/submission-guidelines).

As we start a new academic year, the edition begins with just two practical *Science notes*. Long-standing and frequent contributor Chris Talbot starts with an article that involves a link between chemistry and physics. Steven Weir has become another frequent contributor recently. His note explains an electronic construction.

Over recent years, we have seen that, although the attendance at ASE Annual Conferences has remained fairly stable, the proportion of classroom teachers able to attend has reduced considerably. School managers are reluctant to have classes left without their teachers despite the enrichment that the conference can provide; and most conferences have to start after the Christmas holidays (which was not the case when I joined the ASE). Hence we have invited conference presenters to provide written versions of the activities they displayed.

The first of these presentations makes use of food products and other items found at home to demonstrate a number of science topics. Simple activities for all! No doubt eyebrows will be raised about sweets in science labs, in this and a later article. In contrast, Nigel Sanitt tackles 'space-time' in a way that is easier to follow than the typical textbook on relativity.

During my own school days, 'differentiation' was an A-level mathematics topic. In recent times, the term has been used to describe the need for taking different approaches to teaching students in the same class with varying levels of ability and background knowledge. This has become the focus of an approach that teachers need to adopt if all children are to achieve their best possible progress. Wendy Ross-Constance provides several methods that can help.

Materials science is a subject that can seem to fit between chemistry and physics; and it has an important role in engineering. Jayne Shaw provides an account of an initiative in which projects tackled by students are reported back to teams from other schools.

The final article in this set comes from Germany. Two projects are described within the theme of chemical 'escape rooms'. The idea is shown in some programmes on television, where participants have to solve certain puzzles in order to escape from a locked room. Separate 'rooms' have been devised for two different age groups,

in which the clues have to be solved using knowledge of chemistry. Clearly these activities take time to set up, and it might be more appropriate to use them for after-school or holiday clubs.

More than 2000 years ago, the Greek philosopher Aristotle proposed that there were four main elements, air, fire, earth and water, that somehow interacted to produce all other materials. But by 200 years ago, scientists, who often worked as individuals, were gradually evolving the ideas about materials and their interactions that we now recognise as chemistry. By the 1860s, the concepts of elements and compounds were understood, and various scientists made lists of groups with similar properties while arranging them in order of 'atomic weight', as it was then called. However, I remember my own chemistry teacher, when introducing and explaining the periodic table, saying that Mendeleev's inspiration was to leave gaps for elements that were not yet known but that he anticipated would be discovered in the future.

Mendeleev published his table in 1869 and, as the 150th anniversary, 2019 had been chosen as the International Year of the Periodic Table. In the recent past, Professor Hal Sosabowski has led two themes for *SSR* about public understanding of science, and he was keen to coordinate this theme about Mendeleev and his table. He will take over the story on page 31.

Reports in the newspapers in August made comment that the new GCSE exams were more difficult, and of course the grading system was turned upside-down to try to avoid direct comparison with what had gone before. Somehow, teachers are required to pump more knowledge into their students with no more time to ensure that it is efficiently absorbed. Many teachers will try to evolve their own methods, but in the final article, Alastair Gittner and Chris Harrison, on behalf of the ASE Research Committee, explain how educational research into teaching methods can produce more effective learning. This will make valuable reading for all classroom teachers.

**Geoff Auty**  
Editor, *School Science Review*