IUPAC and OPCW Working Toward Responsible Science

video footage that demonstrates how this complex set of topics can be communicated in engaging and informative ways with educators and chemists. The joint project was led by Peter Mahaffy (Canada), and Alastair Hay (UK), and included other members of the OPCW Temporary Working Group on Education and Outreach: Jan Apotheker (Netherlands), Djafer Benachour (Algeria), Jo Husbands (USA), Robert Matthews (Australia), Ting-Kueh Soon (Malaysia), and Alejandra Suarez (Argentina). An interdisciplinary team of undergraduate students and faculty at the King's Centre for Visualization in Science (www.kcvs. ca), under the direction of Peter Mahaffy and Brian Martin, developed the educational materials, in close consultation with scientists and educational specialists from both IUPAC and the OPCW. Additional funding for the project was provided by the European Union through the OPCW.

A Versatile Online Resource

Following best practices in the design of electronic learning materials, the *Multiple Uses of Chemicals* website resource was made with interactivity in mind, implementing a variety of case studies and role-playing scenarios to communicate information effectively. To engage a wide range of audiences while delivering content appropriate to each type of user, the resource starts with three separate portals: *Brief Overview, Students*, and *Educators and Policymakers*.

The *Brief Overview* displays the major features of the resource, and is highly condensed for easy navigation through the site. The *Students* portal targets secondary and post-secondary chemistry classes, and can be used to stimulate discussions of scientific responsibility and integrity in the context of applications of



various concepts in general and organic chemistry, or to support courses in ethics. Interactive resources for students include role-playing scenarios, case studies, and a variety of personal and discussion questions. The *Educators and Policymakers* section contains tips for implementing the resource into presentations or classroom discussions, as well as a list of learning outcomes for each topic, supplementary resources such as worksheets for students, and links to other websites that may be useful in preparing presentations or lectures.

The website is divided into four major sections: Multi-Use Chemicals, Responsible Choices in Chemistry, Convergence of Chemistry and Biology, and Codes of Conduct. The majority of the content is in the first two sections, where users are introduced to the concept of multi-use chemicals and the problems associated with their regulation and distribution.

The Multi-Use Chemicals section explores the concept of multi-use chemicals, starting with three case

Complementary OPCW Education and Outreach Resources

In addition to the Joint IUPAC/OPCW Multiple Uses of Chemicals resources, the OPCW has published other resources, exploring the history and science behind chemical warfare agents:

• Fires is a documentary film series exploring the historical context for chemical weapon use, abuse, regulation, and prevention, while also investigating the motivations and inspirations for both the producers and monitors of chemical weapons. Find it at: www. thefiresproject.com

• Chemistry in Conflict is an educational module for high school students, designed to introduce students to chemical weapons, the Chemical Weapons Convention, and ethics in science. It provides both a rich context for educating in chemistry, and historical background to the production and regulation of chemical weapons. A diverse set of activities, case studies and exercises facilitate instructor implemen-

tation. Feedback is currently being incorporated into the resource, after which it will be made freely and publicly available. (See OPCW Today, Dec 2013 (same as ref.3), pp. 25-26.)

