

# CHEMISTRY IN 2020

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**SOURCE: NATURE 463**, 26-32 (7 JANUARY 2010) | DOI:10.1038/463026A; PUBLISHED ONLINE 6 JANUARY 2010

The future of chemistry should look very different from the past. Traditional, reductionist, highly specialized academic chemistry has transformed food, energy, health, transportation, communications and the quality of modern life. It has also — accidentally — depleted finite and rare resources, endangered workers and contaminated ecosystems. Green chemistry is the way forwards: it combines expertise from synthetic, physical and biological chemists, together with that of toxicologists, environmental health and life scientists, to deliver sustainable chemical design.

Making chemical products and processes that reduce or eliminate the use and generation of hazardous substances is an inherently systems approach. The 'twelve principles of green chemistry' unite all aspects of the molecular life cycle, from obtaining the feedstock and starting materials, through the synthetic and manufacturing process, to the end of commercial life and ultimate disposal of products. These principles are based on the latest fundamental discoveries on the interaction between anthropogenic substances and the natural world.

Scant research funding, and hence insufficient effort, is devoted to sustainable innovation in chemistry. As a first step, chemistry needs to adopt a clearly stated research imperative that researchers in molecular science must maintain their creativity while not doing harm to people and the planet. We need to turn all of chemistry green.