Repositioning chemistry for the 21st century

A mature science developed over more than 200 years, chemistry provides understanding of the properties of atoms and molecules and practical methods for creating new molecular structures that may find useful applications. Chemistry is also an enabling science, having provided the fundamental understanding of molecular behaviour and interactions at the core of other disciplines that range from molecular biology, material science and nanoscience to astronomy. And chemistry is practical and omnipresent, playing key roles in conquering diseases, solving energy problems, addressing environmental challenges and providing discoveries that generate new industries. Contributing to the dramatic rises in overall human wealth and well-being during the last two centuries, it has also been termed a ‘quality of life’ science.

But chemistry cannot rest on its laurels. Some negative perceptions have accrued over time, as a result of deliberate applications (e.g. chemical warfare) and accidental or unintended events (e.g. chemical spillages and other disasters; toxic side effects of drugs and food additives; environmental contamination). This has sometimes led to the field and those who work in it being held in low esteem by the general public, media and policy-makers and to a diminution in popularity with students. However, there are many emerging challenges that chemistry must help to overcome. To do so, it will need to reposition itself, refreshing its popularity as a field to attract new talent and public support and reforming how it is taught and applied as a science that connects to the real world and its problems.

Chemistry must frankly acknowledge the past problems to which it has contributed as well as the many successes it has achieved. For the future, chemists must reinvent the field, projecting and practicing it ethically and especially to improve quality of life for people and the sustainability of development globally. The 2011 International Year of Chemistry led to a much greater degree of engagement between the subject’s practitioners and the general public and a focus on how chemistry can contribute to solving challenges such access to clean water. All those in the field of chemistry, including educators, researchers, the chemical industry and the professional bodies and academies, must join forces and continue to build on that momentum. Chemists need to develop improve their communication skills to engage in frank and constructive dialogue with the public, using language that is accessible to explain the relevance of their work to everyday life.

It is more than just a question of image: chemistry as a discipline needs redesign and reform. The 2015 Gordon Research Conference (Chemistry Education as an Agent in Global Progress) provides an example of chemistry educators assessing how teaching and learning at all levels can be improved to inspire the next generation of chemists. The field’s major national and international associations must also undergo change, giving less emphasis to the professional advancement of their members and more to strengthening understanding and respect for chemistry from the public. New champions at all levels of these organizations are needed to press the case for the reforms.

Industry must contribute to the repositioning. It needs to wholeheartedly embrace ethical rules and

practices and engage in responsible chemicals management, responsible innovation and adhere to the principles of sustainability. It must connect more closely with its consumers and engage in frank conversations with society as a whole, recognizing the demands for transparency and deep concerns about risks. Academia can collaborate in this dialogue, clearly explaining the science, applications, and impacts – and must also engage in the research and interdisciplinary and transdisciplinary approaches that are needed to tackle the formidable challenges that the world faces in the 21st century.

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