

Chemistry Update

Newsletter 338, 26 November 2021

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Calendar of Events

Inorganic Seminar

Speaker: Dr Michael Cowley, University of Edinburgh

Date: Wednesday 1 December

Time: 1pm—2pm

Location: C/A/101

Inorganic Plenaries

Speakers: various

Date: Thursday 9 December

Time: 11.40am—4.45pm

Location: C/A/101

[Further details](#)

Organic Plenaries

Speakers: various

Date: Friday 10 December

Time: 13.10pm—4pm

Location: C/A/101

[Further details](#)

Chemistry Graduation January 2022

Date: Thursday 20 January

Time: 10am

Message from Christine Bond, Exams and Graduation Manager:

If you are coming to your Department [Graduation Ceremony in January 2022](#) to celebrate and support the students you have worked with and require an academic gown or staff ticket please complete [this form](#) **no later than Friday 17 December 2021** otherwise gowns cannot be guaranteed.

Date of Next Issue:

17 December 2021

York Chemistry student picks up top accolade at Yorkshire Asian Young Achiever Awards

A University of York graduate student has won a prestigious award at the Yorkshire Asian Young Achiever Awards (YAYAs).



PhD Chemistry student Ruhee Dawood, 23, was nominated for the 'YAYAs Achievement in School or College' award category for mentoring in STEM subjects.

The category looked for candidates who "show others just what can be achieved by application, hard work and determination".

Ruhee was shortlisted along with 33 candidates, and heard that she had won in front of a live audience of 250 invited guests at the Cedar Court Hotel in Bradford on Thursday, 4 November.

The YAYAs, which launched in 2020, celebrate young people aged 16-30 of South Asian heritage who were born, or are living or working in Yorkshire. The awards are run by QED UK, a social enterprise that seeks to improve the social and economic circumstances of disadvantaged communities in the UK and in Europe.

Of Indian origin, and born and brought up in Kenya, Ruhee was awarded a Sharifah Sofia Albukhary Scholarship to study Chemistry at the University of York. Despite all of the challenges posed by the pandemic, Ruhee graduated at the top of her year. She was also awarded the Department's Whinfield Medal for her achievements.

Ruhee then won a further scholarship, a Chemistry Wild Fund Platinum Award, to fund her PhD at York in the Molecular Energy Materials group led by Dr Alyssa-Jennifer Avestro.

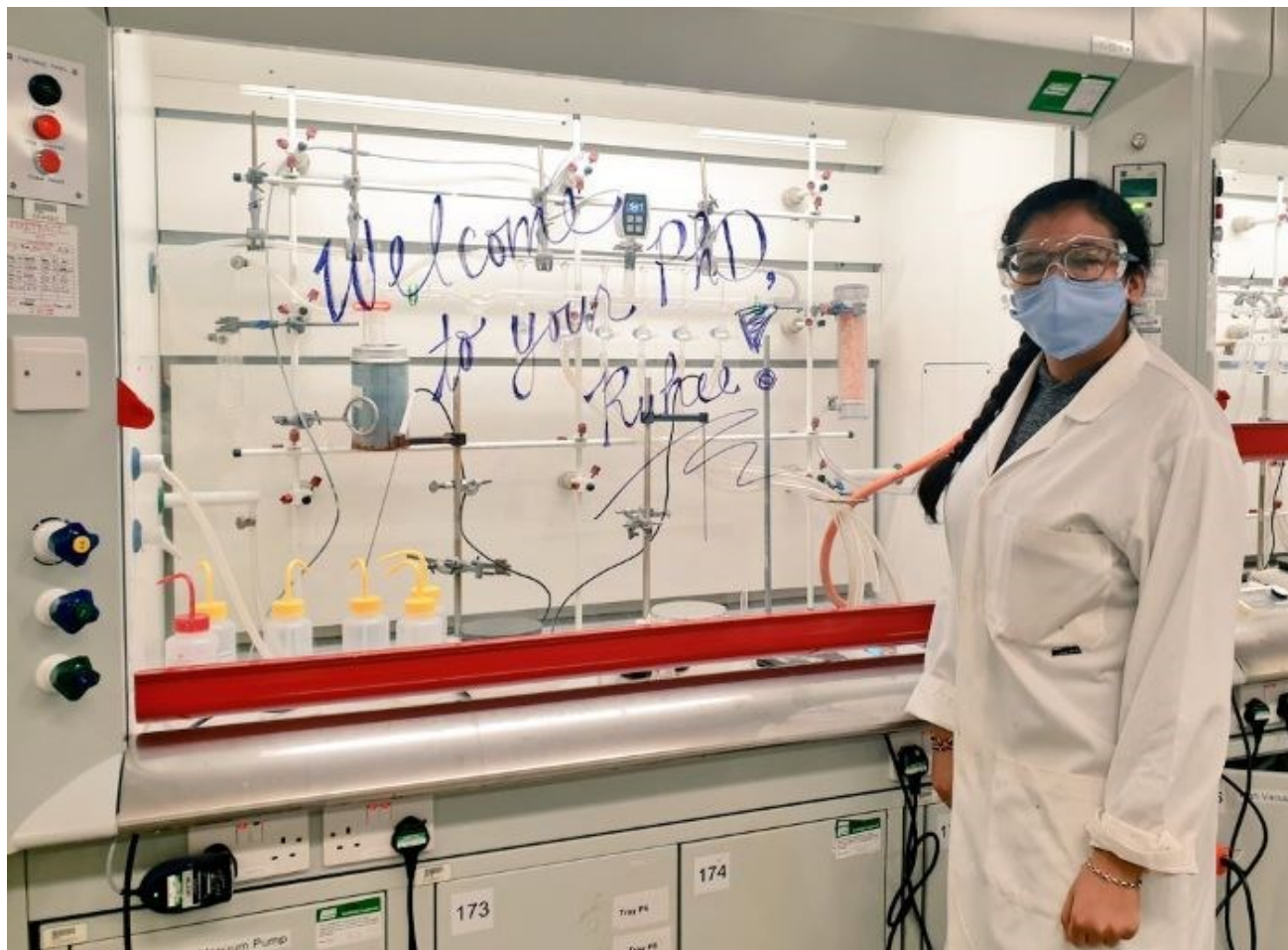
Ruhee recognises the importance of role models and in giving back to the wider community and works as a mentor in the STEMi Women Kuongoza Program, which seeks to empower women and girls across the Middle East, South Asia and Africa.

Ruhee said: "I'm really pleased that the achievements of the South Asian Community in Yorkshire are being recognised so I want to say a big thank you to QED and all the sponsors for a wonderful evening at the YAYAs Award Ceremony and Dinner. Also a big congratulations to all the nominees and winners of the night!"

She added: "It can be very hard to consistently perform at your highest level without having a role model who understands your circumstances and helps you overcome the barriers you are faced with to be successful.

"I was very lucky to find a role model during my undergraduate degree to inspire the best out of me and to support me through my PhD and scholarship applications. Now I hope to return the favour and I have taken up active mentorship roles to encourage and support international students from ethnic minority groups to pursue studies in STEM subjects by helping them lower barriers for themselves."

Dr Alyssa-Jennifer Avestro, Royal Society Dorothy Hodgkin Fellow from the Department of Chemistry and



Chemistry Postdoctoral Champion, said: “All of us in the Avestro Group, the Molecular Materials Research Grouping in Chemistry, and our Department colleagues are ecstatic about Ruhee's success as the 2021 Yorkshire Asian Young Achiever in the School/College category. It has been a pleasure and honour of my career to mentor bright rising stars like Ruhee and to witness her specific growth into a confident woman and BAME scientist in a STEMM field. She has overcome many barriers to be where she is today - though I regret to say that she may likely face additional ones in the future. This I know, being an international woman researcher of BAME background myself.”

“However, the QED Foundation and the YAYAs programme reminds us that despite these challenges, our presence in STEMM is valuable. Ruhee realises this, and I am so thrilled to know that she is adopting further leadership and mentoring roles to help drive this change for young women and minorities in the sciences. We are so proud and privileged to have Ruhee in our lives and look forward to seeing what trail she blazes in the years to come. Her recognition is so well deserved.”

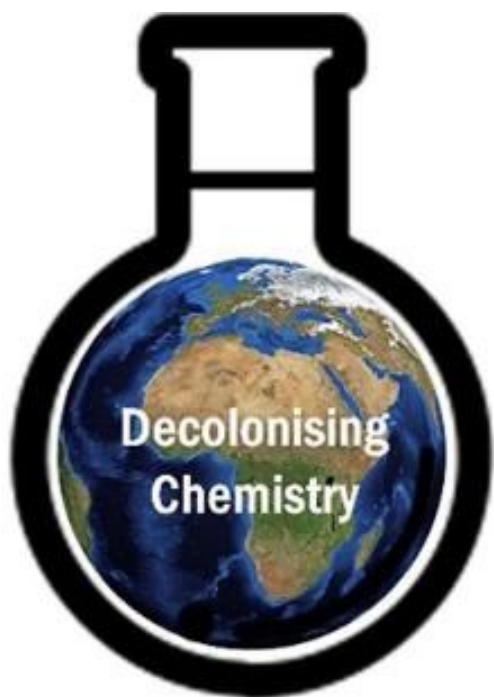
One of Ruhee's mentees from Nigeria has been inspired to pursue further studies in the USA, and Ruhee has also supported a student from India in a successful application for the same PhD scholarship as her own.

Having served as the undergraduate representative in the Department's Equality and Diversity group, Ruhee is now a postgraduate representative. She has recently contributed to Chemistry's efforts to decolonise the curriculum through co-authoring a paper in the ACS Journal of Chemical Education along with senior professors, including Chemistry's Head of Department Prof. Caroline Dessent.

Through contributing to the Department's Equality and Diversity goals, Ruhee hopes to inspire changes which might level the playing field for all who wish to pursue an academic career.

Decolonising Chemistry

The Department of Chemistry at the University of York is taking bold steps towards decolonisation and has recently published a key paper sharing its progress so far, with the goal of encouraging other departments to develop momentum towards a vibrant diversified and decolonized curriculum across the international chemistry community.



The Need for Decolonisation

Across UK Higher Education, it is well-evidenced that black and ethnic minority students [have worse outcomes](#) than their white peers with equivalent pre-university qualifications. Furthermore, the UK chemistry pipeline loses almost all of its black students after [undergraduate studies](#). Clearly one way to address these issues is to ensure proper support and inclusion of such students in the university setting.

In the broadest sense, decolonization involves identifying colonial systems, structures, and relationships, and working to challenge them. Although discussions of decolonization are increasingly common in Arts and Humanities departments, they remain rare in Chemistry. Decolonisation suggests the need to question the understanding of science as something that grew solely from the discoveries of a

series of famous, western individuals. Instead, the colonial roots in science that can arise from both commerce and imperialism should be recognised. As such, the aim of decolonising science is to develop a more complete scientific perspective that better includes global voices and represents global challenges and interests.

Taking the First Steps

The Department of Chemistry has embarked on an ambitious program, and taken a number of key steps, developing an understanding of what decolonisation really means in a chemistry setting. It is important to note that this project was started in response to the Department listening to what its students were saying, both directly, and in the form of culture surveys in which the results were analysed by ethnicity.

A steering group was therefore set up comprising both staff and students. The group agreed that the first step was to communicate with the wider Department about a vision for decolonisation, and why it was important.

There is a belief amongst some scientists that science teaches 'objective truth' and well-established 'discoveries' and 'facts' and therefore does not suffer from colonial influences and attitudes. However, this view is a simplistic one, which fails to recognize how science developed, the environment in which scientists work, or the societal contexts in which it still operates. It is therefore essential to communicate clearly about decolonising chemistry.

A Strategic Approach

Having reflected about decolonising chemistry, the Department now aims to ensure that alongside its teaching of key chemical principles, it will:

- **Teach diverse histories of chemistry and science** showing influences of global thinkers, providing students with a degree of literacy in science history
- **Explore science as a global endeavour** and the importance of teamworking
- **Probe ethical considerations of applying science in a global society** – the need for scientists to understand global development and engage with those from different cultures
- **Include role model scientists from different backgrounds and cultures** – to foster a sense of belonging for all in taught material
- **Discuss structures and hierarchies in science** – how they can operate against minoritised groups
- **Empower all of our students with training in equality, diversity and inclusion**
- **Celebrate (e.g.) Black History Month** – invite speakers who reflect on their lived experiences, produce visual displays in the Department featuring ethnic minority scientists

Decolonisation and Diversification

As work on decolonisation of the curriculum has progressed, it has become synergistic with concepts of more general diversification of the curriculum to better represent a wide range of minoritised groups, historically overlooked in the history of science. The Department aims to ultimately better balance its teaching in terms of all aspects of diversity. In addition to thinking about curriculum, it is hoped that decolonisation will provide a focus to think more generally about teaching and assessment and allow the possibility of a culture shift that provides a space for different views and ways of studying.

Reflecting on the progress of the decolonisation project so far, Head of Department, Professor Caroline Dessent said: “I’m passionate about creating the best possible environment in our department for all our students to study in. Our decolonising the chemistry curriculum project is a key part of the work we are doing to support minority ethnic students, and to educate all our students about the importance of viewing chemistry from a global perspective.”

Chair of the University Staff Race Equality Forum, Dr Avtar Matharu said: “Our courses must ensure our students have equal opportunities to thrive. The importance of decolonisation and diversification of our curricula is top-down driven, championed by Prof Kiran Trehan, Pro-VC Partnerships and Engagement, and Chair of University Race Equality Coordination Group. We are making genuine change for a positive future.”

The paper on decolonization is [published in Journal of Chemical Education](#).

Inclusive training of the next generation of professional chemists

Two recent papers published in *Journal of Chemical Education* highlight the innovative ways the Department of Chemistry is approaching the training of undergraduate students and graduate teaching assistants. The work aims to foster an inclusive culture within the Department, influence others beyond the department, and develop the next generation of professional chemists to act as agents for change.



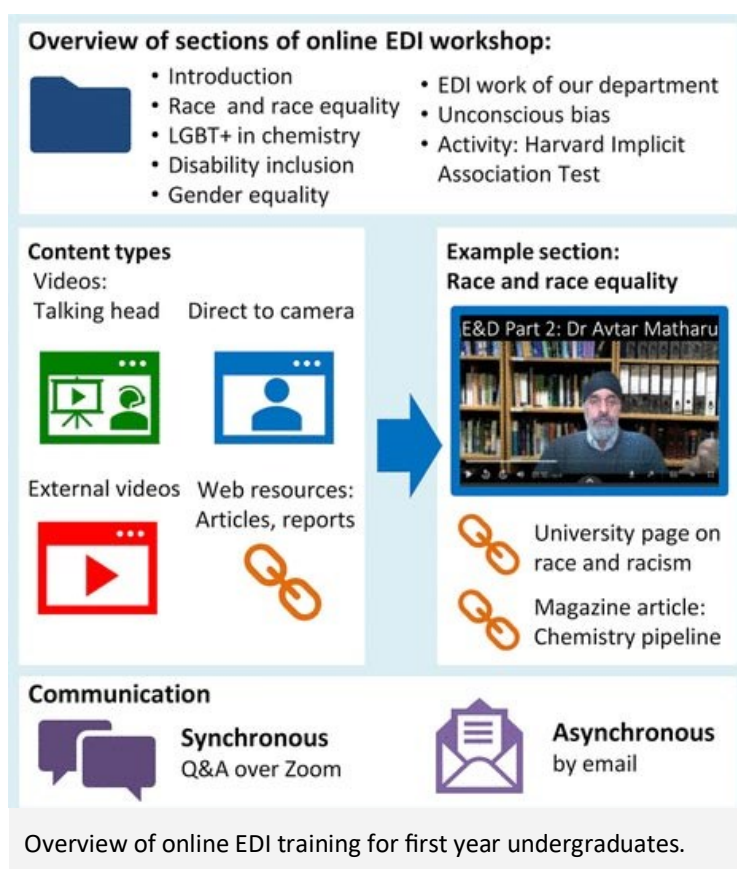
Equality and Diversity Training

It is perhaps surprising that although undergraduates receive extensive training and teaching across their degree, very rarely does any of this address equality, diversity and inclusion (EDI). The recent introduction of an online EDI training workshop in the Department of Chemistry at York aims to revolutionise the Skills training provided to first year undergraduate students at the beginning of their degree and set them up to succeed both in their university studies, and their future lives as professional chemists.

Authentic Voices

The training incorporates short authentic videos from a diverse range of departmental voices. This provides students with insights into how they can access support, act as allies, and respect diverse peers. This prepares students for study within the department, particularly activities such as group practical work and tutorial group teaching. Beyond that, it helps prepare them for their professional life in chemistry, where many of them will take on leadership positions. Specifically, the training explores issues faced by black and ethnic minority scientists, women in STEM, LGBT+ individuals, and disabled scientists. Students also carry out an exercise in unconscious bias and learn about the ethos of the department and its diversity work.

Reflecting on this innovative training, Employability and Diversity Officer, Dr Leonie Jones said: "Hearing staff talk about their own experiences, or their professional insights into EDI, supported by data and evidence, engages students with the subject and allows them to see its practical relevance in the real-world."



Training Graduate Teaching Assistants

Synergistic with work to train undergraduates in EDI, we also developed training for our graduate teaching assistants (GTAs). GTAs help support the learning of our undergraduate students, particularly in Teaching Labs. The overarching aim of providing them with EDI training was to improve the equity of student experience in undergraduate chemistry laboratories, an issue which had been raised through undergraduate feedback. We aimed to achieve this by improving GTA awareness of inclusive teaching practices and EDI principles, encouraging reflection, and sharing inclusive teaching practices.



Overview of EDI training for graduate teaching assistants (GTAs).

It was found that encouraging students to reflect on inclusive learning environments, cultures, and practices was highly valued by GTAs. In addition, the participants engaged in rich discussion of inclusive teaching and drew from their lived experiences. Indeed, when developing EDI training for GTAs, the session had been designed to empower them, and value their contributions. As Dr Julia Sarju reflects: "Graduate students have a diversity of lived experiences which are likely to be closer to undergraduates when compared with faculty and senior faculty, and there is higher representation of minorities. It was therefore vital to value and harness their own lived experiences and, in many cases, recent experiences of learning in undergraduate chemistry laboratories."

Reflections

Reflecting on EDI training at both undergraduate and graduate levels, the new Head of Department, Professor Caroline Dessent said: "In the longer term, transforming the culture of chemistry, requires the next generation of scientists to be aware of cultural issues and committed to equity, inclusion and empowerment. We believe that providing formal training in these aspects enables our students to go on to be agents for change. We also hope that other Chemistry Departments develop EDI training programs for their students, and are making materials available to help them in doing so."

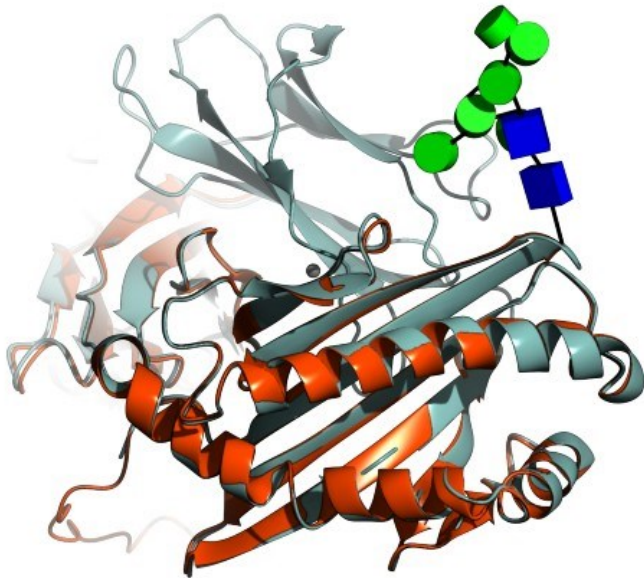
The Department of Chemistry at the University of York recognises the importance of equal participation, progression and success for all, striving to provide a working, learning, social and living environment that will enable all our staff and students to contribute fully, to flourish and to excel. The Department of Chemistry has held an Athena SWAN Gold Award continuously since 2007, recognising the work it has carried out to support and promote the careers of women in science.

The papers are published in *Journal of Chemical Education*.

- [What Makes a Professional Chemist? Embedding Equality, Diversity, and Inclusion into Chemistry Skills Training for Undergraduates](#)
- [Improving the Equity of Undergraduate Practical Laboratory Chemistry: Incorporating Inclusive Teaching and Accessibility Awareness into Chemistry Graduate Teaching Assistant Training](#)

Scientists build on AI modelling to understand more about protein-sugar structures

New research, building on AI algorithms, has enabled scientists to create more complete models of the protein structures in our bodies - paving the way for faster design of therapeutics and vaccines.



A model of sugars involved in the research.
Credit: Dr Jon Agirre

The study - led by the University of York - used artificial intelligence (AI) to help researchers understand more about the sugar that surrounds most proteins in our bodies.

Up to 70 per cent of human proteins are surrounded or scaffolded with sugar, which plays an important part in how they look and act. Moreover, some viruses like those behind AIDS, Flu, Ebola and COVID-19 are also shielded behind sugars (glycans). The addition of these sugars is known as modification.

Sugar components

To study the proteins, researchers created software that adds missing sugar components to models created with AlphaFold, which is an

artificial intelligence program developed by Google's DeepMind which performs predictions of protein structures.

Senior author, Dr Jon Agirre from the Department of Chemistry said: "The proteins of the human body are tiny machines that in their billions, make up our flesh and bones, transport our oxygen, allow us to function, and defend us from pathogens. And just like a hammer relies on a metal head to strike pointy objects including nails, proteins have specialised shapes and compositions to get their jobs done.

"The AlphaFold method for protein structure prediction has the potential to revolutionise workflows in biology, allowing scientists to understand a protein and the impact of mutations faster than ever.

"However, the algorithm does not account for essential modifications that affect protein structure and function, which gives us only part of the picture. Our research has shown that this can be addressed in a relatively straightforward manner, leading to a more complete structural prediction."

Protein structures

The recent introduction of AlphaFold and the accompanying database of protein structures has enabled scientists to have accurate structure predictions for all known human proteins.

Dr Agirre added: "It is always great to watch an international collaboration grow to bear fruit, but this is just the beginning for us. Our software was used in the glycan structural work that underpinned the mRNA vaccines against SARS-CoV-2, but now there is so much more we can do thanks to the AlphaFold technological leap. It is still early stages, but the objective is to move on from reacting to changes in a glycan shield to anticipating them."

The research was conducted with Dr Elisa Fadda and Carl A. Fogarty from Maynooth University. Haroldas Bagdonas, PhD student at the York Structural Biology Laboratory, which is part of the Department of Chemistry, also worked on the study with Dr Agirre.

The paper, "[The case for post-predictional modifications in the AlphaFold Protein Structure Database](#)," is published in *Nature Structural & Molecular Biology*.

25th Anniversary of the Children Challenging Industry (CCI) programme



Joy Parvin is thrilled to share this very special edition of the Association for Science Education's Primary Science journal, featuring the work of CIEC. It is [FREE for all to download](#).



Many of the articles share CIEC's approaches to raising children's STEM career aspirations and awareness of industry. We also share two aspects of research and evaluation. Agata Lambrechts writes about the importance of those dreaded evaluation questionnaires in ensuring science programmes such as [CCI](#) remain impactful and move with the times; and Nicky Waller shares our involvement with the primary pilot of the highly-regarded [BEST](#) programme. BEST has been highly successful in secondary schools, and we were delighted to be invited to partner the team at UYSEG who created and continue to innovate this programme (Judith Bennett, Alistair Moore and Peter Fairhurst).

Do get in touch with [Joy](#) if you'd like to discuss primary schools' outreach, and how you might make use of CIEC's expertise in grant proposals.



HVB Early Career Researcher Meeting

Early Career Researchers from both **academia** and **industry** are invited to a networking event at the Kings Manor in York on **9 December 2021**. This is an opportunity to build your network and discuss how the High Value Biorenewables Network (HVB) can help you with challenges in your research, career or enterprise. We'll also be recruiting an organising committee for an ECR workshop in 2021 so ideas and volunteers are welcome. Spaces are limited and available on a **first come-first served basis**.

Register here: www.highvaluebiorenewables.net/events/hvb-early-career-researcher-network-meeting/

What is the most environmentally friendly way to de-ice a car?

This is the question that seven different BBC radio stations (including York and Leeds) asked Professor Michael North during the first week of COP26. Or as one presenter put it, 'Is it best to be a scraper, a sprayer or a blower?'. Presenters and their listeners were aware that running a car engine for a long period generates carbon dioxide and other exhaust fumes; whilst using de-icer consumes both the chemicals in the de-icer and the propellant and requires an aluminium can (hopefully recycled!).



The short answer is that there is no short answer as every car, house and personal set of circumstances are different. However, prevention is always better than cure, so if your house has a garage big enough to accommodate your car then clear out all the junk and put your car in the garage overnight – that way it won't need de-icing in the first place! If you have a driveway, it's

also a good idea to park as close to a wall of your house as possible. The wall acts as a physical barrier to snow and rain and your house will also lose heat overnight through the walls and this creates a microclimate near the walls which can prevent some of the car windows from icing up.

If, however, you do need to de-ice the windows then it's definitely best to heat them from the inside out. If you can melt the thin layer of ice that is directly attached to the glass then the rest of the ice should easily slide away without having to be melted. So my advice is, turn the car engine on and turn on the electrically heated front and rear windscreens if your car has them. Then turn on the air-conditioning / heater, set it at maximum, and to blow the air directly onto the front windscreen. This should rapidly de-attach the ice to both the front and rear windscreens, allowing the windscreen wipers or gravity to remove the remaining ice.

Side windows can be more of a problem as they are not likely to be electrically heated. My suggested approach is that whilst the car is de-icing the front and back, get out and scrape any loose frost / snow off the side windows. Then I do recommend using de-icing fluid. However, I use it sparingly trying to apply at the top of the window and onto bare glass if possible so that gravity can carry it down the window and allow it to seep into microgaps between the glass and ice, thus melting the most important part of the ice. My own experience is that the above method de-ices all the windows in about three minutes and allows a single can of de-icer to last a whole Yorkshire winter.

Finally, I always emphasised that you should **NEVER** throw boiling or even hot water at frozen glass as the thermal shock could shatter the glass and turn a minor inconvenience into a major financial and environmental disaster! It's also worth noting that you can buy bottles of de-icer fluid on the internet which you can use to fill a hand pumped garden sprayer, thus avoiding the use of aluminium cans and propellant.

Probably the most important outcome of these interviews is that the radio-show listeners are starting to think about the environmental impact of everything they do and are keen to know if they can make minor changes to their routines which might have a significant impact on the environment.

27 Change Agents: One COP 26

Twenty seven students from the MSc in Green Chemistry and Sustainable Industrial Technology course met virtually this month to reflect on COP26.



The meeting was led by Course Director Professor Avtar Matharu, who invited 27 agents of change to share their views on why they are studying green chemistry, what COP26 means to them and what one single thing are doing to combat climate change.

Megan Rule, Course Representative, said: "It was really exciting to hear stories from my peers from a global perspective. There is an urgent need to change our ways for a better future for all."

Participants at the meeting spoke on themes of the importance of hope, listening to one another, respect, equality, diversity and inclusivity, the importance of making small changes to our daily lives and in particular, the need to work collectively and internationally in order to solve the environmental issues we face.

Professor Matharu said: "It was very important to us as practitioners of green and sustainable chemistry, to reflect on COP26. I enjoyed listening to the views of our students who are passionate about protecting the planet and its inhabitants. We were able to gain a truly international perspective."

[View the recording of the full meeting.](#)

The [MSc Green Chemistry and Sustainable Industrial Technology](#) was the first course of its kind to be accredited by the Royal Society of Chemistry. Every year it attracts talented students from around the world with a passion for green and sustainable chemistry.

New starters

Katie Jameson, PDRA in Structural Biology: Drug Discover in Leishmaniasis
Room: B/K266; Ext: 8276; Email: katie.jameson@york.ac.uk

Alexandra Males, Associate Lecturer T&A (3 months secondment)
Room: C/B012; Ext: 2717; Email: alexandra.males@york.ac.uk

Ashish Kumar, PDRA in Experimental Atmospheric Science
Room: C/G119; Ext: 1223; Email: ashish.kumar@york.ac.uk

Saeed Akkad, PDRA in Fascione group
Room: C/E014; Email: saeed.akkad@york.ac.uk

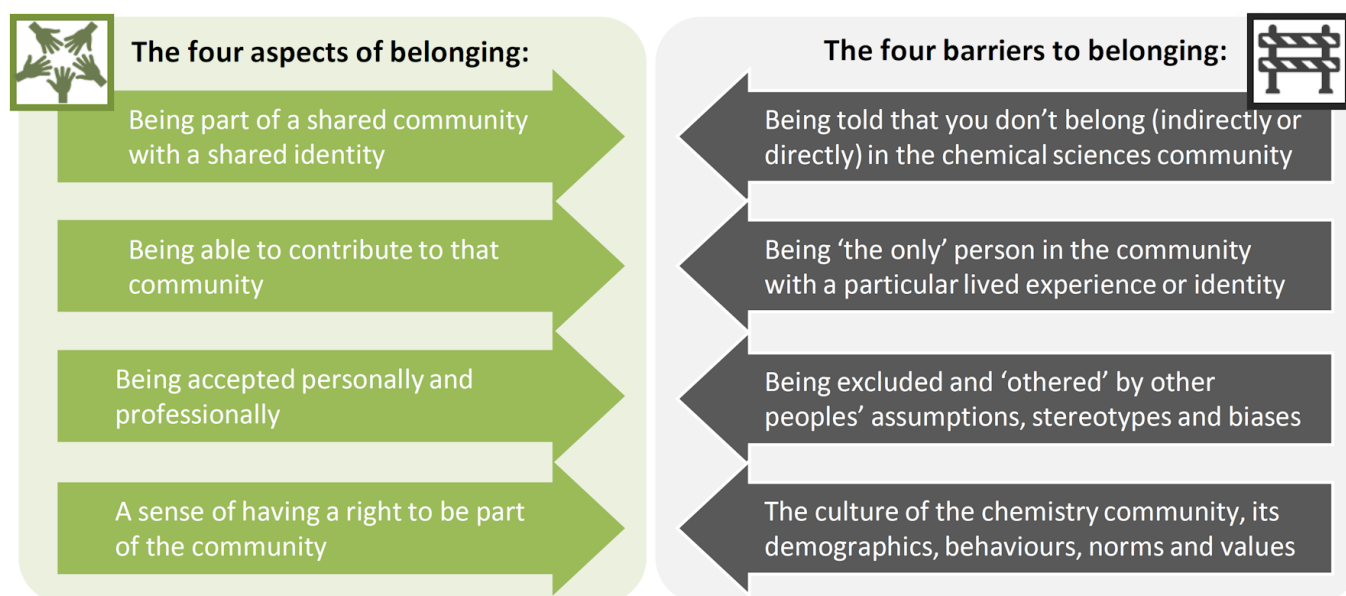


Belonging in the chemical sciences

The Royal Society of Chemistry (RSC) has recently published a new report entitled "[A sense of belonging in the chemical sciences](#)".

The report is important for us as a department and as individuals because "belonging" at work impacts on our wellbeing, but also leads to better science in terms of creativity, innovation, productivity and collaboration.

By investigating the lived experience of chemists, the RSC has identified some key aspects of belonging and barriers to belonging, which are shown below.



These are important because we all contribute to the kind of community that we work and study in, and we can influence it in a positive or negative way. The report identifies actions that we can all take as individuals to build belonging:

- Take responsibility for raising one's own awareness and understanding
- Be mindful of how everyday behaviours can make people feel excluded
- Listen to and believe people when they share experiences of not belonging
- Encourage and support colleagues, irrespective of their background
- Respect all colleagues as professionals
- Challenge the exclusion and discrimination of others

Please do take a look at the report and reflect on the actions you can take to make our community a welcoming and inclusive one.

If you are interested in this topic, you can still sign up to the RSCs Inclusion and Diversity Forum 2021: [Why belonging and inequalities in race and ethnicity matter](#) on 8 December where the report will be launched.

Leonie Jones (employability and diversity officer).