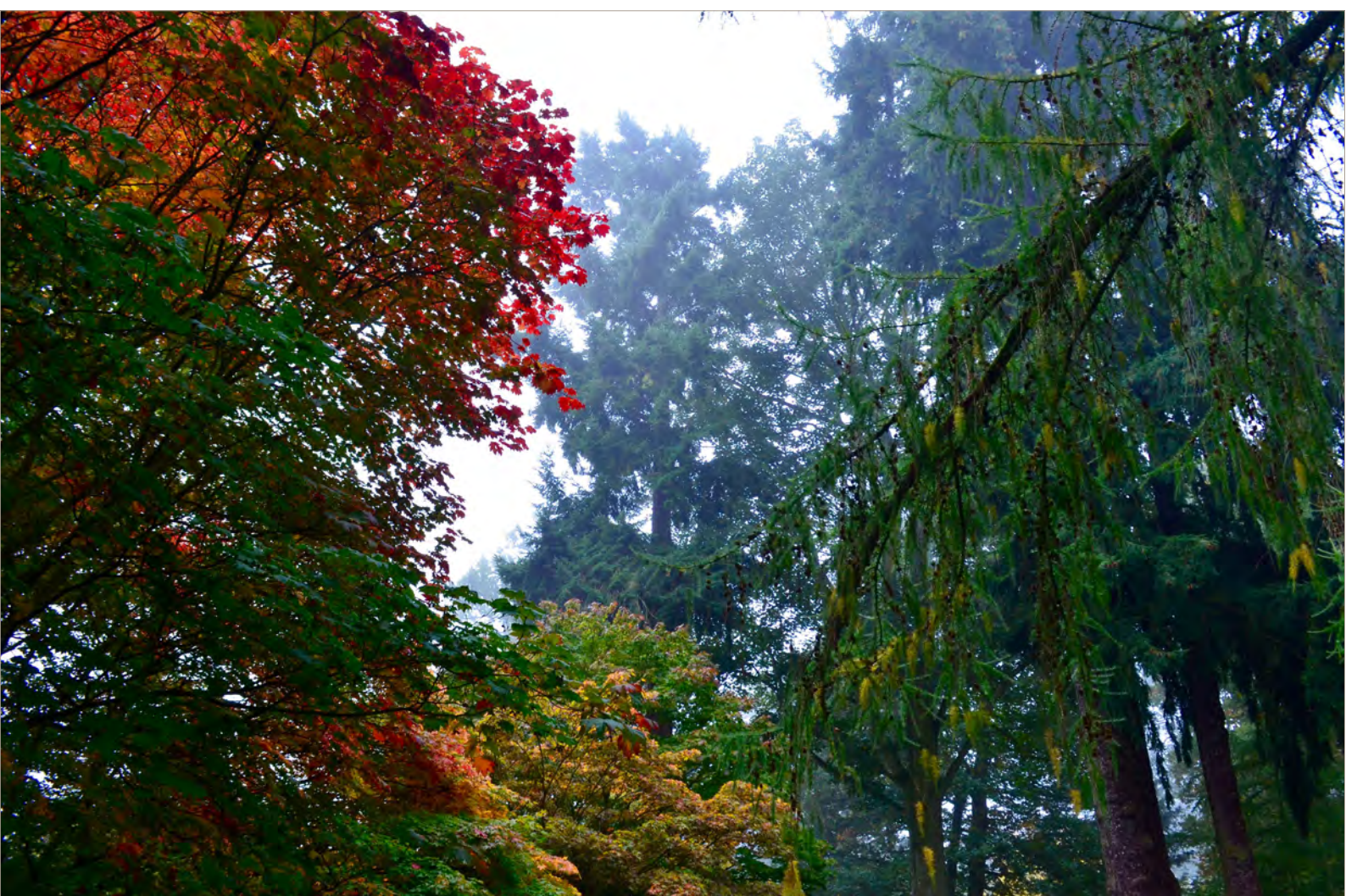


# Sustainable Chemistry

*Developing new science for a better future*



The University of Oxford's Harcourt Arboretum



## Overview

Much of modern life depends on the products of industrial chemistry. Over the course of 200 years, the industry has produced a plethora of new products that have underpinned economic growth and wealth creation. But this success has come at a cost. The environmental consequences of obtaining the raw materials, processing them to make useful products, and then disposing of them at end of use have until recently been largely ignored.

There is a growing realisation that we need radical change in the chemical industry so that it can continue to support human needs but in a sustainable way. Yet the science we need to accomplish this vital task just doesn't exist at the moment. Yes, some of this change will come about by the adoption of best practice using existing technologies. But this will not be enough.

We shall also need to rethink parts of the industry and come up with new molecules and new processes – fundamental new science is needed.

Researchers at Oxford, in Chemistry and associated departments, are enthusiastically committed to this “Green Chemistry revolution”.

Approximately 20% of fossil fuels are used by the chemical sector, which in turn is responsible for about 10% of greenhouse gas emissions. To achieve national and global targets for net zero emissions, this figure will need to come down to zero – a challenge given the fact that carbon itself is essential for the final product.

Existing work at Oxford seeks to find alternative and novel raw materials and to reduce energy requirements. This includes studies of plant-based feedstocks and development of new catalysts, both conventional and using biocatalysis (enzymes). It also includes work on making fertilisers (fixing nitrogen) using less energy, a critical climate change challenge. Much more work in this area is urgently required.



The world has woken up to the consequences of letting vast amounts of plastic enter the environment, damaging human health and biodiversity. Research in Oxford to address this challenge involves extending the life of the plastics we use, ensuring they are ultimately safely degradable, and eliminating the highly toxic and long-lived chemicals that are currently released into the environment. The research not only involves chemistry but the economic and regulatory constraints and opportunities of the development of new products and technologies. A start has been made but nothing less than a complete restructuring of the plastics and associated industry is needed to make it sustainable.

But the problem with plastics is but one element in a huge network of challenges that must be met to prevent a catastrophic degradation of our planet, and the civilisation it sustains. And of course, these challenges are not just a scientific problem; they involve matters of law, policy, economic, politics and a deep understanding of human nature at both the collective and individual level. They call for the kind of multidisciplinary approach to research – and the peerless depths of scientific and intellectual resources – that are the hallmarks of Oxford’s enduring mission of advancing knowledge for the greater common good.

And these are the multidisciplinary strengths that Oxford Chemistry will draw upon as the University seeks to consolidate and substantially increase its research on sustainable chemistry in the next 10 years. The department’s world-leading excellence in innovative fundamental science can provide the novel ideas needed to provide solutions for critical environmental problems.

The University envisages a landmark programme for the creation and development for what is essentially a new science. We are seeking a transformational benefaction that will provide the posts, buildings, scholarships and infrastructure needed for this urgent, all-important task. This is a unique opportunity for a visionary benefactor to help lay the foundations for a profound advancement in the history of science.

## Conclusion

We must not only save the planet from the worst ravages of climate change; we must also ensure that humankind can thrive in the future, that we can preserve the hard-won benefits of modern civilisation and extend them to them to all, in a more sustainable and equitable fashion. Sustainable chemistry is essential to this vision, this mission.



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