

What use is chemistry?



Index 1.1 1 sheet

This activity is based on a Sunday Times article by Sir Harry Kroto, a Nobel prize winning chemist who discovered a new allotrope of carbon – buckminsterfullerene or ‘bucky balls’. The article appeared on November 28, 2004 and is reproduced overleaf as a background for teachers.

The aim is to introduce students to the scope of modern chemistry and the impact that it has on their lives, even in areas that they may not think of as related to chemistry.

An alternative exercise for more able students would be to research what was used before chemical scientists had produced a particular new product or material (eg silk or wool stockings before nylon, leather footballs before synthetics, grated carboric soap before shampoo) and then to write about the difference it would make to their lives if they did not have the modern product.

Students will need:

- Plenty of old magazines and catalogues (Argos catalogues are good as virtually everything in them would not exist without modern chemistry)
- Large sheets of sugar paper
- Glue and scissors.

It works well if students produce the poster in groups, but then do the written work by themselves. The activity could be set for homework.

What use is chemistry?

Some years ago I was delighted to receive an honorary degree from Exeter University recognising my contributions to chemistry – especially the discovery of a new form of carbon that has the same geometric pattern as a football and is affectionately known as the Buckyball.

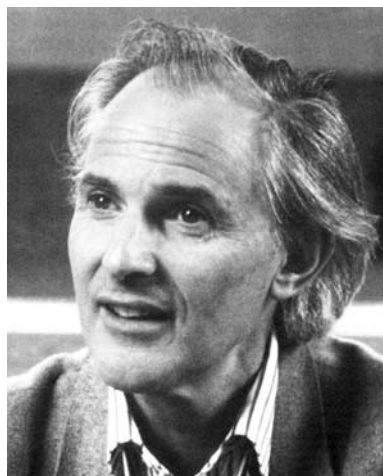
With my co-workers I was awarded the Nobel prize for the discovery of this molecule, often seen as heralding the birth of nanotechnology.

Now, however, I have decided I have no alternative but to return the degree in protest at Exeter's decision, last week, to close its chemistry department, even though it has just had an intake of 107 students. I did the same thing when Hertfordshire University closed its chemistry department a few years ago. I hope that other eminent scientists who have been similarly "honoured" follow my lead.

This is yet another short-sighted slash-and-burn act of philistinism by a British university. Part of the blame, however, must be laid at the government's door for refusing to pay universities the true cost of teaching science students.

The present situation is summed up in the case of the University of Wales Swansea, whose vice-chancellor closed down chemistry in March, saying: "I don't want any chemistry undergraduates here, they're too expensive." If closures continue at the present rate there will be just six, out of about 50 where chemistry is taught, left by the end of the decade.

A university without chemistry should be stripped of the title and redesignated a liberal arts college, which is all it is.



Sir Harry Kroto

Does all this matter? Yes, because it heralds a looming disaster for Britain's economic future. If scientific research and teaching disappear from our smaller universities and become concentrated in half a dozen ponderous battleships, it will be goodbye to the sorts of laboratories where some of Britain's finest chemistry has been done: where genetic fingerprinting was invented and the experiments that paved the way to the Buckyball's discovery were carried out.

Our continued neglect of chemistry cannot fail to hamper our economic growth.

China, Japan, South Korea and India are beginning to vie with the United States as leaders in scientific research. This year about 10,000 students started psychology degrees in the UK, more than all those who began chemistry, physics and engineering degrees.

While each science student yields, on average, a 2% per year payback in tax on our educational investment, the education of psychology students results in a loss. If one adds to this the fact that the

chemistry-related industries make a £5 billion profit on a £50 billion turnover, the apparent government inaction over the looming disaster is scarcely credible.

Next spring I teach for the last time at Sussex University. I joined it in 1966 at the age of 27. It was reported earlier this year that Florida State University had offered to support my research and fund the Vega Science Trust, the science foundation I set up to make science programmes for television and the internet (www.vega.org.uk).

I did not want to leave Sussex, but in the absence of alternative support I could hardly refuse. Since the decision to leave became known a British university, as well as another American one, has offered to match Florida's offer, but it is too late.

I hope it is not too late for the vice-chancellor of Exeter to reconsider his decision and for ministers to rethink the level of support for the sciences.

In the meantime I ask all chemistry teachers to get their kids to forgo, for a week, the 20th-century contributions of chemistry to their everyday lives. How will they get by on Sunday, with no shampoo, just grated carbolic soap. Monday, no anaesthetic at the dentist. Tuesday, no food produced with inorganic fertilisers – 80% of the world would starve. Wednesday, no purified water. No adhesives on Thursday, so furniture will fall apart. Friday, no contraceptives. Saturday, no modern sports equipment.

Let's see Beckham bend a ball with the boots I had when I was a kid.

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What use is chemistry?

Over the past 100 years, chemistry has transformed our lives. A great number of new products, materials and processes have made our society totally different to how it was in the early 1900s.

What would life be like without shampoo and conditioner, shower gel and bubble bath, antiperspirants and deodorants, Lycra™, Nylon™ and other synthetic fibres, brightly coloured dyes, light-weight tennis rackets, goalkeeper's gear and other modern sports equipment, most make-up, detergents? Without our increased knowledge of chemistry, there would be no inorganic fertilisers (80% of the world would starve), no purified water, no aspirin, paracetamol or ibuprofen, no penicillin or other antibiotics, no anaesthetic, no adhesives (your furniture would fall apart!), no contraceptives, no house paint. Even in just the last few years, chemistry research has led to the development of flat screens, smaller mobile phones (by improving battery technology) and scratch-resistant CDs and phone covers.

Think about the contribution that chemistry has made to our lives as you do the following activities.

1. Make a collage using old catalogues, magazines and other pictures to show the changes that chemistry has made to our lives in the last 100 years. Find lots of pictures of things that could not exist without the contribution of modern chemistry.
2. Write about a day in your life and how it would be different without all the things that chemistry has helped to provide. Think about what you wear, what you eat, your leisure activities and what happens if you get ill.

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