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Introduction to indoor air quality

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This themed collection aims to showcase research on all aspects relating to indoor air quality. Although we spend much of our time indoors, most research and public attention to date have focused on ambient air, as has policy action to reduce exposure to, and the health impacts of, air pollution.

This has started to change. The Covid-19 pandemic has drawn attention to indoor air quality, not only through discussion of viral transmission but as, in many countries, restrictions further increased the time people spent indoors. This has contributed to a new policy focus on indoor air quality in several high-income countries – from a **White House Summit on Improving Indoor Air Quality** to new **laws on ventilation in public buildings in Europe**. However, large gaps remain in our understanding of indoor air quality. This collection highlights research across the chemical sciences on indoor air and highlights the contribution of the chemical sciences to increasing the evidence base on indoor air quality.

Indoor environments are complex and depend on building size and shape, activity, lighting, emissions, and exchange with the outdoor environment. Currently, there are limited measurement data and understanding of indoor air pollution in real-life settings in comparison to monitoring networks of ambient air. Cowell *et al.* investigate the use of sensor technologies in their paper 'Particulate matter in a lockdown home: evaluation, calibration, results and health risk from an IoT-enabled low-cost sensor network for residential air quality monitoring' (**https://doi.org/10.1039/d2ea00124a**). The low cost and size of sensors contribute to their potential to increase the breadth of data collection.

As identified in that study, cooking can result in particulate emissions far higher than the targets being aimed for in new legislation for ambient air in the EU and UK. The aerosol emissions associated with different cooking oils and cooking temperatures were studied in detail by Sankhyan *et al.* (**https://doi.org/10.1039/d2ea00099g**) in work that shines a light on the additional complication of human behaviour in performing a given activity, something it would be hard to address with policy.

The complexity of the factors influencing indoor air quality also results in similarly complex challenges to address it. For example, the policy levers affecting indoor air quality are often spread across multiple government departments and agencies. In the UK, planning regulations are found in the Department for Housing and Levelling Up, while product regulation sits in the Department for Business and Trade. Indoor environments include workplaces (Health and Safety Executive) and transport systems (Department for Transport). The need for coordination across government was identified by Defra's Air Quality Expert Group in a report on **Indoor Air Quality** in the UK and will hopefully be addressed by the creation of a cross-government working group on indoor air.

In the Royal Society of Chemistry's Policy and Evidence team, we aim to inform and influence decision makers on issues where the chemical sciences are most affected or where the chemical sciences can inform policy interventions. On the topic of indoor air quality, we are collaborating with teams across the organisation to draw together the best evidence from the chemical science community, including through initiatives such as this themed collection and an expert roundtable organised by several of the RSC's **Subject Community Councils** at the end of last year. We will use this evidence to influence air quality policy in the UK and internationally, where there are several ongoing environmental policy initiatives – such as the development of a **new UN panel on**

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chemicals, waste and pollution prevention and **a new taskforce** under the Convention on Long-range and Transboundary Air Pollution.

Policy actions to tackle pollution and improve human health rely on collaboration between the scientific community and decision-makers, underpinned by robust evidence drawn from all regions of the world. The conversation about indoor air quality is growing and this collection showcases the contribution of the chemical sciences to an exciting area of research with real policy impact.

Whether it's to publish your own research or read cutting-edge work of the highest quality relating to indoor air quality, *Environmental Science: Atmospheres* and *Environmental Science: Processes & Impacts* offer comprehensive coverage of the latest research. *Environmental Science: Atmospheres* is an interdisciplinary, open-access journal advancing the understanding of atmospheric science and related challenges. The journal offers transparent peer review, where readers can see how the paper has progressed from submission to acceptance. *Environmental Science: Processes & Impacts* is a multidisciplinary journal for the environmental chemical sciences, focusing on the natural environment. With a broad scope, authors can be assured that their work is read by researchers in industry and academia, and by professionals involved in assessing environmental and biological impacts. We continue to strive to publish the best environmental science papers, including those relating to indoor air quality, and hope you enjoy the collection.