Chemistry Update

Newsletter 331, 30 April 2021

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Calendar of Events

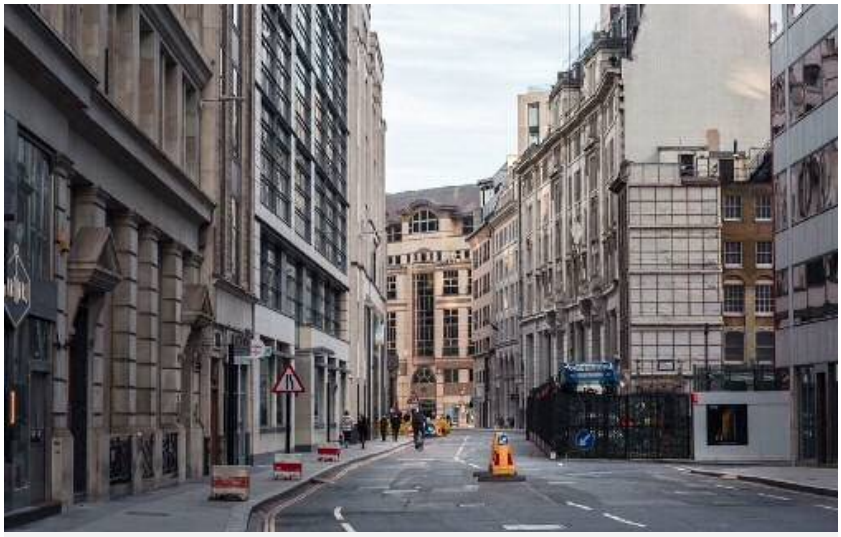
After the pandemic: convalescent chemistry education
Speaker: Prof Simon Lancaster, UEA
Date: Wednesday 5 May
Time: 1pm—2pm
Location: Virtual

Decolonising the Science Curriculum: Potential actions and a case study
Speaker: Dr Neil Williams, Kingston University
Date: Friday 14 May
Time: 1pm—2pm
Location: Virtual

Date of Next Issue:
28 May 2021

Latest lockdown had less impact on UK air pollution levels than the first, new analysis shows

The latest winter lockdown did not have the same impact on air pollution levels as the first lockdown of 2020, new research from the University of York shows.



Greater disparities between the lockdowns for NO_2 pollution were observed in large urban areas, such as London

The researchers say the disparity was probably due to people using more heating as they were working from home during the winter months and also from people who were starting cars in colder conditions.

During the spring 2020 UK lockdown, nitrogen dioxide (NO_2) decreased by 52 per cent on average compared with only 28 per cent on average in the lockdown which started in January 2021. NO_2 is a key pollutant caused by vehicles and other emissions.

Restrictions

The research was led by undergraduate student Rhianna Evans and Dr Will Drysdale from the Department of Chemistry and used data from roadside monitoring stations across the UK.

Rhianna Evans said: “Despite restrictions being similar, it seems the impact of the winter lockdown reduced pollution less due to factors like people working from home and therefore using more heating and others who were going into work starting cars in colder conditions which creates more pollution.

“It is important to consider this diversity of sources for future reductions in air pollution. The winter lockdown scenario where these domestic sectors made up a greater proportion of total NO_2 sources shows that a shift in society’s behavioural patterns can produce pollution from other sources.”

Emissions

Dr Drysdale added: “This change in behaviour may mimic future scenarios where emissions from road transport continue to decline, either through uptake of electric vehicles or work patterns including a greater remote component. It is worth examining as we look forward on how we continue to improve air quality.

“The key difference in the winter is the weather. Air pollution is heavily influenced by this, for example concentrations are lower on windy days, as it spreads out more. The model we have used takes this kind of effect into account however. In this case the colder temperatures influence our activity, which in turn leads to us emitting more. This seems to have muted the reductions from lockdown this time around.”

Greater disparities between the lockdowns for NO_2 pollution were observed in large urban areas, such as

Leeds and London, with NO_2 reductions in the most recent lockdown less than half that of the spring lockdown.

Air pollution

In the winter lockdown NO_2 dropped by 25 per cent in Leeds and 30 per cent in London compared to a much larger decrease of 59 per cent in both last spring. These cities have large workforces who are most likely working from home increasing the domestic emission footprint and causing smaller changes in air pollution.

The reductions were calculated using a model based on the weather and previous air quality data from the UK's Automatic Urban and Rural Network of air quality monitoring stations.

'Outstanding Contributions' to Green Chemistry recognised with major European Award

York Academic and Global Green Chemistry Pioneer, Professor James Clark to receive 2021 European Sustainable Chemistry Award (ECSA).

The prestigious award, from the European Chemical Society recognises Professor Clark's track record in the commercialisation of fundamental green chemistry research alongside his outstanding contributions in the development of green chemistry as a distinct area of chemistry and in the creation of a global green chemistry community.

The ESCA 2021 will be presented to Professor Clark during the 5th European Chemical Society Conference on Green and Sustainable Chemistry, to be held virtually on 26 and 29 September 2021.

Professor Clark is the founder and Director of the Green Chemistry Centre of Excellence at the University of York. He established the leading scientific journal, *Green Chemistry*, and the world's largest private membership network, the Green Chemistry Network. He has a strong interest in industrial symbiosis and waste utilization – making chemicals, fuels and materials from chemical, food and other wastes – solving both the problems of increasing waste and diminishing resources.

Professor Clark said: "*I am delighted to receive this important award which I believe reflects the outstanding pure and applied research carried out by the York team past and present.*"

New studies examine emissions from burning sources in India

Around 3 billion people globally burn biomass every day to meet their cooking and heating energy requirements. Approximately a quarter of these users are in India and therefore emissions from solid fuel combustion sources potentially represent a large regional pollution source. Despite this, there are very few studies which examine emissions from burning sources and consequently the air-quality impact is very poorly understood.

As part of a large collaborative study which formed part of the Atmospheric Pollution and Human Health in an Indian Megacity project, researchers came together from both India and the UK to better understand the quantity and composition of volatile organic compound emissions from burning sources in India. A range of over 70 different fuel samples were collected including fuel woods, cow dung cakes, crop residues, sawdust, municipal solid waste, charcoal, and liquefied petroleum gas. These were then burnt at the combustion chamber at the CSIR-National Physical Laboratory in Delhi and the emissions measured.

Combustion experiments of a variety of different solid fuels

The organic emissions were measured using a range of state-of-the-art techniques. These revealed a great deal of information about the types of organic emissions from different fuels. UK researchers were led by Professor Hamilton and took advantage of a brand new Leco two-dimensional gas chromatography instrument coupled to time-of-flight mass spectrometry housed at the Wolfson Atmospheric Chemistry Laboratories to examine intermediate- and semi-volatile organic gases and particles emitted during burning. This provided a huge variety of compositional data and showed that

some combustion sources released over 1000 different organic species into the aerosol phase. Organic gases were also qualified and quantified using a range of complementary techniques to allow the potential air-quality impacts of these different sources to be evaluated in regional policy and chemistry models. The most important finding of these works was that some sources, such as cow dung cakes and municipal solid waste, released significantly larger quantities of organic material than combustion with liquefied petroleum gas. This highlighted that these sources are likely to have disproportionately large contributions to poor air quality. They also showed that chemical species which are often not included in emission inventories such as furans, furanones and phenolics were likely to be significant drivers of the secondary chemistry of emissions.

Researchers from India and the UK next to an aerosol chamber at CSIR-NPL Delhi in March 2019

The research is published in the following articles:

Stewart, G. J. et al. Emissions of intermediate-volatility and semi-volatile organic compounds from domestic fuels used in Delhi, India, *Atmos. Chem. Phys.*, 21, 2407–2426, https://doi.org/10.5194/acp-21-2407-2021, 2021.

Stewart, G. J. et al. Emissions of non-methane volatile organic compounds from domestic fuels in Delhi, India, *Atmos. Chem. Phys.*, 21, 2383–2406, https://doi.org/10.5194/acp-21-2383-2021, 2021.

Stewart, G. J. et al. Comprehensive organic emission profiles, secondary organic aerosol production potential, and OH reactivity of domestic fuel combustion in Delhi, India, *Environmental Science: Atmospheres*, 1, 104 - 117, https://doi.org/10.1039/D0EA00009D, 2021.

Avtar supporting the NHS Covid-19 vaccination campaign

Dr Avtar Matharu was filmed earlier this week in support of the York NHS Trust Covid-19 vaccination programme. Here's a wider view of the message.

Thanks to the thousands of people involved, in less than four months the health service in England has given the vital first vaccine dose to more than half the adult population - some 26 million people - opened more than 1,600 vaccination services, and visited over 10,000 care homes.

In my role as chair of the University of York's staff Racial Equality forum and citywide, the York Inter-Faith Group, I am acutely aware that some people in the Black, Asian and Minority Ethnic communities are reluctant and hesitant to have the Covid-19 vaccine - and yet we know that Covid-19 has a disproportionate impact on these very communities.

I want to reassure you, the Black, Asian and Minority Ethnic Communities of the safety, effectiveness and importance of the vaccine. The Covid-19 vaccine gives the best, scientifically proven, protection against coronavirus.

Unfortunately, there is a lot of misinformation out there so it is only natural that you will have many questions and concerns - so let me clear some of them up.

First, there is no evidence to suggest that the vaccine will work differently on people from different ethnic backgrounds, and be assured that the vaccine does not damage or change our DNA in any way. Not taking the vaccine can damage us more.

I know some people are worried that the vaccine was developed so quickly. The vaccine was available quickly because of a global effort by governments around the world - so something that might normally take years took just months. However, be assured that the Covid-19 vaccines have gone through the same strict process and regulations as other vaccines - such as for measles, mumps, rubella and TB, for instance.

It's also important to understand that the vaccine does not include the live virus itself - only harmless elements from it and taking the vaccine is the only way to boost the immunity against Covid for you and your loved ones. Nor does the vaccine include pork, or any material of foetal or animal origin.

All Faith Leaders actively promote the vaccination programme. I am aware it's the month of Ramadan, the NHS have produced the following posters on how to safely observe Iftar, and that vaccination does not break your fast. York NHS will also re-schedule appointments as necessary.

There are no cases of significant side effects amongst the millions of people who have received this vaccine and it is very, very rare for there to be long term side effects. What we do know is that Covid-19's long term implications can be deadly.

Finally, there is no evidence to suggest that Covid-19 vaccines will affect fertility. Claims of any effect of Covid-19 vaccination on fertility are speculative and not supported by any data.

By taking the vaccine we will soon be able to live normal lives again. Not only will you be saving your life, but saving the lives of others too.

"I was delighted to be part of this productive partnership and support the vaccination programme following discussions with David Watson, Lay Member, University Council and Non-Executive Director, York Teaching Hospital NHS Foundation Trust. We have an important role to support and work with our local communities", said Avtar.

Acknowledgements

Text co-written with Emma Clements, Communications Manager, York NHS

Images are courtesy of Tim Hunt, York NHS

Nichola Greenwood, Operational Lead for Covid vaccination & Lead for Patient Equality and Diversity, York Teaching Hospital NHS Foundation Trust

Polly McMeekin, Director of Workforce and Organisational Development, York Teaching Hospital NHS Foundation Trust

David Watson, Non-Executive Director, York Teaching Hospital NHS Foundation Trust and Lay Member, University of York Council

Ramadan posters are courtesy of Shamim Eimaan, Project Support Officer, NHS Vale of York Clinical Commissioning Group

Ramadan 2021

Ramadan is the holiest month of the year for Muslims. This year Ramadan falls from 11/12 April until 11/12 May (the start of Ramadan depends on sighting of the moon). In terms of our University calendar this is the final week of the current vacation until the middle of Week 4 of Summer Term. During Ramadan, Muslims around the world fast from dawn until sunset each day which can be up to 17 hours this year.

Ramadan will end before the start of the common assessment or 'exam' period this year but it still may have an impact on both students and staff in particular those who are undertaking (or marking) assessed work, workshops, laboratory work, field work or vivas.

During this time Muslims try to follow a normal study or work routine as far as possible, but have responsibilities for devotion to extra prayers and readings to their daily religious commitments. As we saw last year, Ramadan will prove a very different experience for Muslims due to the Covid-19 pandemic. Whilst working from home may make some aspects of fasting easier for some, it can also bring challenges, including the potential to feel more isolated. Individuals might want to share Ramadan with colleagues by having a conversation or sharing what they are doing for it, what food they are preparing, and what the month means for them.

For students: You might like to give your personal tutor, supervisor or those leading activities such as workshops advance notice that you will be fasting. The University advises that you try to structure your day, setting yourself a study timetable, or planning your lab-work so you can start and finish earlier may be helpful. It encourages you to take a break if you find yourself frustrated or tired.

For those managing staff and research students: Be aware and open to discussing Ramadan and what support staff and research students (including Mchem project students) may need. Individuals may request flexibility around their working arrangements such as an early start and finish times, breaks for afternoon prayers (Zuhr and Asr) and annual leave to celebrate Eid at home. Meeting organisers may wish to consider timing over this period to enable as many students or members of staff as possible to attend.

For those on working or studying in the department during Ramadan, we have arranged for two single-gender rooms (C/A/122 and C/B/102) to be available for prayer. Washing facilities are available close to both rooms (for C/A/122 the WCs in the Chemistry reception or the accessible toilet; for C/B/102 the WCs in the C/B block reception area). Contact chem-opsman@york.ac.uk or caroline.dessent@york.ac.uk if you have any questions or comments about the prayer facilities.

Links

Muslim Council of Britain Ramadan 2021 information page includes advice for line managers, employees and those observing Ramadan whilst studying from home during Covid-19.

University of York Islamic Society (ISOC)

University information on religious observance during exams

Equality & Diversity Group seeking new technician member

The Equality & Diversity Group are looking for a new member from the Technician Team. This is a good opportunity to add to your career development profile, while learning more about the work the Department does to support Equality, Diversity & Inclusion. The committee meets for 2 hours 3-4 times a year.

If you are interested, please get in touch with Caroline Dessent (caroline.dessent@york.ac.uk) for more details.

New starters

Dr Craig Poku, PDRA in Air Pollution Monitoring (WACL)
Room: C/G116; Ext: 4757; Email: craig.poku@york.ac.uk

Qingyun (Lorna) Tang, PDRA in Applied Biocatalysis (YSBL)
Room: B/L223; Ext: 8687 & 8833; Email: qingyun.tang@york.ac.uk

Christopher Goult, PDRA (Bruce group)
Room: C/E202; Ext: 2563; Email: christopher.goult@york.ac.uk

Natalie Wong, PDRA (Dessent group)
Room: C/A057; Ext: 4525; Email: natalie.wong@york.ac.uk

David Barrett, Department Manager
Room: C/A119; Ext: 2501; Email: david.barrett@york.ac.uk

Nicholas Yates, PDRA in Protein Bioconjugation and Glycoscience
Room: C/B020; Ext: 2894; Email: nicholas.yates@york.ac.uk

Elin Karner, Undergraduate Office Administrator
Room: C/A111; Ext: 4182; Email: elin.karner@york.ac.uk

Jack Todd, MSc Administrator
Room: C/A142; Email: jack.todd@york.ac.uk

Online Department suggestion box

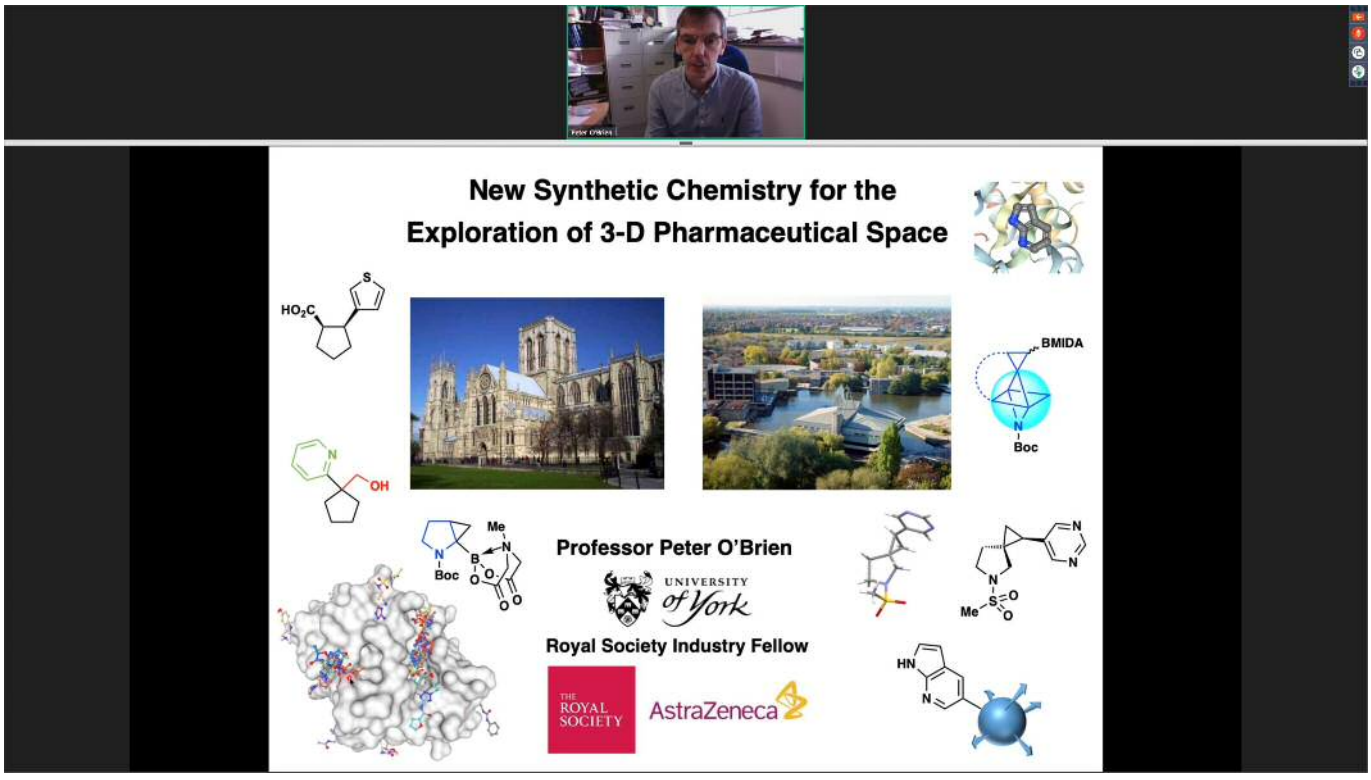
The online Equality and Diversity suggestion box has been extended to be a suggestion box for the whole Department. You can submit your thoughts/suggestions/ideas for general Departmental matters as well as matters relating to Equality and Diversity. You can find the Google form at this link.

O'Brien Group news – third lockdown and beyond…

A bit of news on what myself and the group have been up to in 2021 as we battled through the third lockdown and then welcomed the longer and sunnier daylight hours. We've turned our group Covid testing into group outings – wandering over to the sports centre and making it more of a social event than a chore! It seems to be working well and we often bump into other chemists on the way there or back.

In early March, Stephen Yao and Giordaina Hartley presented posters on their PhD projects at the Catalysis@York event organised by Andy Weller. It was a great afternoon of science showcasing the wide -ranging catalysis research in the Department – thanks to Andy and the graduate office for putting this event together.

Also in March, Peter gave an invited lecture at the RSC's meeting entitled "Synthesis in Drug Discovery and Development". All of the group attended the two-day meeting which featured talks from both academia and the pharmaceutical industry. Here is Peter in action delivering his virtual talk, which focused on the topic of his Royal Society Industry Fellowship:



At the end of April, Peter will be delivering a Departmental seminar on his Royal Society Industry Fellowship. Here, he will be the warm up act for the invited external speaker, Dr Susannah Coote, a York alumnus who carried out her PhD in the group and is now a lecturer at Lancaster University.

Also in April, the group's latest COVID-19 related work was published in *Science Advances* – we had four York 3D fragment hits against the macrodomain protein. More details to follow in a news story at some point.

Organised by the Learning and Teaching Forum

The University of York's Annual Virtual

Learning and Teaching Conference **2021**

Save the date… Friday 2nd July 2021

Keynote Speaker: **Professor James Pickering**, University of Leeds

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CALL FOR CONTRIBUTIONS DEADLINE: 12:00 21ST May 2021