UNIVERSITY of York

Chemistry Update

Newsletter 324, 28 August 2020

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Calendar of Events

Promotion Planning Seminar
Date: Wednesday 2 September
Time: 10am—11am

Open Days
Date: Saturday 19 & Sunday 20 September
Time: 9am—4pm

Date of Next Issue:
25 September 2020

COVID recovery choices shape future climate

A post-lockdown economic recovery plan that incorporates and emphasises climate-friendly choices could help significantly in the battle against global warming, according to a new study.

This is despite the sudden reduction of greenhouse gas emissions and air pollutants during lockdown having a negligible impact on holding down global temperature change.

The researchers warn that even with some lockdown measures staying in place to the end of 2021, without more structural interventions global temperatures will only be roughly 0.01°C lower than expected by 2030.

Economic recovery

However, the international study estimates that including climate policy measures as part of an economic recovery plan with strong green stimulus could prevent more than half of additional warming expected by 2050 under current policies.

This would provide a good chance of global temperatures staying below the Paris Agreement's aspirational 1.5°C warming limit and avoiding the risks and severe impacts that higher temperatures will bring.

The study analysed newly accessible global mobility data from Google and Apple. They calculated how 10 different greenhouse gases and air pollutants changed between February and June 2020 in 123 countries.

Lockdown

The team's findings, published today in *Nature Climate Change*, detail how despite carbon dioxide (CO_2), nitrogen oxides (NO_x) and other emissions falling by between 10-30% globally, through the massive behavioural shifts seen during lockdown, there will be only a tiny impact on the climate, mainly because the decrease in emissions from confinement measures is temporary.

The researchers also modelled options for post-lockdown recovery, showing that the current situation provides a unique opportunity to implement a structural economic change that could help us move towards a more resilient, net-zero emissions future.

Dangerous climate change

Study lead author, Professor Piers Forster, director of the Priestley International Centre for Climate at Leeds University, said: "The choices made now could give us a strong chance of avoiding 0.3°C of additional warming by mid-century, halving the expected warming under current policies. This could mean the difference between success and failure when it comes to avoiding dangerous climate change.

"The study also highlights the opportunities in lowering traffic pollution by encouraging low emissions vehicles, public transport and cycle lanes. The better air quality will immediately have important health effects - and it will immediately start cooling the climate."

Study co-author Professor Mathew Evans, from Wolfson Atmospheric Chemistry Laboratories, University of York and the National Centre for Atmospheric Science, said: "The analysis of air quality observations from around the world showed us that the emissions reductions captured by Google and Apple's mobility data were pretty close to those actually being experienced."

The paper Current and future global climate impacts resulting from COVID-19 is published in *Nature Climate Change*.

York academic shortlisted for prestigious award

An atmospheric chemist from the University of York has been shortlisted for a major award by a leading science journal.

Dr Pete Edwards in the lab

Dr Pete Edwards from the Department of Chemistry is one of eight leading researchers nominated for the Nature Research Awards for Driving Global Impact.

The award acknowledges his work in the Wolfson Atmospheric Chemistry Labs to understand the chemical processes controlling global challenges like air pollution and climate.

Dr Edward's current research develops novel measurement techniques to reduce uncertainties in the models used to inform air quality and climate policy.

After hearing about the nomination, Dr Edwards said: "It is an honour to be recognised in this shortlisting alongside such eminent researchers in their respective fields, and is a huge tribute to my team and collaborators past and present.

"As an atmospheric chemist whose work involves instrument development, lab work, and field measurements, it is often easy to get buried in details and lose sight of the wider societal impacts of the work we do.

"This nomination really highlights the importance of atmospheric chemistry research in tackling global issues such as air pollution and climate, and I find this immensely motivating."

Dr Martin Cockett, Deputy Head for the Department of Chemistry said: "It is a fantastic achievement for Pete to have been nominated for this prestigious award and a testament to his very impressive track record as a master of the multifaceted research project in a field as complex and important as atmospheric chemistry."

The winner will be announced on 20 November.

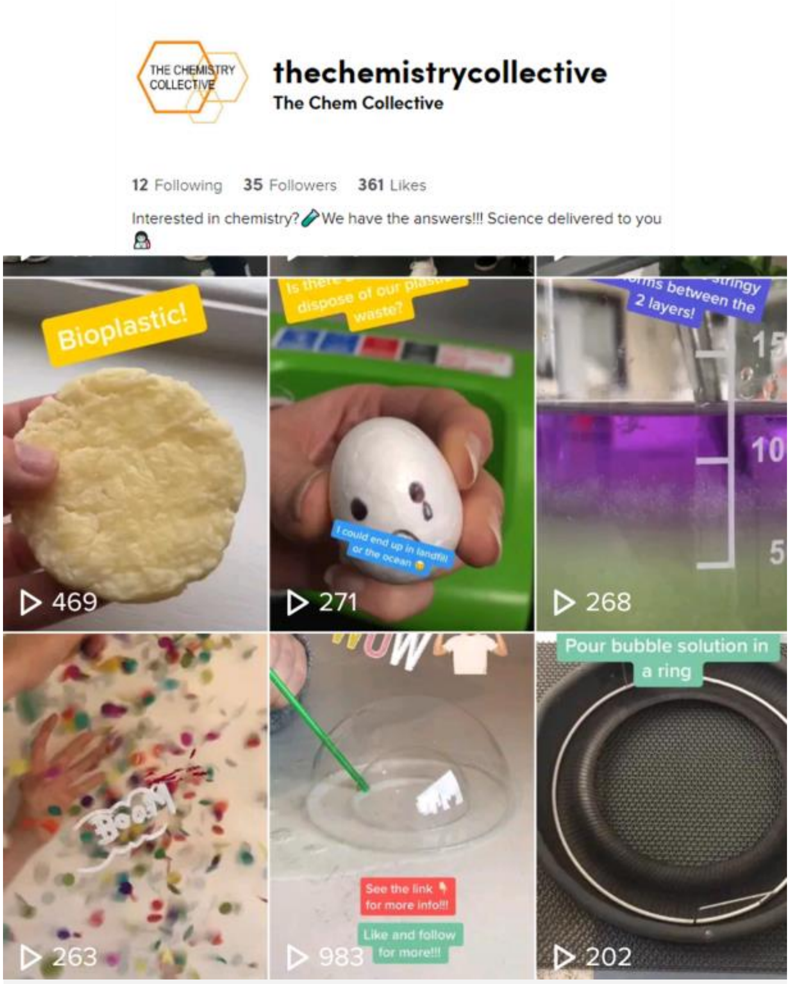
Using TikTok to teach chemistry and aid with scientific public dissemination

Recently graduated BSc Chemistry students Clare Hayes and Katie Stott performed research into developing new and innovative methods to aid with chemistry education and public dissemination, as part of their research project under the supervision of Dr Glenn Hurst and Dr Katie Lamb. By utilising a systems thinking approach to contextualise theoretical concepts, Clare and Katie created new learning resources including a YouTube video on carbon dioxide utilisation, which won a CO_2Chem video prize.

A major component of this research involved investigating the use of the mobile phone application TikTok for teaching chemistry as well as a public dissemination tool. Systems thinking has been used with numerous online teaching tools and mobile phone applications. Previous work at the University of York has highlighted how Snapchat can be used to facilitate contextualization of undergraduate chemistry and led to the creation of "Green Tycoon", a free mobile phone application that teaches fundamental green chemistry principles to undergraduates. Considering the recent transition to online teaching due to COVID-19, the use of social media to aid teachers with chemistry teaching and communication is now extremely important.

Clare Hayes (top left), Katie Stott (bottom left), Katie Lamb (top right) and Glenn Hurst (bottom right)

TikTok is a social media video-based phone application that enables creative and engaging videos to be shared on social media platforms worldwide. Despite its young age, TikTok is now one of the top ten most downloaded apps of all time. As TikTok is mainly used by people aged 18 or younger to make creative and often humorous online videos, this was an opportunity to make informative, fun and visually engaging chemistry videos that could reach younger audiences, as well as the general public, and inspire them to learn about chemistry.



Thumbnails of TikTok videos created by Katie and Clare for the "The Chemistry Collective" account

Using an online TikTok account, "The Chemistry Collective", 16 chemistry outreach and educational videos (15-60 seconds long) were created, reaching approximately 8,500 views in May 2020. Upon surveying participants, viewers of these TikTok videos strongly agreed that they had learned something new about chemistry since watching these videos and had an increased interest in chemistry. This highlights how TikTok can be used in a creative and innovative manner to enhance public and undergraduate student engagement with chemistry education, together with facilitating the ability of the public to understand how chemistry can be fun, performed at home and is part of our daily lives.

"It was an absolute pleasure to be a part of this research project and to co-supervise Clare and Katie with Glenn" says Katie Lamb. "Clare and Katie were incredibly creative and I am so pleased that their hard work has resulted in a joint first-author publication in the *Journal of Chemical Education*." Clare and Katie's work: "*Making Every Second Count": Utilizing TikTok and Systems Thinking to Facilitate Scientific Public Engagement and Contextualization of Chemistry at Home*", is now available to read online. Katie and Clare also wrote an article for The Times Higher Education, reflecting on their experiences of creating new and innovative methods for teaching chemistry.

New starters

Dr Mia Shandell, Postdoctoral Research Associate in Chemical Biology
Room: B/K266; Ext: 8276; Email: mia.shandell@york.ac.uk

Dr Catherine O'Leary, Postdoctoral Research Associate in Experimental Atmospheric Science
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BDC Inductively Coupled Plasma Mass Spectrometer (ICP-MS) Analysis

The Agilent 7700x ICP-MS is capable of measuring metal and non-metal elements in concentrations of parts per trillion. The sample is ionised using argon plasma and the ions are separated and quantified using a quadrupole mass spectrometer. ICP-MS provides precise data with short sampling time (roughly 30 seconds per sample).

To date, the Biorenewables Development Centre (BDC) has used ICP-MS to analyse a broad range of samples including plant materials, fermentation media, Starbon®materials and fertiliser to quantify heavy metals and common environmental elements.

Pricing for the ICP-MS service

The price per sample is £39.33. This price includes pick-up of the samples from the Green Chemistry Centre of Excellence (GCCE), digestions and analysis. Use the BDC ICP-MS Request Form to request samples.

Elements that we are able to analyse in full quantitative analyse

Aluminium (Al)	Gold (Au)	Rhodium (Rh)
Antimony (Sb)	Hafnium (Hf)	Ruthenium (Ru)
Arsenic (As)	Iridium (Ir)	Selenium (Se)
Barium (Ba)	Lead (Pb)	Silver (Ag)
Beryllium (Be)	Magnesium (Mg)	Sodium (Na)
Boron (B)	Manganese (Mn)	Tantalum (Ta)
Cadmium (Cd)	Neobium (Nb)	Tellurium (Te)
Calcium (Ca)	Nickel (Ni)	Thallium (Tl)
Chromium (Cr)	Potassium (K)	Thorium (Th)
Cobalt (Co)	Paladium (Pd)	Tin (Sn)
Copper (Cu)	Phosphorus (P)	Uranium (U)
Iron (Fe)	Platinum (Pt)	Vanadium (V)
Germanium (Ge	Rhenium (Re)	Zinc (Zn)

Semi quantitative analyse is also available on all elements. The full list of elements available is shown below:

Lithium
Beryllium (Be)
Boron (B)
Carbon (C)
Nitrogen (N)
Sodium (Na)
Magnesium (Mg)
Aluminium (Al)
Silicon (Si)
Phosphorus (P)
Sulfur (S)
Chlorine (Cl)
Potassium (K)
Calcium (Ca)
Scandium (Sc)
Titanium (Ti)
Vanadium (V)
Chromium (Cr)
Manganese (Mn)
Iron (Fe)
Cobalt (Co)
Nickel (Ni)
Copper (Cu)
Zinc (Zn)
Gallium (Ga)

Germanium (Ge)
Arsenic (As)
Selenium (Se)
Bromine (Br)
Rubidium (Rb)
Strontium (Sr)
Yttrium (Y)
Zirconium (Zr)
Niobium (Nb)
Molybdenum (Mo)
Rutherium (Ru)
Rhodium (Rh)
Palladium (Pd)
Silver (Ag)
Cadmium (Cd)
Indium (In)
Tin (Sn)
Antimony (Sb)
Tellurium (Te)
Iodine (I)
Caesium (Cs)
Barium (Ba)
Lanthanum (La)
Cerium (Ce)

Neodymium (Nd)
Samarium (Sm)
Europium (Eu)
Gadolinium (Gd)
Terbium (Tb)
Dysprosium (Dy)
Holmium (Ho)
Erbium (Er)
Thulium (Tm)
Ytterbium (Yb)
Lutetium (Lu)
Hafnium (Hf)
Tantalum (Ta)
Tungsten (W)
Rhenium (Re)
Osmium (Os)
Iridium (Ir)
Platinum (Pt)
Gold (Au)
Mercury (Hg)
Thallium (Tl)
Lead (Pb)
Bismuth (Bi)
Thorium (Th)

As we are unable to use HF acid, there are certain elements that we cannot digest, these include:

Molybdenum (Mo)
Silicon (Si)

Sulfur (S)
Titanium (Ti)

Tungstun (W)
Zirconium (Z)

Distance Learning Development

By Taylor Dixon and Ross Ward

This summer, Ross and Taylor, two year 3 MChem students, have been working alongside Dr Julia Sarju and Professor Andy Parsons to develop the Physical chemistry distance learning module for students in their fourth year.

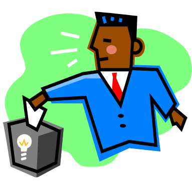
This distance learning module uses six research papers by authors from our Department to put physical chemistry into context within the real world. Various resources have been produced by the pair to go alongside these papers to help with students' understanding, helping them to find links between the core chemistry they have been taught and the real, cutting-edge research currently happening in the Department.

The support provided through the resources should also help to develop students' confidence in reading and understanding scientific papers by highlighting the key concepts and providing questions that will encourage the students to think critically about what they are reading. This is especially important for these students as they will be undertaking their Year 4 project, either in Industry, Abroad or at York, and will need to look through and reference many primary literature sources when doing their final MChem report.

This mixed staff and student team has worked together on this project to give both an academic and student perspective of the content included to hopefully make all the resources accessible and easy to understand. The screencasts created for the module were voiced and put together by the two undergraduates, giving a more relatable and student-centred learning experience. The Physical course will run for the first time in the 20/21 year alongside modules produced previously by other students, such as the Organic and Inorganic packages.

Online learning becomes a feature of all the Year 4 courses in the coming academic year, where previously only those in Industry and Abroad have participated, making it all the more important that content is engaging and can be easily understood by students. There is hope that students from the three veins will feel more connected via the online community created by the discussion boards.

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 on the intranet homepage or at this link.

KMS Winners

The KMS Prize interviews have taken place online this year and winners have been chosen. The KMS Prize is for excellence in scientific research, and all PhD students in their third year are eligible for nomination.

Shortlisted candidates are then invited to an interview with an academic panel (Anne Duhme-Klair, Jamie Blaza, Terry Dillon chaired by Aneurin Kennerley) where they are asked to give a presentation on their research and answer various questions about their work and the wider chemistry surrounding it.

The Panel commented on the high quality of all shortlisted candidates, and eventually decided on the following winners - many congratulations to:

Joint First:

Lucy Wheeler (Kirsty Penkman and Roland Gehrels)

Ben Tickner (Simon Duckett)

Joint second:

Natalie Wong (Caroline Dessent and Martin Cockett)

Anna Patterson (Dave Smith)

The KMS Winners' Seminar will take place on Wednesday 7 October as usual, but likely to be in a revised online format. Further details to follow.

Kaba Access Control System Upgrade

Message from Systems Development Manager

Beginning 1 September, for two weeks, there will be a major project to reprogram all electronic locks which use the Kaba system. This is a necessity to enable the University to use the latest versions of Kaba locks. The work will mean some card users may experience difficulties accessing some rooms as normal during the transition. As the work is being done in phases, the work on each building will be kept to as short a timescale as possible to minimise disruption.

The following website provides further details on the project and will be kept up to date with plans and progress in each area: kaba-upgrade website.