Technological developments related to chemistry in the context of international security

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Report on developments in S&T to the Fifth Review Conference

Issued on 22 February 2023 as RC-5/DG.1 and comprises:

- 15-page report, including 45 recommendations
- 47-page annex with additional, detailed information on developments in S&T supporting the advice and recommendations in the report

Director-General issued a response (RC-5/DG.2, dated 22 February 2023)

General trends

- **Blurred boundaries** between the physical, biological, and digital realms
- **Unprecedented pace** of development
- Technology **convergence** or transfer between sectors
- Increasingly **affordable and performant equipment**, with flexibility of application
- Developments in S&T present an ever-changing set of **challenges and opportunities**
Overview of SAB advice

• Chemicals
• Technology convergence
• S&T of relevance to verification
• Technologies for delivery and dissemination of toxic chemicals
• Assistance and protection
• Chemical safety and security
• Science literacy and science advice
Artificial Intelligence
ChatGPT-4

“...a key risk driver is GPT-4’s ability to generate publicly accessible but difficult-to-find information, shortening the time users spend on research and compiling this information in a way that is understandable to a non-expert user.

OpenAI conclusion,
ChatGPT-4 System Card
AI in chemistry

- Molecular design
- Property prediction
- Virtual HTS
- Retro-synthesis
- Conditions prediction
- Laboratory robots
Laboratory robots and “cobots”

From robotic arms to automated equipment
Automated chemistry

Several companies are looking to package automated chemistry solutions to make them more mobile and user-friendly.

www.chem.gla.ac.uk/cronin/  www.chemify.io

https://ondemandpharma.com/
Dissemination technologies

As important as considering impacts from advances in science and technology in design and production of toxic chemicals

These can be considered at the macro level as well as at the micro level
Drones
Do-it-yourself community

https://www.youtube.com/watch?v=i59F8463A58

Drug delivery

New technologies are being developed to help deliver specific chemicals to specific areas of the body:

• DNA origami
• Nanostructured organic or inorganic carriers
• Molecular cages including organelles
Questions?