



**AGM and Lecture Weekend
30 - 31 October 2004
The Great Barr Hotel, Birmingham**

This year's Annual General Meeting and Lecture Weekend is again being held at The Great Barr Hotel, Birmingham - a pleasant and comfortable venue that the Society has used for a number of years for its meetings. We have two renowned speakers presenting the lectures, and during the AGM, you can have your say about how the Society should develop in the future and the sort of events that you would like to see organized. There is also the chance to socialise with fellow members and enjoy the evening dinner in the hotel dining room. If you have not booked, you will find a booking form at the end of this *TouchPaper*, which should be returned as soon as possible.

Programme

Saturday

- 11.00 - 13.00 OUCS Committee Meeting
- 13.30 - 15.30 OUCS Annual General Meeting (Agenda and Accounts on page 2)
- 15.30 - 16.00 Tea
- 16.00 - 17.15 Lecture: **The Chemistry of Sexual Attraction, Dr Dave Kelly**
Chemistry Department, University of Cardiff
- 19.30 for 20.00 Dinner
- 21.45 - late The Infamous Chemistry Quiz

Sunday

- 10.30 - 11.45 Lecture: **Copper: the new element in Life, Dr Charlie Harding**
OU Chemistry Department

Copper: the new element in Life

Dr Charlie Harding
OU Chemistry Department

Cu

To those whose notion is that the chemistry of life centres on carbon, it comes as a surprise to discover that about half of all known proteins contain metal atoms. Important among these are iron, copper and manganese, elements that are essential to most forms of life.

From our knowledge of the chemical evolution of the Earth, we speculate that copper became available only with the appearance of oxygen in the atmosphere, at which stage the availability of iron dwindled. Nature appears to have responded by utilising copper in roles formerly taken by iron.

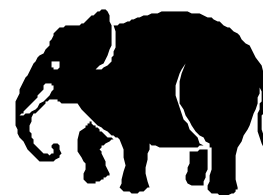
Copper proteins are known to serve various functions especially the ferrying of electrons for catalysis, direct catalysis such as the removal of poisonous oxygen species and the carriage of oxygen molecules in the blood of arthropods. It is at the metal site that action mainly occurs. We look at the properties of copper that led to its emergence as an element essential to life and how it is suited to roles in enzyme catalysis and oxygen transport. On the basis that metal sites in proteins are not essentially different from those in smaller molecules, chemists attempt to model metalloproteins. Our own work at the OU on the study of models includes unusual complexes containing the first examples of copper-copper bonds.

The Chemistry of Sexual Attraction

Dr Dave Kelly
Chemistry Department, University of Cardiff

This talk explores chemical communication between animals for attracting mates, forming groups and other purposes.

Examples drawn from insects, mice, cats, elephants and human beings will be used to show that chemical communication is universal in the natural world. Along the way, Dave will discuss 'the strange case of the man with a smelly arm' (IgNobel Prize for Medicine and Physiology, 1998); how to collect tiger urine; more than you ever wanted to know about cockroaches; dinosaur and whale pheromones.



Dave did undergraduate chemistry and biochemistry and post-graduate organic synthesis at the University of Salford. Subsequently he was a Post-doctoral Fellow at the Universities of Waterloo, Maryland and Oxford.

Currently he is Lecturer in Organic Chemistry at Cardiff University, Consultant for Joe Bloggs Incredible Clothes Company and the only chemist featured on page 3 of *The Sun* twice...

Annual General Meeting Agenda

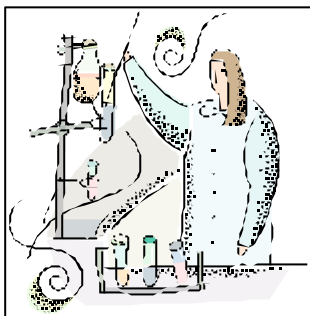
1. Apologies for absence
2. Minutes of the last AGM 1 November 2003 (Copies available at the meeting)
3. Matters arising
4. President's Report
5. Chair's Report
6. Treasurer's Report
7. Membership Secretary's Report.
8. Marketing Report.
9. TouchPaper
10. Future Events
The Science Weekend
Bristol Revision Day
Others
11. Election of Officers
12. Any other business
13. Date of next AGM
To confirm 29 October 2005

OUCS Accounts 2003

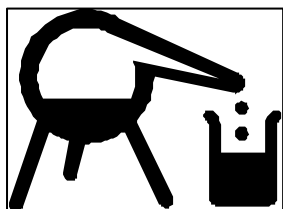
INCOME		£
Bank Interest		10.00
Marketing		0
Membership Subscriptions		784.50
Bristol Revision Day		<u>670.00</u>
	Total	1,464.50
EXPENDITURE		
Uncategorized		0
Advertising		171.64
AGM		663.15
Bristol Revision Day		400.00
March Meeting		357.20
Marketing (T-shirts)		214.09
Postage		5.64
Prizes		0
Stationery		39.33
TouchPaper		251.84
Travel Expenses		<u>1.20</u>
	Total	<u>2,104.09</u>
BALANCE		-639.59
The loss is accounted for by marketing expenditure for stock.		

Further recollections of an alchemist

My workbench in the Analytical Lab was about 8 feet long. The surface was tiled with a wooden shelf which held all the reagent bottles, including conc. H_2SO_4 , HNO_3 , HCl and NH_4OH . Needless to say, working with these on an open bench led to the respective salts being deposited, over a period, onto the bench. The black Formica which faced the upright surfaces had turned white over the years. Goodness only knows what proportion we inhaled. I started to try and clean the surfaces, and must have made a good job because my boss noticed, and instigated a thorough clean-up.



What's that in the fume cupboard?



In the back of the fume cupboard there were two Winchesters with unreadable labels. No one could remember them being put there. Not having a clue what they contained, and not being able to get the stoppers out, being crudded-

up in our analytical language, and unable to have a good sniff (this was standard procedure for first analysis), two of us were ordered to take them out the back and put them in the rhine (a man-made ditch with flowing water) and throw rocks at them until they broke! The water would then carry away the contents. The first one broke with no trouble, but the second exploded and sent up a fountain! We could only assume that it was sodium waste that had been there for years. We were lucky not to damage any cars, or ourselves.

The plant darts team

There was a pottery kiln as part of the smelting process. It was about 50 feet across, and the working temperature inside was unbearable. Men were employed to walk round the kiln on an elevated walkway and throw wet pottery clay onto the cracks that appeared on the surface to stop any metal escaping. It was so hot in there that they only wore shorts, and had to have a break every 20 minutes and a drink of water. Those men should have played darts for England, their aim was so accurate.



What to do with H_2SO_4 ?

The ore was shipped in from Australia. A continuous bucket chain, each bucket holding about $1\frac{1}{2}$ - 2 tons of ore, delivered it onto a conveyor belt which went

through the sinter plant where the ore was roasted. The sinter was transferred to the IVF, and zinc tapped out. From the slag were extracted H_2SO_4 , cadmium, beryllium, HF, several zinc alloys, cuprinol and Blue Powder (which went into cosmetics). Each had their own production plant which had to be staffed and monitored. A pipe-line took the H_2SO_4 directly into Fisons next door. The surplus went by rail to anyone who would take it. It was so cheap in those days that it was practically given away and so much was produced because the zinc was in the ore as the sulfide that even the Smelting Works could not get away with pouring so much away. In fact the whole rate of production was geared to how much acid could be sold.



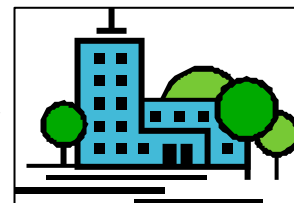
A chemical community

It was a huge site covering about 550 acres and about 4000 people were employed there. There was an on-site dentist, not so much for the benefit of the employees, but because it was cheaper to pay him rather than give us an afternoon off work. We also had our own social club with playing field and clubhouse. We could play tennis, football, hockey cricket, bowls and of course skittles. The bar was cheap, so a lot of employees frequented it. I even met my husband there.



That sinking feeling

The building that I worked in was the Research Block, which was separated from the main plant by Fisons. The whole district is reclaimed land, having at one time been an extension of the Somerset Levels. The local kids used to call it the withy beds with reference to the willows that still grew in places. The Research Block was built on a concrete raft in the shape of a T. The upright of the T was two storeys, and the wings were one. Needless to say the whole thing started to sink. The extra pressure of the middle two storeys caused the raft to crack across the joins of the wings, and then it sank faster than them. You could stand at one end of the building and see the dip in the middle. By the time I went to work there it had sunk about 13 inches in the middle. Any pens put on a table in the wing just rolled off and the windows were all out of true. The company's answer was to ignore all the advice, as they had in the construction because the whole area should have been piled, and to try and float more concrete under the raft. Promptly all the



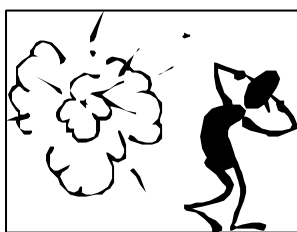
drains blocked up, and it took them weeks to dig them all out. We always had workmen in the building, easing doors and mending broken water pipes that were caused by the subsidence.

Eau de Avon!

Part of our job in the Analytical Lab was to help the researchers in the development of new products. Cadmium compounds, and to a lesser extent zinc, were taking over from lead as a white paint pigment. As a junior I spent ages painting plates to go through various durability tests. Good news was that I had some free samples. Less successful were our attempts to make a rival to Chanel No 5! We produced some absolutely disgusting aromas.



Vacation work with disastrous results



It was the Smelting Works policy to employ a university student during the summer vacation. The theory was that they could cover the work for people on holiday. Usually it worked quite well, but one student did

not have a clue. He had no idea about ordinary safety procedures. He had an experiment going with a small cylinder of CO₂ on his bench bubbling through his sample. Unfortunately he trapped the supply tube so that the back pressure built up and blew the cylinder straight out of the window. This to my mind emphasises the importance of practical work. It is not much help to have a head full of ideas if you can't safely put them into practice. Summer school abolitionists please note!

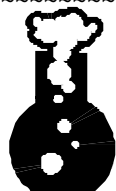
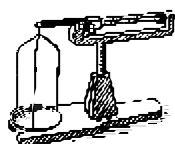
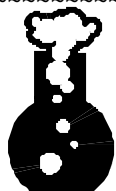
Where are they now?

The market for zinc, its alloys and its compounds gradually decreased. Mazak in particular had a great drawback in that it could not be welded. The use of plastics and ceramics increased, and slowly the plant wound down, and production moved elsewhere.

Today the Research Block is now a tyre depot. The main Smelting Works has been gradually sold off to several other firms. The last of the zinc production company plant is at this moment being dismantled. Such is progress!



Pat Wilson



Global Warming



Readers of the June 2003 *TouchPaper* will remember that New Zealand farmers were enraged to learn that they would be charged an f-tax of 72 cents per cow and 9 cents per sheep in order to fund research on ways for New Zealand to meet its commitment under the Kyoto Protocol to reduce harmful emissions. *New Scientist*, 25 September 2004 p 18, reports the research of a team led by Andre-Denis Wright of the Commonwealth Scientific and Industrial Research organization in Perth, Western Australia into reducing methane emissions from sheep as a result of their eructations (that's belches and farts). The contribution of farm animals accounts for about 20% of global emissions of methane which is a significant source of global warming since, volume for volume, it traps 23 times as much heat as CO₂.

The team has developed a vaccine against the archaean microbes that produce methane in sheep rumens. Two injections of the vaccine produced a reduction of 8% less methane in a 13 hour burp test, as reported in *Vaccine*, vol 22, p 3976. The vaccine is based on three species of inactivated microbe was effective against only 20% of methanogen species in sheep, and further vaccine development will attempt to affect more microbe species and further cut methane production.

Food additives can also reduce the methane eructations of livestock, as reported in *New Scientist*, 15 March 2003 p 23, but they must be given daily so they are only effective for intensively farmed animals, whereas a vaccine could be given to all ruminants. Human beings make a generous contribution to methane emissions, especially after a good curry, so one wonders when the researcher's eye will be pointed in this direction.

News from the Chemistry Department

The Head of Department, Professor David Shuker, suffered a heart attack in the summer, but everyone is glad to say that he is now fully recovered and back in business.

After more than 30 years in the department, Charlie Harding and David Johnson both retired on 30 September last. They will both remain as Honorary Visiting Fellows for 3 years.



Course reviews - the inside story

Have you done a current OU chemistry or related course? Would you be prepared to write a course review for *TouchPaper*?

If so, please contact the Editors who will commission you to write a piece of up to 500 words about the course, warts and all, that you think would be helpful to others contemplating taking that course. The committee has agreed that a fee of £10 will be paid to those who write a commissioned course review that is published.



Editorial

Welcome to the October edition of *TouchPaper*.

You will find details of the AGM being held at The Great Barr Hotel in Birmingham in this edition, together with information about the lecture programme and directions how to get to The Great Barr.

Previous AGMs and Lecture weekends have been very enjoyable and stimulating, and it is clear that this year's will be no exception. We look forward to seeing you there!

You will also find details of the proposed Forest of Dean weekend to be held over 9-11 April 2005, with the nearby attractions that should form the basis of an enjoyable weekend in good company.

We are sure that you will all join us in sending good wishes to David Shuker on his return to the helm of the Chemistry Department after his illness, and to Charlie Harding and David Johnson for long and active retirements. In fact you can say this in person to Charlie at the AGM and Lecture Weekend.

We are not going to make the usual appeal for material for *TouchPaper*, Roy Jones has done it for us!

We look forward to receiving your items, otherwise the next edition may be all about the geology of the Algarve!

Roger Beck and Sue Whitaker
Joint Editors



Letter to the Editors

Hi Sue and Roger,
With reference to the letter re *TouchPaper* content (June 2004), I have to take issue with this. I have always enjoyed the content as chemistry impacts every aspect of life. I can't help feeling everything is relevant to chemistry, you clearly can't escape it.
I also feel that chemists have other interests as well. You have made countless appeals for material to put in *TouchPaper* which sometimes seem to fall on deaf ears (no offence intended), so we would have an empty newsletter were it not for the general interest items. You cannot get out what is not put it!
My view is keep up the good work, and to my fellow chemists out there, I urge you to contribute.



Roy Jones
Region 05 Rep

Thanks Roy - how about starting the ball rolling?

More error messages -

You step in the stream
But the water has
moved on
This page is not here

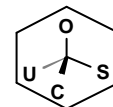
Out of memory.
We wish to hold the
whole sky,
but we never
will



ChemSoc Diary

30-31 October 2004

AGM and Lecture Weekend at The Great Barr Hotel, Birmingham
(details and booking form in this *TouchPaper*)



9-11 April 2005

OUCS visits the Forest of Dean
(details in this *TouchPaper*)

2-4 October 2005

The Science Revision Weekend at York

29 September - 1 October 2006

The Science Revision Weekend at York

Green Silicon

A new electrochemical process for silicon extraction could make large-scale production of this widely used material more environment friendly, according to chemists in China.

Silicon has an essential role in the world of electronics, being familiar in countless components from microelectronic silicon chips and optical fibres to large solar panels. It is also employed in the production of silicones, which are used in everything from bathroom sealant to cosmetic augmentation materials. Silicon even finds a role in alloy production.

Industry generally uses a straightforward reduction method to produce elemental silicon starting with silicon dioxide (SiO_2 in the form of quartz). Carbon is the reductant and the process is carried out at 1700°C . Carbon dioxide is the by-product as oxygen is released from the silica. According to Nottingham University's George Chen (currently a Specially Invited Professor in the College of Chemistry and Molecular Science at the Wuhan University in China) this process was used to produce about 4.1 million tonnes of silicon worldwide in 2002, with a corresponding release of 6.5 million tonnes of the greenhouse gas carbon dioxide into the atmosphere.

Electrochemical reduction

Chen and his colleagues, Xianbo Jin, Pei Gao, Dihua Wang, and Xiaohong Hu, believe that a more environment friendly approach should be attainable using electrochemical reduction rather than the conventional energy-hungry carbothermal process. They think that the old-fashioned charcoal technology should be replaced by a more advanced process from the environmentalist viewpoint.

Electrolytic production of silicon was first carried out as long ago as 1854 by French chemist Etienne Henri Sainte-Claire Deville (1818–1881). A purity level of 99.999% was later claimed by G.M. Rao and co-workers in 1980 using fluorosilicates in a molten fluoride. In the early 1980s, however, results began to suggest that the silica would be the ideal raw, but high temperatures would be needed to make these processes work. The Wuhan researchers have now revealed a new electrochemical technique, which they claim will become viable for the large-scale production of silicon, because it avoids the high energy costs and reduces the carbon dioxide emissions considerably.

From insulator to conductor

For the electrochemical extraction of silicon, Chen and his team took the approach of using silicon dioxide itself as the material for the negative electrode (cathode). They also opted to use molten calcium chloride as the best electrolyte for the job. Calcium chloride is well known as an electrolyte for electrochemical reduction of metal oxides at high temperatures. Sharp-eyed readers will have spotted the potential flaw in their arrangement, however. Silicon dioxide is, of course, an electrical insulator. Nevertheless, the researchers persisted with their idea and found in initial tests that conversion of quartz to elemental silicon does in fact occur at the three-phase boundary between the silicon dioxide, the electrolyte, and the flattened end of the tungsten wire that is used to connect the electrode to the circuit. This provides enough impetus for the electrochemistry to kick in properly as the silica is gradually converted to conducting silicon.

Theoretically, the reaction should eat its way through the entire silica electrode. However, the researchers found that in practice only a small area around the tungsten plate is in fact converted. They explain this in terms of the physical charac-



teristics of the electrolytic melt - it simply cannot penetrate sufficiently deeply into the newly formed silicon layer on the surface of the silica electrode. This has the inhibiting effect of preventing further formation of the three-phase boundary and so the electrochemical reaction grinds to a halt.

A practical solution

Determined to make the process work though, Chen and his co-workers have now found a practical solution. Instead of using a solid quartz electrode, they have switched this for silicon dioxide powder that has been pressed into thin pellets and then sintered. The resulting electrode is, of course, then porous enough to allow the electrolytic melt to penetrate more deeply into the material of the electrode. Indeed, the particles, just a few micrometres across, are much more effectively converted to silicon powder by the electrolysis process than in the solid silica electrode. The use of X-ray diffraction provided the researchers with assurance of the purity of the silicon they were producing.

In terms of industrial application, high purity, low-energy, and reduced carbon dioxide emissions will all be rather desirable properties of the new silicon-production process. Moreover, as bulk quartz would not be practicable for industrial production, the discovery that silica powder, which is far more readily available, works with this degree of success is much more likely to be make the process attractive to silicon manufacturers.

In addition, the researchers discovered that by mixing the quartz powder with other metal-oxide powders it is possible to directly produce fine-tuned alloys using their electrochemical reduction method. Fine powders of oxides can be prepared easily and mixed uniformly, the researchers explain, so that the electro-reduction of such mixtures leads to an alloy, the composition of which is precisely controlled. They have successfully produced Si-Fe and Si-Cr alloy powders with a particle size of 2–3 μm in this way.

To the design of a true industrial process

Despite the long history of silica electrolysis dating back to the mid-nineteenth century, Chen and his colleagues have demonstrated, for the first time, that porous pellets of silica powder or mixtures with other metal oxide powders can be electro-reduced to pure silicon or its alloy in molten calcium chloride. Their cyclic voltammetry studies revealed that electro-reduction can proceed very quickly indeed, although perhaps at higher current densities than would be viable on the industrial scale. Nevertheless, the CV studies will provide developers with a fundamental reference against which to match the design of a true industrial process for the mass production of silicon powder by electrolysis. Usefully, as reduction depth and time follow an approximate logarithmic law, this can be used to select for a particular particle size too, adding to the versatility of the process. The team is currently working on optimising their electrolysis process.

Reference

Xianbo Jin, Pei Gao, Dihua Wang, Xiaohong Hu & George Z. Chen. Electrochemical preparation of silicon and its alloys from solid oxides in molten calcium chloride. *Angew Chem Int Ed* 2004, **43**:733–736 DOI: 10.1002/anie.200352786.

David Bradley

'The Alchemist' February 2004

Source: ChemWeb.com, <http://alchemist.chemweb.com>

© ChemWeb – ChemIndustry.com Inc

AGM AND LECTURE WEEKEND 30-31 OCTOBER 2004

How to get there

***The Great Barr Hotel, Pear Tree Drive, Newton Road, Great Barr, Birmingham B43 6HS
Tel: 0121 357 1141***

Directions from M6 Motorway

Distance is 1.5 miles

Leave M6 at Junction 7

Follow signs for Birmingham A34

Approximately 1 mile from the motorway you will come to a set of Traffic Lights at a cross-roads (Scott Arms Shopping Centre), turn right towards West Bromwich (A4041) this is Newton Road.

The hotel is situated 1 mile from the traffic lights on the right hand side in Pear Tree Drive (just past the Malt Shovel Inn).

From M5 motorway

Distance is 3 miles

Leave M5 at Junction 1

Follow signs for A41 Dudley/Wolverhampton (Expressway) to the next island.

Turn right onto All Saints Way (A4031) passing MacDonalds and Sandwell Hospital on your right hand side.

Bear right onto Newton Road (A4041) road passes over the M5.

The hotel is situated in Pear Tree Drive which is the second turning on the left.

Direction from Birmingham City Centre

Distance is 5 miles

Follow signs for Walsall A34

Turn left upon reaching the Traffic Lights at the Scott Arms Shopping Centre, towards West Bromwich (A4041), this is the Newton Road (see above).



Have you ever done anything stupid? Should you at times have to wear a sign saying 'I'm stupid'?

Here are some examples of sign-worthy behaviour:

A man went fishing with his friend, and as they came back into the dock he lifted up a big string of fish. An idiot on the dock goes "Hey, y'all catch all them fish?" "Nope. Talked them into giving themselves up. Here's your sign!"

We were trying to sell our car about a year ago. A guy came over to the house and drove the car around for about 45 minutes. We get back to the house, he gets out of the car, reaches down and grabs the exhaust pipe, then says "Darn, that's hot!" See, if he'd been wearing his sign, I could have stopped him.

I learned to drive an 18 wheeler in my days of adventure. Wouldn't you know I miss-judged the height of a bridge. The truck got stuck and I couldn't get it out, no matter how I tried. I radioed for help and eventually a local cop shows up to take the report. He went through his basic questioning...OK...no problem. I thought sure he was clear of needing a sign...until he asked "So, is your truck stuck?" I couldn't help myself! I looked at him, looked back at the rig and then back to him and said "No, I'm delivering a bridge...here's your sign!"

I stayed late at work one night and a co-worker looked at me and said "Are you still here?" I replied "No, I left about 10 minutes ago, here's your sign!"

During a weekend away collecting material for *TouchPaper*, one of the Editors decided to take a shower before dinner. Unbeknown to her, there was a problem with the shower drain which caused water to flood down into the kitchen below. The landlady of the establishment came rushing upstairs, burst into the bedroom and flung wide the shower door to find the Editor clad only in a wet birthday suit. The landlady then said "Have you just had a shower?" She was awarded a sign forthwith!

New Small Fuel Cells Near Commercialisation



More than 200 years after Alessandro Volta invented the first battery, scientists worldwide are developing fuel cells that may someday power entire households and automobiles.

"Fuel cell system technology hasn't advanced much since it was developed to support the manned space effort in the 1960s," says John Rusek, of the Purdue University School of Aeronautics and Astronautics. But much research is now in progress and in September 2003 many fuel cell developers met in London at the Eighth Grove Fuel Cell symposium to discuss their progress. In the US, R&D is being accelerated by President George W. Bush's 2003 State of the Union address pledging \$1.2 billion in federal money for fuel cell research.

Small fuel cells

Even the best available batteries are hard pressed to keep modern electrical devices going for a full day. While large fuel cells for automobiles may grab the limelight, small fuel cells for cell phones, notebook computers and other personal electronic devices will probably become commercial first. As personal electronic devices simultaneously become smaller, faster and more capable, their power demands increase. Further increasing electrical power demand by notebook computers is wireless capabilities. Even the best available batteries - those based on lithium ion cells - are hard-pressed to keep modern electrical devices going for a full day. Charging these batteries takes time so business travellers must carry extra battery packs whose size, weight and expense makes them a much less than optimal solution to keeping their electrical devices going.

Direct conversion methanol fuel cells

Fuel reforming is the key to use of direct conversion methanol fuel cells (DMFCs), which offer a potential solution to this problem. The cells are about the size of conventional battery packs, weigh considerably less, and are quickly and easily refuelled in just a few seconds. Fuel reforming is the key to use of DMFCs. "A fuel reformation system converts hydrogen-containing fuel to hydrogen that the fuel cell can use," says Mary Rusek, president of fuel cell start-up venture Swift Enterprises. "The hydrogen, carbon dioxide and additional trace components produced by the conversion process are called reformat fuel. These reformat fuel cells emit greenhouse gases and create other environmental concerns. We're working on direct, non-toxic fuel cells that are cleaner, safer, more powerful and more reliable."

Fuel cells have many advantages over (conventional) batteries. A traditional battery is a closed system, which means that once the chemical reaction is finished, the user either has to recharge the battery or buy a new one. Fuel cells, however, operate as an open system. Fuel or gas flows through the cell on demand. Once all of the fuel is consumed, more can be added to make the cell produce more energy. In addition, robust fuel cells don't have a shelf life because their chemical reaction can be turned on and off. Inside a battery reactions are always taking place, even if the battery is not in use.

Three ways to alcohol fuel cell technology

Manufacturers are pursuing three approaches to developing commercial small alcohol fuel cell technology. In all alcohol (usually methanol) fuel cells, alcohol is used to generate hydrogen ions, electrons that produce electricity and water vapour. The first approach, being patented by companies such as Motorola, Samsung and Toshiba is based on a thin plastic proton exchange membrane (PEM). While protons can pass through the membrane, electrons cannot. Fuel is fed to a catalyst-impregnated anode, which breaks the fuel down into CO₂, hydrogen ions and electrons. The hydrogen ions pass through the PEM to the cathode, which is impregnated with a catalyst promoting the reaction of hydrogen ions, oxygen and electrons to produce water vapour. The electrons, which cannot pass through the PEM, flow through an external circuit creating useful electric current. The produced water vapour is pumped back to the anode where it dilutes the incoming alcohol. (The alcohol concentration must be reduced to prevent diffusion of unburned fuel across the PEM to the cathode.) Key to PEM performance are the expensive catalysts used in the anode and cathode. Medis Technologies is pursuing an alternative technology originally developed in the Soviet Union. This technology uses only a small amount of platinum catalyst on the anode making this design potentially cheaper than a PEM fuel cell. The Medis fuel cell uses a liquid electrolyte much like an ordinary battery instead of a solid, permeable membrane. The third design is being developed by Neah Power Systems and relies on standard semiconductor fabrication techniques developed by Intel Corporation, an investor in Neah. As a result of this reliance, this cell also is potentially cheaper than a PEM fuel cell. The electrodes are bound together with a dielectric material to prevent forming a short circuit. The space between the electrodes is filled with a liquid electrolyte. Methanol is fed to the outer surface of one electrode and oxygen to the other. Passing through the anode pores, methanol is converted to CO₂, hydrogen ions that pass across the liquid electrolyte to the cathode and electrons released to an external circuit generating electricity before reaching the cathode. Essential to the design of the Neah cell are the porous silicon electrodes. The catalyst is deposited as a thin film on these pores generating a large catalyst surface area despite the use of relatively little catalyst. The oxygen comes, not from air, but from hydrogen peroxide. This makes possible a completely sealed fuel system in which the two fuels are isolated in separate chambers of a fuel cartridge and the waste products, water and CO₂, also can be contained in the cartridge. This eliminates the concern of water vapour emission too close to electronic components.

The commercial viability of fuel cells depends upon cost reductions

According to consulting firm Technical Insights, the commercial viability of fuel cells depends upon cost reductions. Primary among these is decreased catalyst costs. In addition, chemists are pursuing improvements in polymers for PEM membranes and in dielectric materials separating the electrodes. These must be heat resistant to enable good performance at quite high temperatures.

John K Borchardt

'The Alchemist' September 2003

Source: ChemWeb.com, <http://alchemist.chemweb.com>

© ChemWeb – ChemIndustry.com Inc



Who's Who in OUCS

President

Lesley Smart
Chemistry Department
The Open University
Milton Keynes
MK7 6AA

Chair

Carole Arnold
51 Paddock Lane
Halifax
HX2 0NT
chair@oucs.org

Secretary

Pat Wilson
105 Coronation Road
Southville
Bristol
BS3 1AX
secretary@oucs.org

Treasurer

Paul Everett
19 Oaklands Dene
Hyde
Cheshire
SK14 3DB
treasurer@oucs.org

Membership Secretary

Carol Houghton
385 Liverpool Road
Hough Green
Widnes
WA5 7HR
membership@oucs.org

Publicity

Kathie Yeowell
4 Bevil Court
Hoddesdon
Hertfordshire
EN11 9LX
kathie.yeowell@imperial.ac.uk

Marketing

Carol Houghton
385 Liverpool Road
Hough Green
Widnes
WA5 7HR
membership@oucs.org

Editors

Sue Whitaker and Roger Beck
99 Hazelwood Lane
Palmers Green
London
N13 5HQ
touchpaper@oucs.org

OUSA Representative

Frank Hollis
92 Little Pynchons
Harlow
Essex
CM18 7DE
frank@oucs.org

The Science Weekend (York)

Lorraine Durcan
10 Charlecote Drive
Chandlers Ford
Hampshire
SO53 1SF
revision@oucs.org

Revision Day (Bristol)

Pat Wilson (Secretary)
secretary@oucs.org

Society Events Organizer

Carole Arnold (Chair)
chair@oucs.org

Region 03

Debbie Cranton
Weathertop, 27 Elliott Grove
Brixham, Devon
TQ5 8RT
debra.cranton@virgin.net

Region 04

Denise Ingram-Hall
C/o CEAC
Aston University
Aston Triangle
Birmingham
B4 7ET
d.s.ingram@aston.ac.uk

Region 05

Roy Jones
92 Dale Road
Normanton
Derby
DE23 6QW
g7sww@cwctv.net

Region 06

Janet Smith
Long Yard
279 Birchanger Lane
Birchanger
Bishop's Stortford, Herts
CM23 5QP
j.e.smith@btinternet.com

Region 07

Alec Thomson
5 Birkdale Green
Alwoodley
Leeds
LS17 7SP

Region 08

Margaret Lister
21 Elston Place
Selby
Yorkshire
YO8 0ES

Region 10

Jan Davidge
19 St Mary's Close
Griffithstown
Pontypool
Torfaen
NP4 5LS

Region 11

Valerie Rutherford
4 Wright Way
New Stevenson
Motherwell
ML1 4LB
vrutherford@beeb.net

There are vacancies for reps in Regions 01, 02, 09, 12 and 13. If you have a little time to spare and feel that there are events or places in your area that you think would be of interest to OUCS members to visit, please contact Carole Arnold or any member of the committee. We shall be delighted to hear from you. Help is available with publicity and organization if required.

THANKS

OUCS is again grateful to David Shuker of the Chemistry Department at Walton Hall for arranging the printing of this edition of *TouchPaper*



TouchPaper Schedule

It is planned to produce issues in February, June and October each year. Please let the Editors have material for inclusion by the end of the preceding month.



Residents of OUCS

1994-1996 Dr Jim Iley

1996-1998 Dr Michael Gagan

1998-2000 Dr Ruth Williams

2000-2002 Dr Stuart Bennett

2002-2004 Dr Lesley Smart

The Open University Chemistry Society
AGM AND LECTURE WEEKEND IN THE MIDLANDS
SATURDAY AND SUNDAY 30-31 OCTOBER 2004

Following the success of past years, the Chemistry Society is once again holding its Annual General Meeting in style, at the Great Barr Hotel, near Birmingham.

The AGM will be followed by the first of the informative, exciting lectures by leading scientists. After dinner on the Saturday will be the infamous OUCS quiz evening followed on Sunday morning by the second invited lecture.

Afterwards there will be time to visit Cadbury's World to stock up for Christmas.

The AGM and lectures are free of charge but if you require a meal after the lecture, it will cost approximately £18.00 for a four-course banquet (payable on the night). Choice of menu to be made on the night from four starters, five main courses including vegetarian, choice of dessert from the sweet trolley plus coffee or tea.

Overnight en-suite accommodation at the hotel is a very reasonable £27.50* per person, inclusive of full English breakfast.

If you wish to attend the AGM and lectures and require accommodation please indicate your requirements on the form below and return the completed form together with **a deposit of £15 as soon as possible for the accommodation** plus an **A5 stamped addressed envelope** for details of programme, receipt and directions. Please make your cheque payable to 'The Great Barr'.

If you wish to attend the AGM and lectures only, please complete the form and return to the address shown together with an **A5 stamped addressed envelope** for details of programme and directions.

One form is required per person, please photocopy as necessary.

* Subject to a minimum of twenty residents; a small supplement may be charged.

✍ _____

REGISTRATION FORM FOR AGM AND LECTURES IN THE MIDLANDS, 30-31 OCTOBER 2004

Please complete in BLOCK CAPITALS

Title: _____ Forename(s): _____ Surname: _____

Address: _____

Postcode: _____ Region Number: _____ Phone: _____

Personal Identifier: _____ Present course(s): _____

Please tick your choice

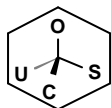
I wish to attend the SATURDAY AGM () Lectures () SUNDAY Lecture () Cadbury World ()

I wish to book () evening dinners (*payment to be made on the night to the hotel*) and/or () overnight accommodation.
Please indicate Smoking () Non-smoking () and Single () Double () *Please tick your choice.*

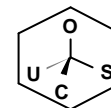
I enclose a cheque payable to 'The Great Barr' for £15.00 (deposit for accommodation).

Signature: _____

Send completed form **WITH AN SAE PLEASE** to:
Paul Everett, 19 Oaklands Dene, Hyde, Cheshire SK14 3DB



OUCS MERCHANDISE



OUCS design

The OUCS logo was devised by W Groom from Shropshire and was adopted as the official OUCS logo in 1994. A representation of the logo was used as the first T-shirt design issued by the Society and remains a popular choice 10 years on.

The design is printed in two sizes:
 large centred logo
 small logo on top left of shirt

The same design sizes are also available (to order) on sweatshirts.

Polo Shirts

Polo Shirts are the latest addition to the clothing range and feature a small logo on top left of the shirt.

Week of Days T-shirt

Another popular and impressive design is 'The Chemist's Week of Days'. Did you know that the days of the week are associated with certain chemical symbols? To find out, by the T-shirt!

Don't forget to request the information to go with this novel and interesting design.

World Tour

Rock and Pop stars issue T-shirts with tour dates, so why not us?

What better way is there to celebrate the Society's 10th anniversary than with a special T-shirt design?

Each year OUCS fans travel great distances to enjoy the 'York Science Weekend'! To mark the first 10 years at York a limited-edition design has been printed.

This T-shirt is a 'must have' for all dedicated 'Revisionists'.



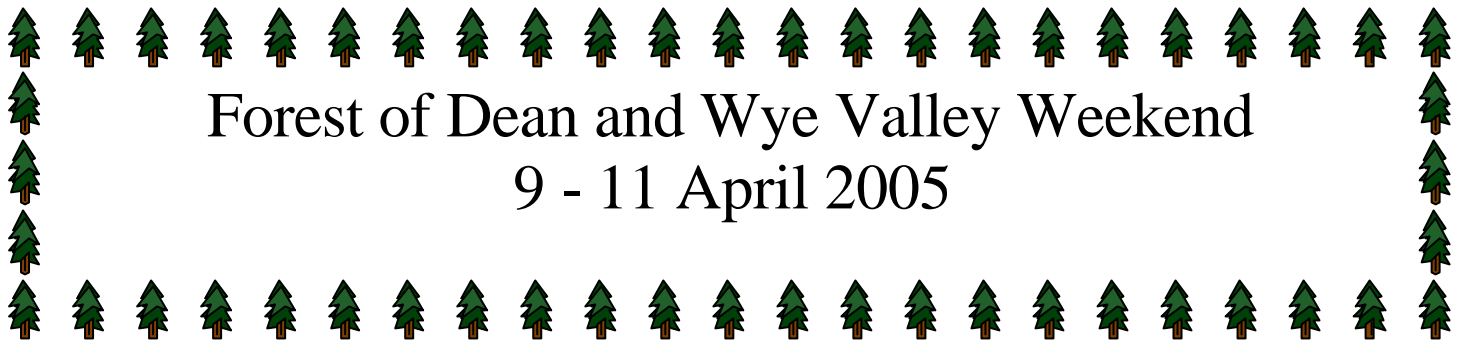
OUCS Order Form

Design		Colour	Size	Members' Price (includes p&p)
OUCS logo	Large Small	Grey/Navy	S M L XL 36" 40" 44" 48"	£7.50
Week of Days (Please send me design information)		Grey/Navy	S M L XL	£7.50
OUCS 10 th Anniversary World Tour		Black	S M L XL	£9.50
Polo Shirts		Red, yellow, grey, royal blue, maroon, green	XS 32/34" S M L 38/40" 42/44" 46/48"	£8.50 £10.50
Please circle your requirements				

From: _____

Membership No. _____

Send to: Carol Houghton, 385 Liverpool Road, Hough Green, Widnes WA5 7HR.



Forest of Dean and Wye Valley Weekend

9 - 11 April 2005

The Royal Forest of Dean

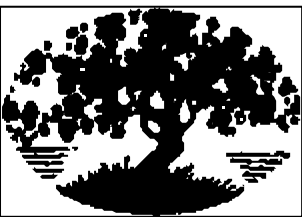
The Royal Forest of Dean is one of England's ancient Royal Forests - areas claimed by the Crown for the popular royal pastime of hunting. Others include the Forest of Dartmoor, the New Forest and Sherwood Forest, and still others are today preserved only in place names such as Enfield Chase. The name 'chase' is self-explanatory, but the term 'forest' does not imply thickly-wooded, it derives from the Norman French word *forey*, now 'foray', the act of chasing game. The Royal Forests were established before the Norman Conquest, but naturally William the Conquer saw these as a good thing, and developed the idea in order to keep the peasants in order.

The Forest covers about 27 000 acres of countryside - ancient woodland, commons, farmland and includes the small towns of Cinderford and Lydney as well as smaller settlements. It includes broadleaf and coniferous trees, and contains two main herds of fallow deer. The area in the past was also an important industrial centre for the extraction of coal, iron, stone and timber, and the relics of these industries can be seen today. Coal is still mined by the Forest's 'Free Miners' in small quantities, a privilege jealousy guarded by the descendants of those Forest residents granted the right to take coal centuries ago.

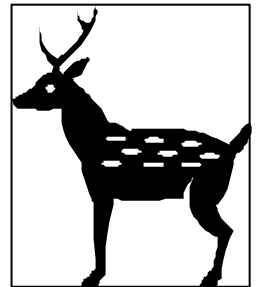
It is bordered to the south by the River Severn, and to the west by the River Wye and the spectacular earthwork of Offa's Dyke, built by King Offa in the eighth century to keep the English or the Celts out, depending on your point of view! The Royal Forest of Dean is still governed in part by the Verderers' Court that sits at The Speech House, now a hotel.

The History of The Speech House and the Verderers' Court

Charles II built The Speech House as a hunting lodge in 1676, and caused his coat of arms to be placed above the exit door to the largest room in the house - the Verderers' Court Room. The Speech House became the centre for all business to do with the royal forest, and this large room was used for talking or making speeches, hence the name of the building. The room maintains much of its original decoration, including three massive ceiling beams.



There are four verderers for each of the Royal Forests, with a chief or senior verderer for each. The office of verderer was instituted by King Canute early in the 11th century and the earliest reference to a Verderer of the Forest of Dean is in 1216, with continuous records of court business from that time. The prime duty of the Verderers originally was to guard the 'vert' (trees) and 'venison' (deer) on behalf of the Sovereign. This duty was carried out at the Verderers' Court of Attachment which met, and still meets, every forty days for the purpose of meting out justice to those miscreants who had transgressed the forest laws i.e. taken timber or poached deer! Today the Court conducts formal business about four times each year. The Court still has the power to impose the death penalty for taking vert or venison, but the sentence can only be carried out on the gallows outside Speech House. Fortunately, the gallows were mislaid several hundred years ago...



The Verderers are still appointed by the Crown at a salary of a doe and a buck each year, although recent appointments have foregone their annual payment. Rare offences today concerning forest deer are dealt with by local magistrates' courts. Today, the Verderers carry out administrative functions to do with the forest, and ensure that the requirements of local land use, the public and Forest Enterprise are met in order to preserve and protect local livelihoods, as well as the beauty and amenity value of the forest. The present Senior Verderer is Dr C Hart. There are two sorts of badger in the Forest of Dean today - the furry variety with the black and white striped face, and the two-legged variety also known as shepherds whose duty is to ensure that their large numbers of free-ranging sheep graze only the road verges and do not transgress the forest laws. It was said that before the outbreak of foot and mouth disease in 2001, there were more sheep than people in the Forest of Dean!



Programme for the Weekend

Attractions in the Forest of Dean and the Wye Valley for visits include:



Caldicot and Chepstow castles, built by the Marcher Lords

Perrygrove Railway

Puzzlewood, old fernymoss grown gullies - the remains of Iron Age mines
Hopewell Colliery (SO 604114), where coal is extracted by the Free Miners
The Dean Forest Railway at Lydney



Symonds Yat (SO 565160), a spectacular viewpoint above a gorge formed by an incised meander of the River Wye, and nesting site for peregrine falcons

Clearwell Caves, where iron ore was mined for 2500 years

The isolated **Rising Sun** pub, with its collection of mining artefacts

The **Dean Heritage Centre** at Cinderford

The beautifully preserved ruins of **Tintern Abbey** (SO 532000), home of Cistercian monks until the dissolution of the monasteries by Henry VIII in 1537



The National Birds of Prey Centre at Newent



The Roman walled city and fortress at **Caerwent**, with baths and amphitheatre

Saturday 10 April

Morning

Free time for visits to local attractions

12 noon

Committee meeting at How Caple Grange Hotel (including lunch)

3 pm

Meet at Speech House for a visit to the arboretum (Speech House is on the B4226 midway between Cinderford and Coleford)

Individual or group visits to other attractions

7 for 7.30 pm

Dinner at How Caple Grange Hotel

Sunday 11 April

Morning

Visit to the Sculpture Trail. Meet at Speech House (location details above)

Individual or group visits to other attractions

Travel Information

How Caple Grange Hotel, How Caple, Herefordshire HR1 4TF Tel: 01989 740 208/668; fax: 01989 740 301

How Caple Grange Hotel is on the B4224 about 4 miles north of the M50 junctions 3 or 4, and 10 miles south-east of Hereford. The nearest railway stations are Ledbury and Hereford, about 10 miles away.

Details of Accommodation

All rooms have a private bathroom, colour TV, radio, direct dial telephone and a welcome tray. The cost per person for dinner, bed and breakfast is £46. The hotel has been used on many occasions by the OUGS and other OU parties, and its location, quality of food and service are all excellent and the resident owner, Tim Victor-Trott, goes out of his way to ensure the comfort of his guests.

Booking Form

Name(s):

Address:

Tel: E-mail:

Please book a single / double * room at How Caple Grange Hotel for dinner, bed and breakfast on Friday 9 April and Saturday 10 April / Saturday 10 April only *.

I / we * have these dietary requirements:

My / our * estimated time of arrival at How Caple Grange Hotel is:

(* Please delete as appropriate.)

Please return this booking form (or e-mail your booking details) to:

Roger Beck, 99 Hazelwood Lane, Palmers Green, London N13 5HQ E-mail: touchpaper@oucs.org