OPCW and the International Union of Pure and Applied Chemistry

Reflecting on and Taking Forward a Partnership with the Scientific Community

21 November

13:00 - 15:00

Antarctica Room

World Forum

Light lunch provided

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

OPCW

Organisation for the Prohibition of Chemical Weapons

OPCW and the International Union of Pure and Applied Chemistry

Reflecting on and Taking Forward a Partnership with the Scientific Community

Jonathan E. Forman, Ph.D.

OPCW Science Policy Adviser and

Secretary to the Scientific Advisory Board

21 November

13:00 - 15:00

Antarctica Room

World Forum

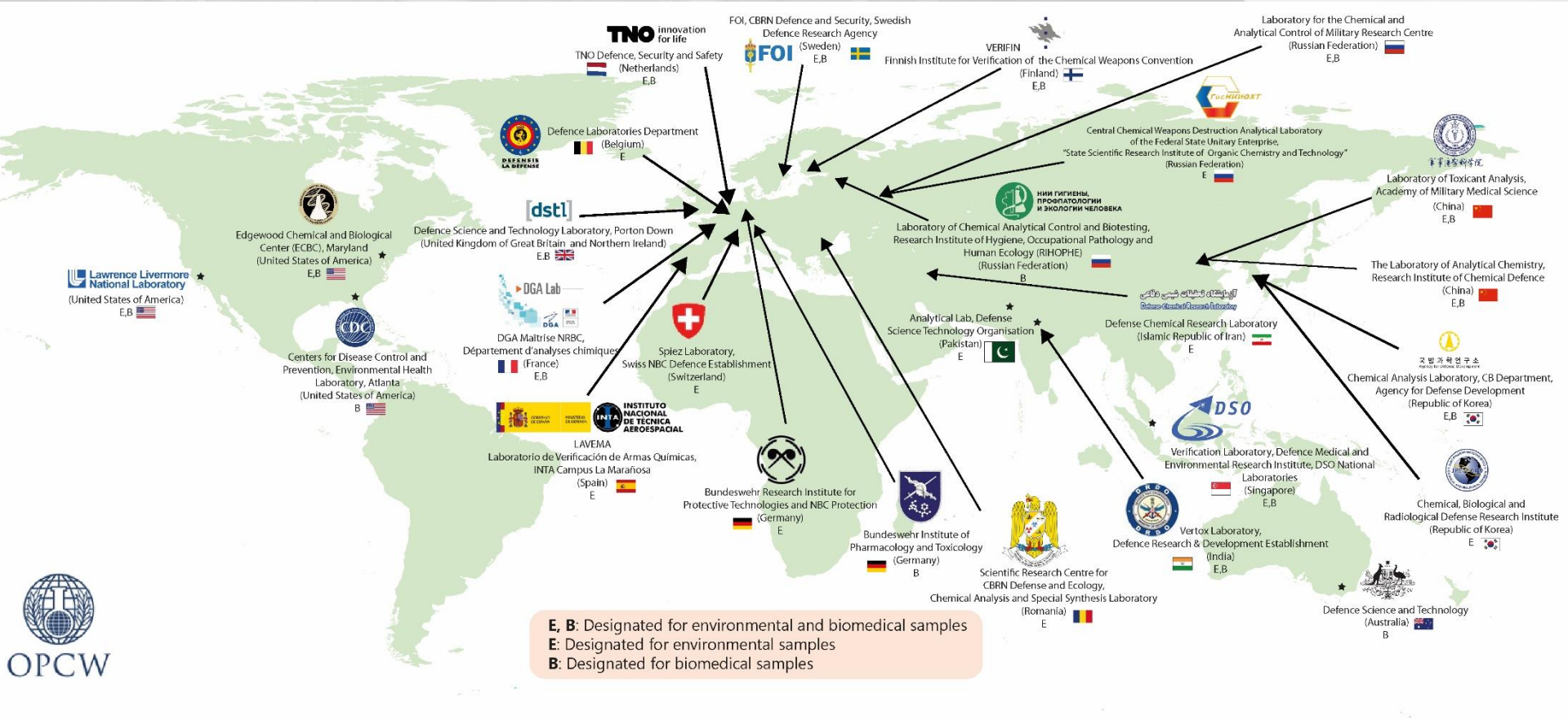
Light lunch provided

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

OPCW

Organisation for the Prohibition of Chemical Weapons

International Science Collaboration and the OPCW



OPCW

International Science Collaboration and the OPCW

OPCW **Technical Secretariat**

S/1681/2018
19 October 2018
ENGLISH only

NOTE BY THE TECHNICAL SECRETARIAT

REPORT OF THE FORTY-SEVENTH MEETING OF THE VALIDATION GROUP FOR THE UPDATING OF THE OPCW CENTRAL ANALYTICAL DATABASE 25 AND 26 SEPTEMBER 2018

1. The Validation Group met on 25 and 26 September 2018 to discuss the evaluation of new analytical data for possible inclusion in the OPCW Central Analytical Database (OCAD) and to consider matters related to this database. Mr Hugh Gregg (United States of America) served as acting Chairperson of the meeting.

2. The evaluators for the analytical techniques evaluated new data and sent their written reports to the coordinators for each analytical technique. The names of the coordinators who were present at the meeting, along with the technique for which each was responsible, are listed below.

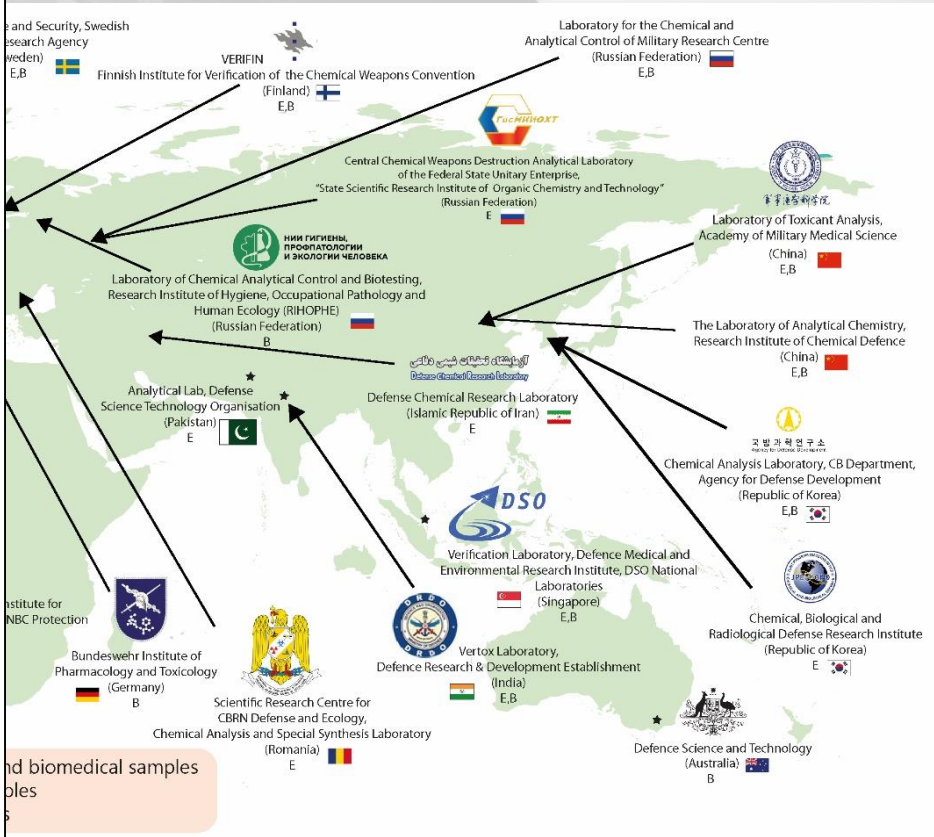
Mr Ferdinand Visser (South Africa)	Gas chromatography (retention index) (GC(RI))
Mr Vesa Häkkinen (acting coordinator) (Finland)	Mass spectrometry (MS)
Mr Armando Alcaraz (United States of America)	Infrared (IR) spectroscopy
Mr Damian Magiera (Germany)	Nuclear magnetic resonance (NMR) spectroscopy

3. The coordinators provided an evaluation summary of the data presented to the Validation Group for discussion at the meeting. The evaluators finalised the evaluation of the analytical data and confirmed that the approved data was technically valid.

4. The Validation Group accepted the resignation of Mr James Riches (United Kingdom of Great Britain and Northern Ireland) from his position as Chairperson of the Group and as member of the MS subgroup. It also accepted the resignations of Mr Alex Bennett (United Kingdom) from the MS subgroup and Mr Takeharu Wada (Japan) from the GC(RI) subgroup. The Group acknowledged the support of each of these contributors throughout the time of their membership.

5. The Validation Group welcomed Mr Arne Ficks (Germany) as a new member of the MS subgroup and Mr Harri August Heikkinen (Finland) as a new member of the NMR subgroup.

CS-2018-1379(E) distributed 25/10/2018



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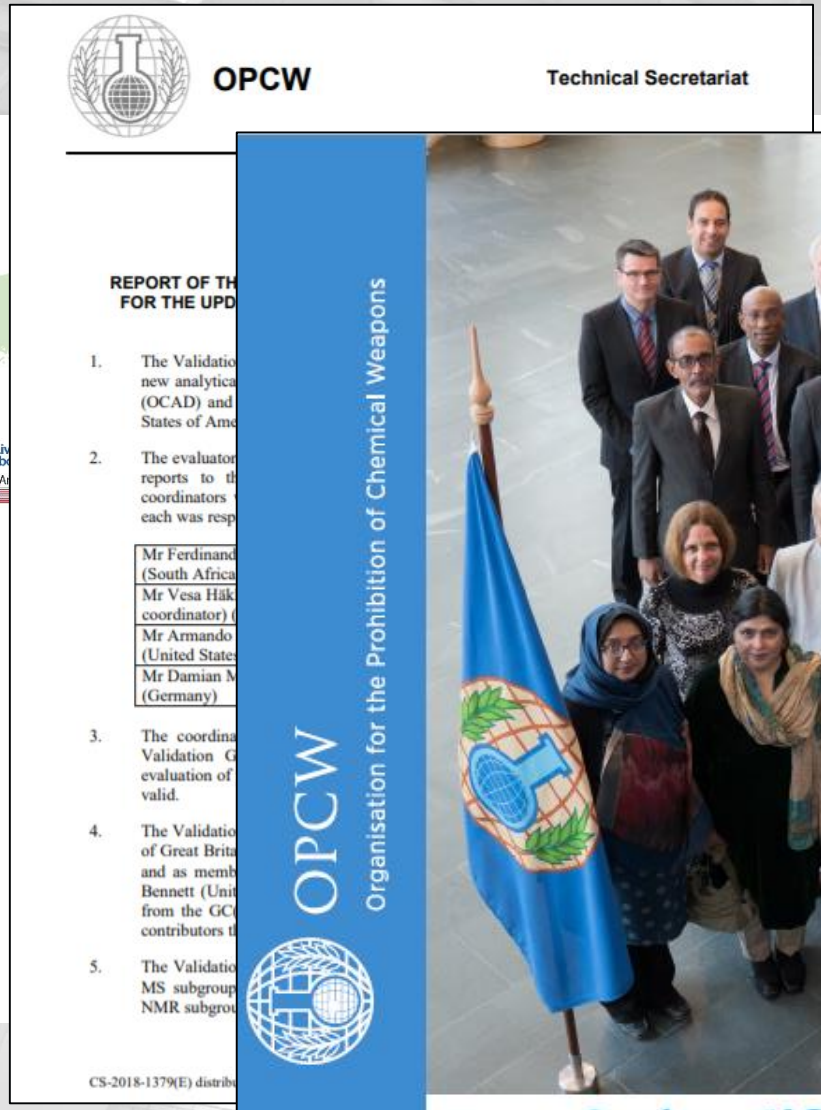
International Science Collaboration and the OPCW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International Science Collaboration and the OPCW

OPCW Technical Secretariat

DE GRUYTER Pure Appl. Chem. 2018; aop

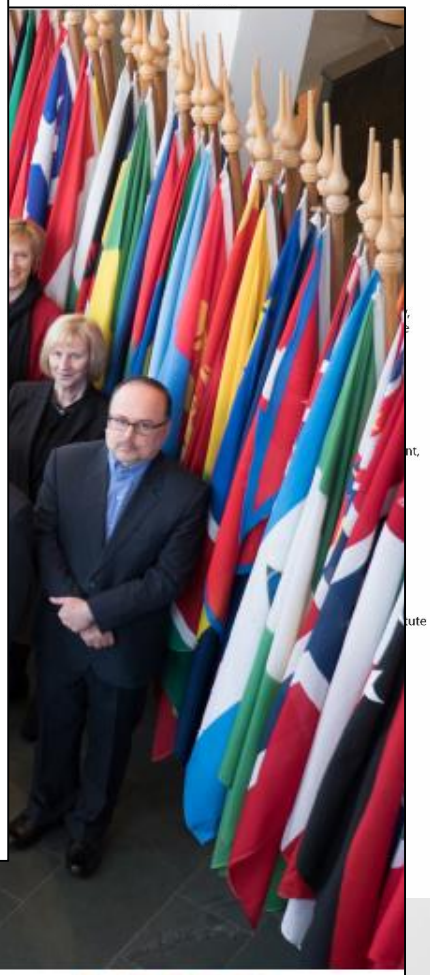
Conference paper

Jonathan E. Forman*, Christopher M. Timperley, Siqing Sun and Darcy van Eerten

Chemistry and diplomacy

https://doi.org/10.1515/pac-2018-0902

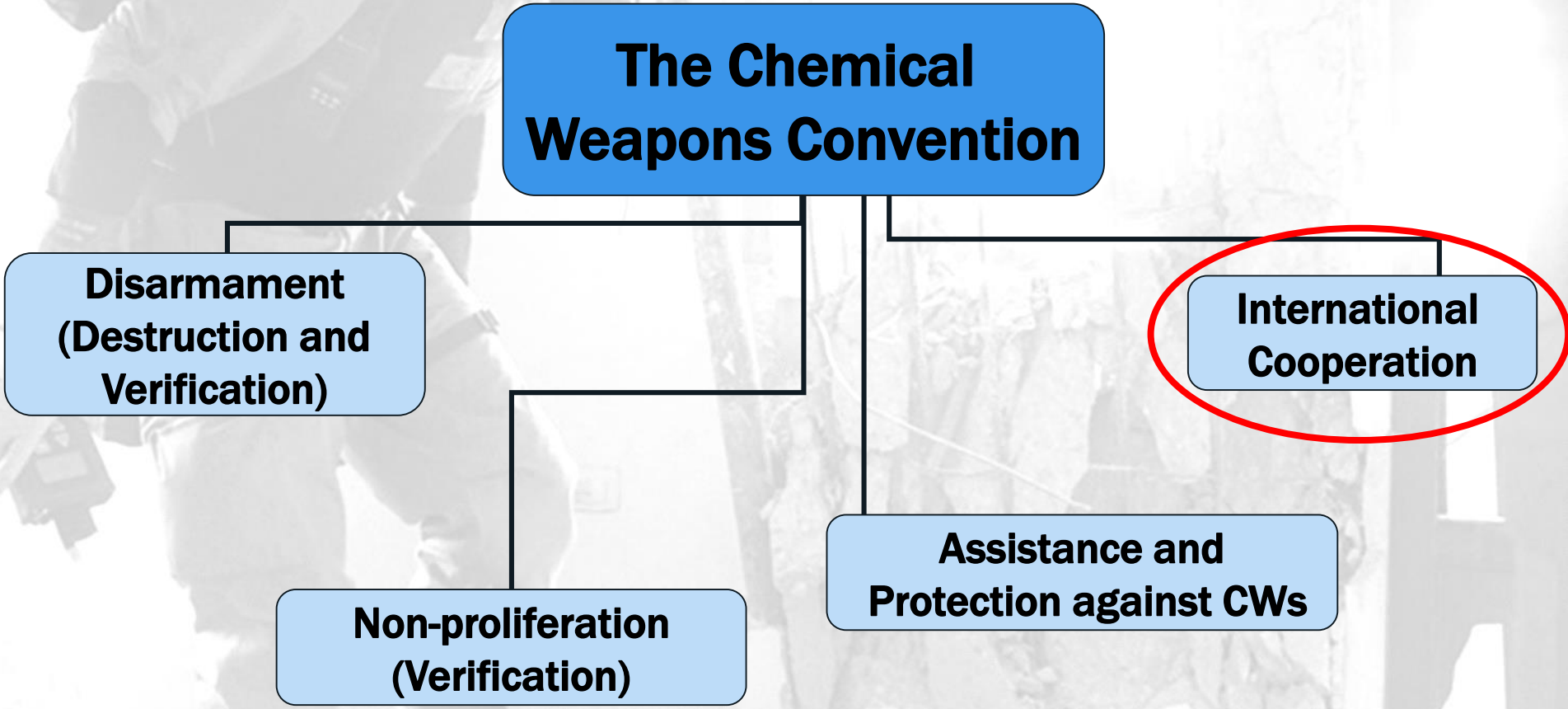
Abstract: The Chemical Weapons Convention is a science-based international treaty for the disarmament and non-proliferation of chemical weapons. The Organisation for the Prohibition of Chemical Weapons (OPCW) serves as its implementing body. The treaty bans chemicals weapons, includes a verification mechanism to monitor compliance, and requires scientific and technical expertise for effective implementation. This necessitates a continuous engagement with scientific communities, whether informal or institutionalized (as demonstrated by the Designated Laboratories, Validation Group, and Scientific Advisory Board (SAB), of the OPCW), to ensure operation of the treaty keeps pace with scientific advances, and that enabling opportunities to meet challenges through scientific advances can be seized. The effective use of science for treaty implementation demands scientific literacy for decision making. Herein, the Convention, its scientific basis, need for scientific expertise, and mechanisms through which the OPCW engages scientists, are described. The function of the OPCW SAB, its review of science and technology to advise disarmament and non-proliferation policymakers, and its role in raising awareness of science within the world of international diplomacy, are reviewed.



Scientific Advisory Board 2018

(As of 11 July 2018)

Implementing the Convention



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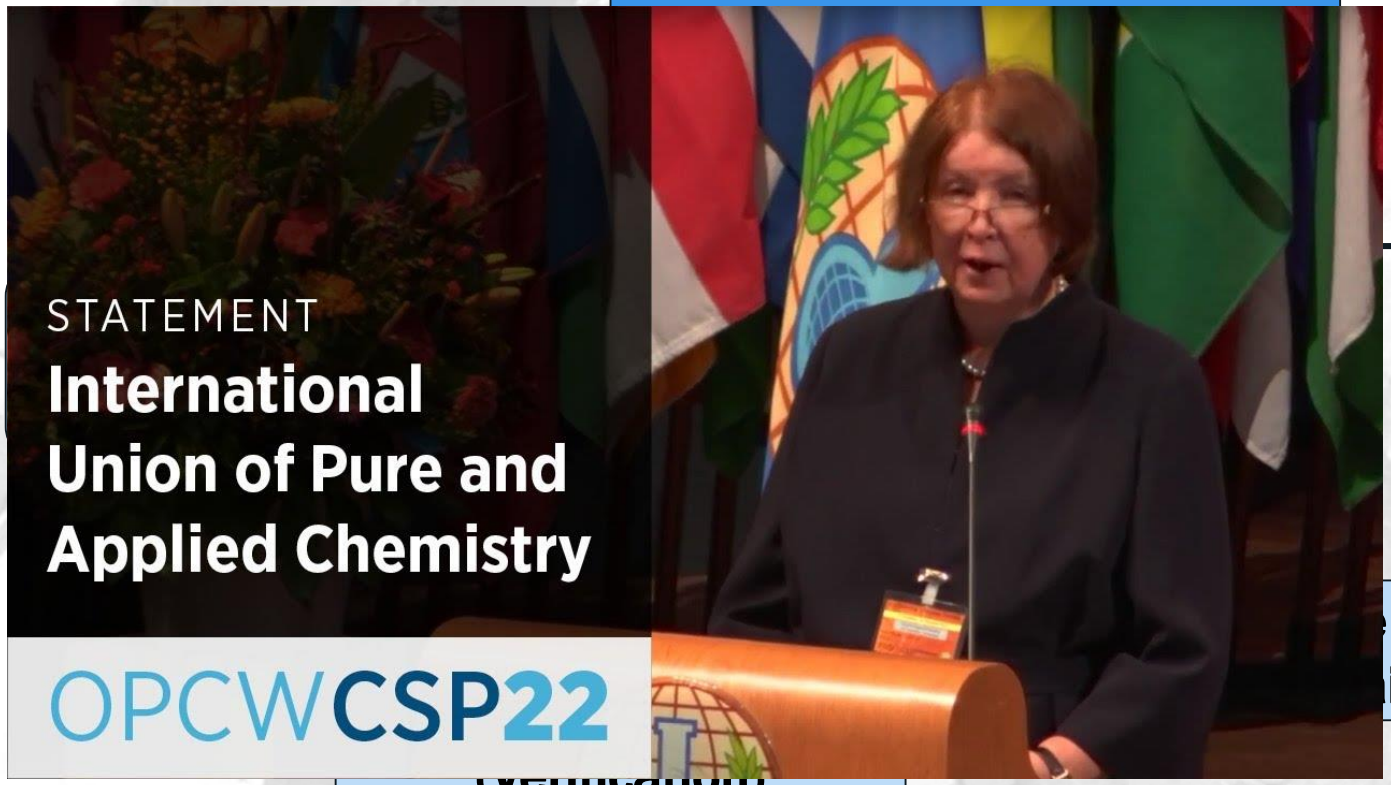

International Cooperation

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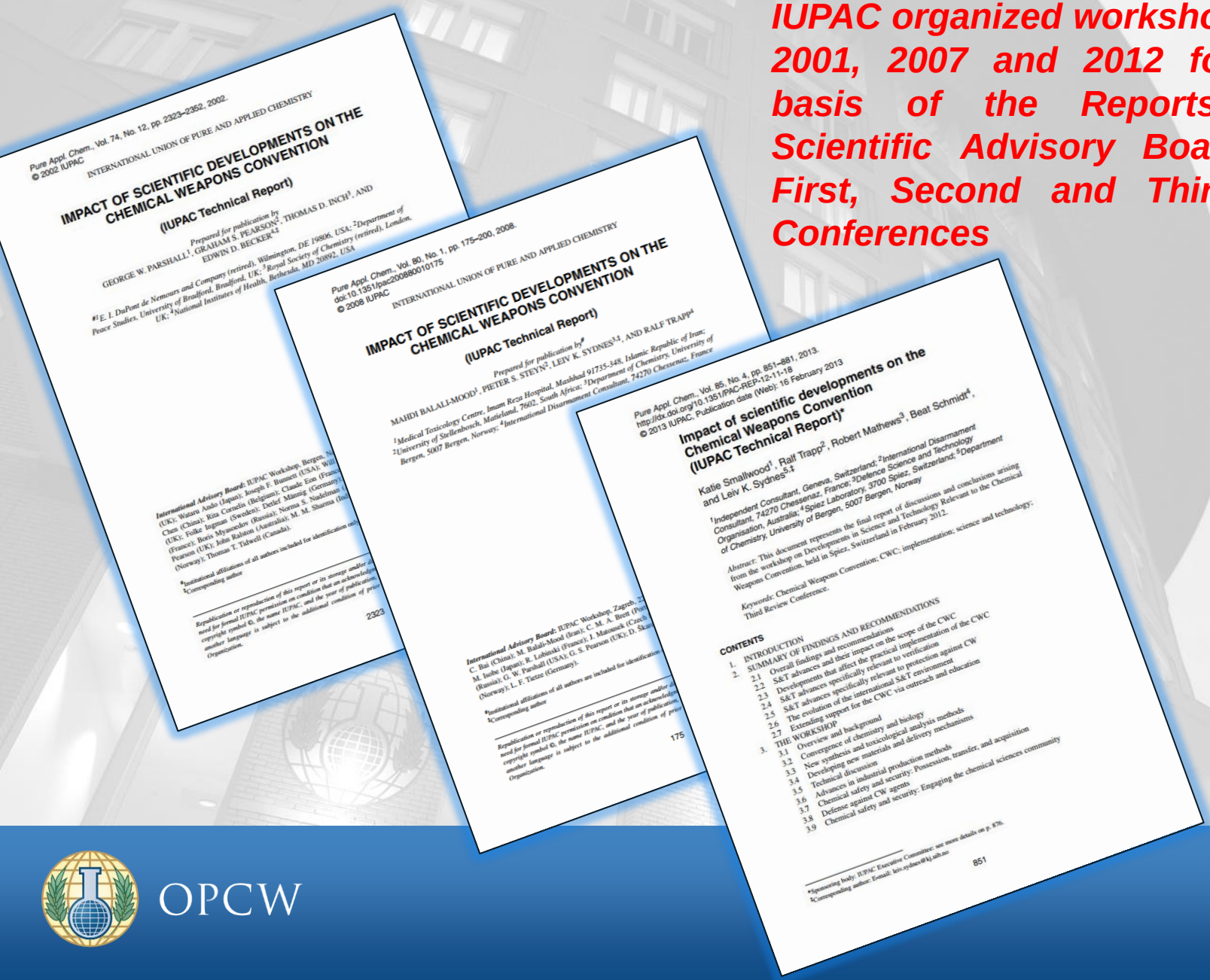
Implementing the Convention

IUPAC and OPCW Collaboration Predates the MoU!

IUPAC organized workshops held in 2001, 2007 and 2012 formed the basis of the Reports of the Scientific Advisory Board to the First, Second and Third Review Conferences



Pure Appl. Chem., Vol. 74, No. 12, pp. 2323–2352, 2002.
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INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

IMPACT OF SCIENTIFIC DEVELOPMENTS ON THE CHEMICAL WEAPONS CONVENTION
(IUPAC Technical Report)

Prepared for publication by
GEORGE W. PARSHALL[1], GRAHAM S. PEARSON[2], THOMAS D. INCH[3], AND EDWIN D. BECKER[4‡]

#[1]E. I. DuPont de Nemours and Company (retired), Wilmington, DE 19806, USA; [2]Department of Peace Studies, University of Bradford, Bradford, UK; [3]Royal Society of Chemistry (retired), London, UK; [4]National Institutes of Health, Bethesda, MD 20892, USA

Pure Appl. Chem., Vol. 80, No. 1, pp. 175–200, 2008.
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INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

IMPACT OF SCIENTIFIC DEVELOPMENTS ON THE CHEMICAL WEAPONS CONVENTION
(IUPAC Technical Report)

Prepared for publication by#
MAHDI BALALI-MOOD[1], PIETER S. STEYN[2], LEIV K. SYDNES[3,‡], AND RALF TRAPP[4]

[1]Medical Toxicology Centre, Imam Reza Hospital, Mashhad 91735-348, Islamic Republic of Iran; [2]University of Stellenbosch, Matieland, 7602, South Africa; [3]Department of Chemistry, University of Bergen, 5007 Bergen, Norway; [4]International Disarmament Consultant, 74270 Chessenaz, France

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Publication date (Web): 16 February 2013
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Impact of scientific developments on the Chemical Weapons Convention (IUPAC Technical Report)*

Katie Smallwood[1], Ralf Trapp[2], Robert Mathews[3], Beat Schmidt[4], and Leiv K. Sydnes[5,‡]

[1]Independent Consultant, Geneva, Switzerland; [2]International Disarmament Consultant, 74270 Chessenaz, France; [3]Defence Science and Technology Organisation, Australia; [4]Spiez Laboratory, 3700 Spiez, Switzerland; [5]Department of Chemistry, University of Bergen, 5007 Bergen, Norway

Abstract: This document represents the final report of discussions and conclusions arising from the workshop on Developments in Science and Technology Relevant to the Chemical Weapons Convention, held in Spiez, Switzerland in February 2012.

Keywords: Chemical Weapons Convention; CWC; implementation; science and technology; Third Review Conference.

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2. SUMMARY OF FINDINGS AND RECOMMENDATIONS
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   2.2 S&T advances and their impact on the scope of the CWC
   2.3 Developments that affect the practical implementation of the CWC
   2.4 S&T advances specifically relevant to verification
   2.5 S&T advances specifically relevant to protection against CW
   2.6 The evolution of the international S&T environment
   2.7 Extending support for the CWC via outreach and education
3. THE WORKSHOP
   3.1 Overview and background
   3.2 Convergence of chemistry and biology
   3.3 New synthesis and toxicological analysis methods
   3.4 Developing new materials and delivery mechanisms
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   3.6 Advances in industrial production methods
   3.7 Chemical safety and security: Possession, transfer, and acquisition
   3.8 Defense against CW agents
   3.9 Chemical safety and security: Engaging the chemical sciences community

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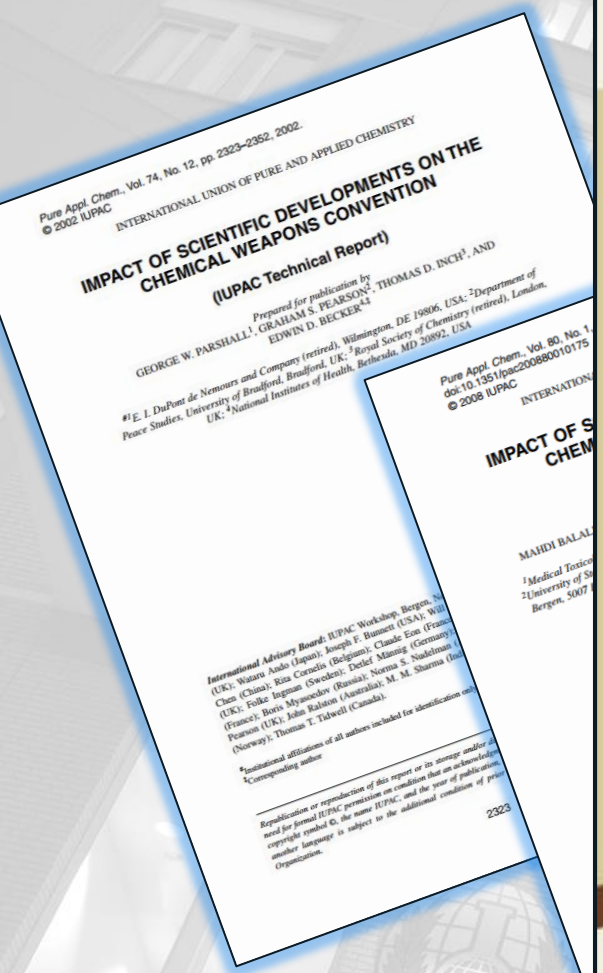
IUPAC and OPCW Collaboration Predates the MoU!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INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

IMPACT OF SCIENTIFIC DEVELOPMENTS ON THE CHEMICAL WEAPONS CONVENTION

(IUPAC Technical Report)

Prepared for publication by

GEORGE W. PARSHALL[1], GRAHAM S. PEARSON[2], THOMAS D. INCH[3], AND EDWIN D. BECKER[4]

#[1]E. I. DuPont de Nemours and Company (retired), Wilmington, DE 19806, USA; [2]Department of Peace Studies, University of Bradford, Bradford, UK; [3]Royal Society of Chemistry (retired), London, UK; [4]National Institutes of Health, Bethesda, MD 20892, USA

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Meeting Participation and Support

GREEN CHEMISTRY

17 to 21 August 2014

Durban, South Africa

2014

5th International IUPAC Conference on Green Chemi

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UNIVERSITY OF KWAZULU-NATAL
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100th anniversary
South African Chemical Institute
1912-2012

University of Venda

5th IUPAC International Conference on Green Chemistry ~ 2014

OPCW EVENTS

Wednesday 20 August

Plenary Lecture: Educating for a Sustainable and Secure Planet Peter Mahaffy — Great Ilanga Room	8:30
Keynote: Green Chemistry Education in Africa Engida Temechegn — Suites 1-3	9:30

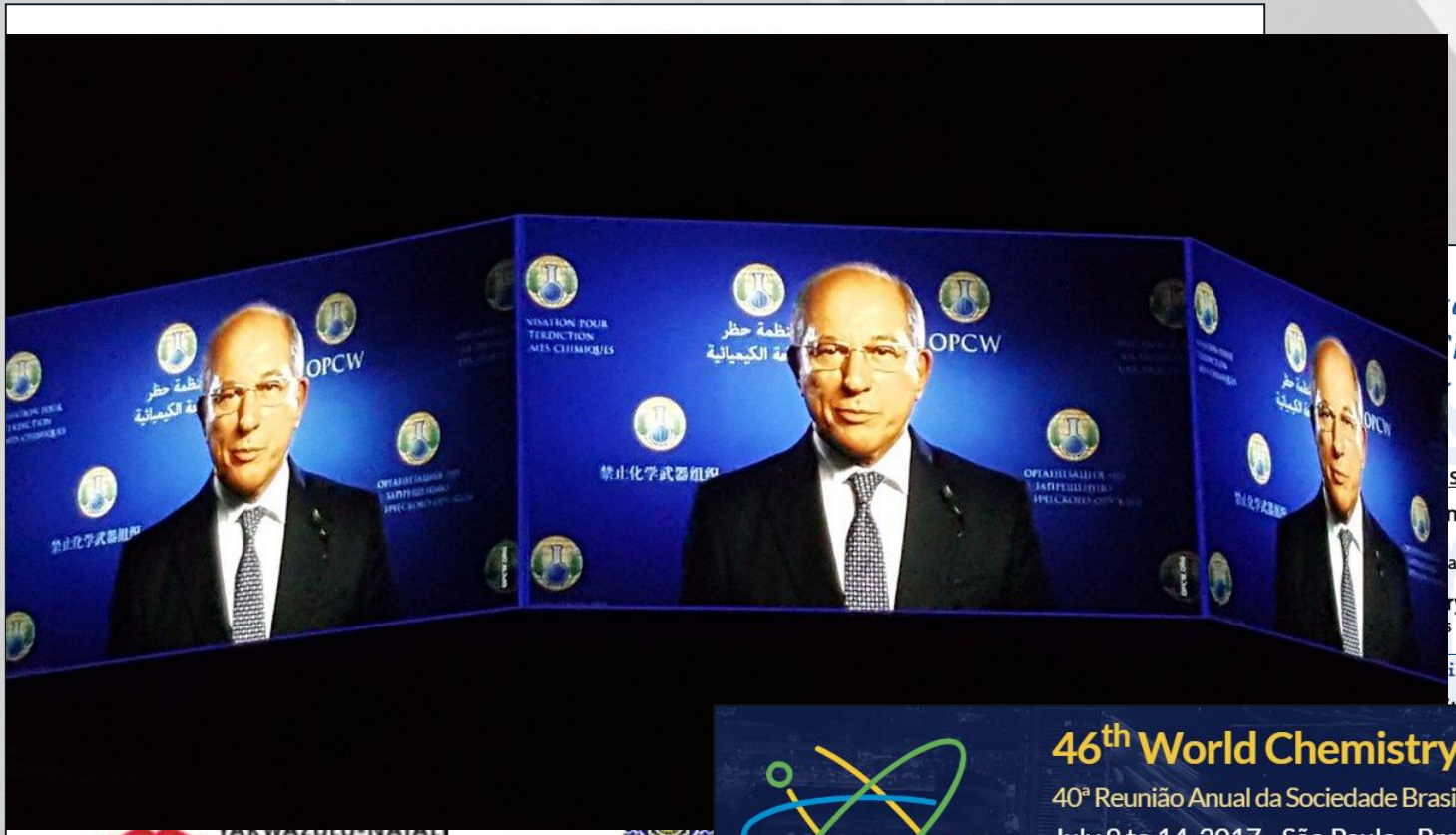
OPCW Sustainability & Security Symposium

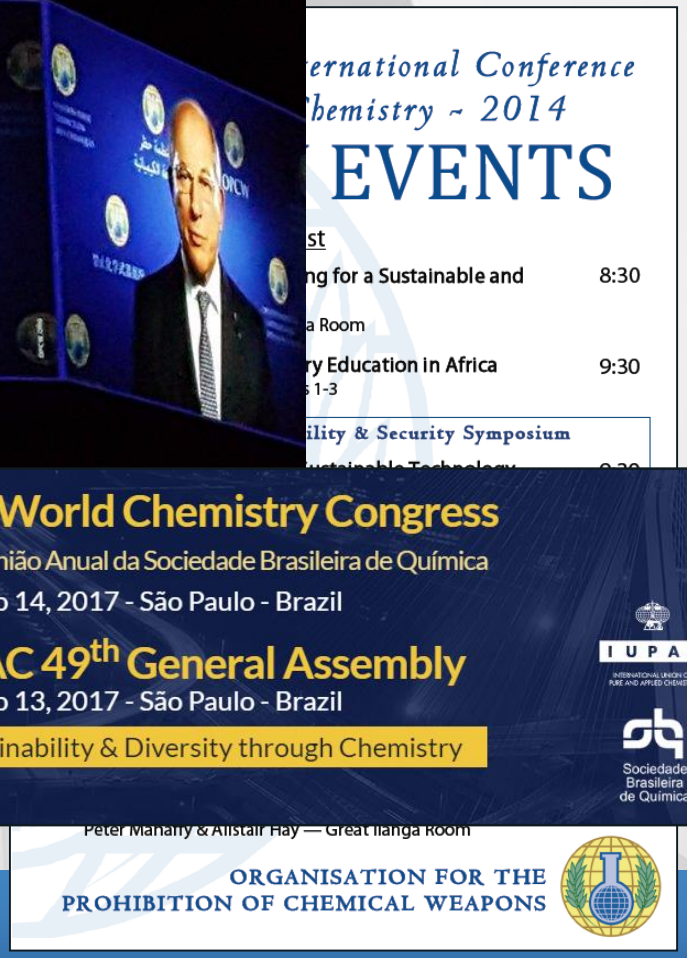
Security Dimensions of Sustainable Technology Development Jonathan E. Forman — Great Ilanga Room	9:30
A Three-Legged Stool: IUPAC and OPCW Working Together to Promote Sustainability and Security Peter Mahaffy & Alistair Hay — Great Ilanga Room	9:45
Sustainability, Security and Ethics Liliana Mammino — Great Ilanga Room	10:00
OPCW Capacity Building Programmes for the Peaceful and Sustainable Applications of Chemistry Sergey Zinoviev — Great Ilanga Room	10:15

Workshop: Multiple Uses of Chemicals Peter Mahaffy & Alistair Hay — Great Ilanga Room	13:30

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Meeting Participation and Support





Meeting Participation and Support

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Technical Secretariat

S/1649/2018
10 July 2018
ENGLISH only

NOTE BY THE TECHNICAL SECRETARIAT

INVITATION TO APPLY FOR A FORUM ON THE PEACEFUL USES OF CHEMISTRY: POTENTIAL CONTRIBUTION OF THE OPCW TO THE ACHIEVEMENT OF THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS
THE HAGUE, THE NETHERLANDS
26 OCTOBER 2018

Purpose of the forum

1. The Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons (hereinafter "the Secretariat") wishes to inform Member States that it is organising a forum on the p
contribution of the OPCW t
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be held at the OPCW Headqua

2. The forum is open to governm
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3. The overall objective of the
international cooperation and
United Nations Sustainable D
strategic objectives:

(a) presenting and discus
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(b) discussing the synergi
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(c) identifying potential pa
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(d) exploring opportunities
the Article XI portfolio

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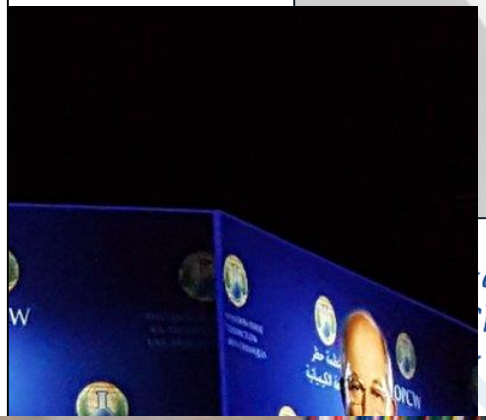

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Committees and Working Groups

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WHO WE ARE | WHAT WE DO | EVENTS | PROJECTS | NEWS

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- OUR HISTORY
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- ORGANIZATIONAL CHART
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- COMMITTEES
- GOVERNANCE
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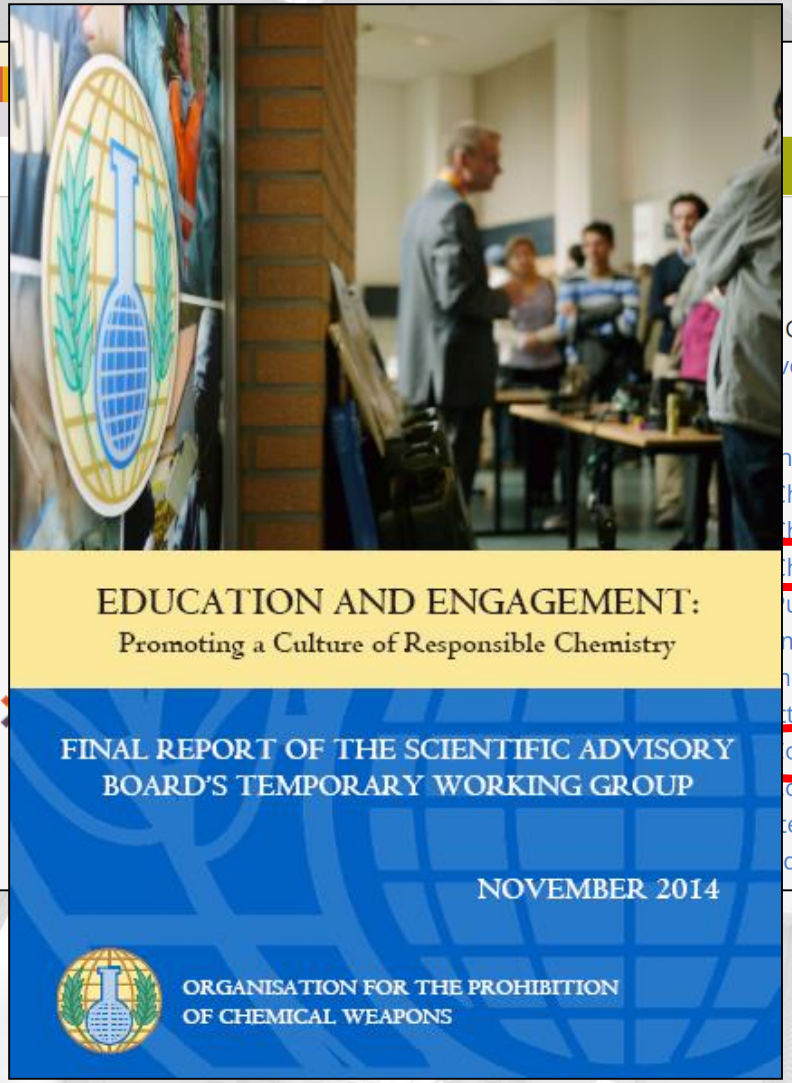
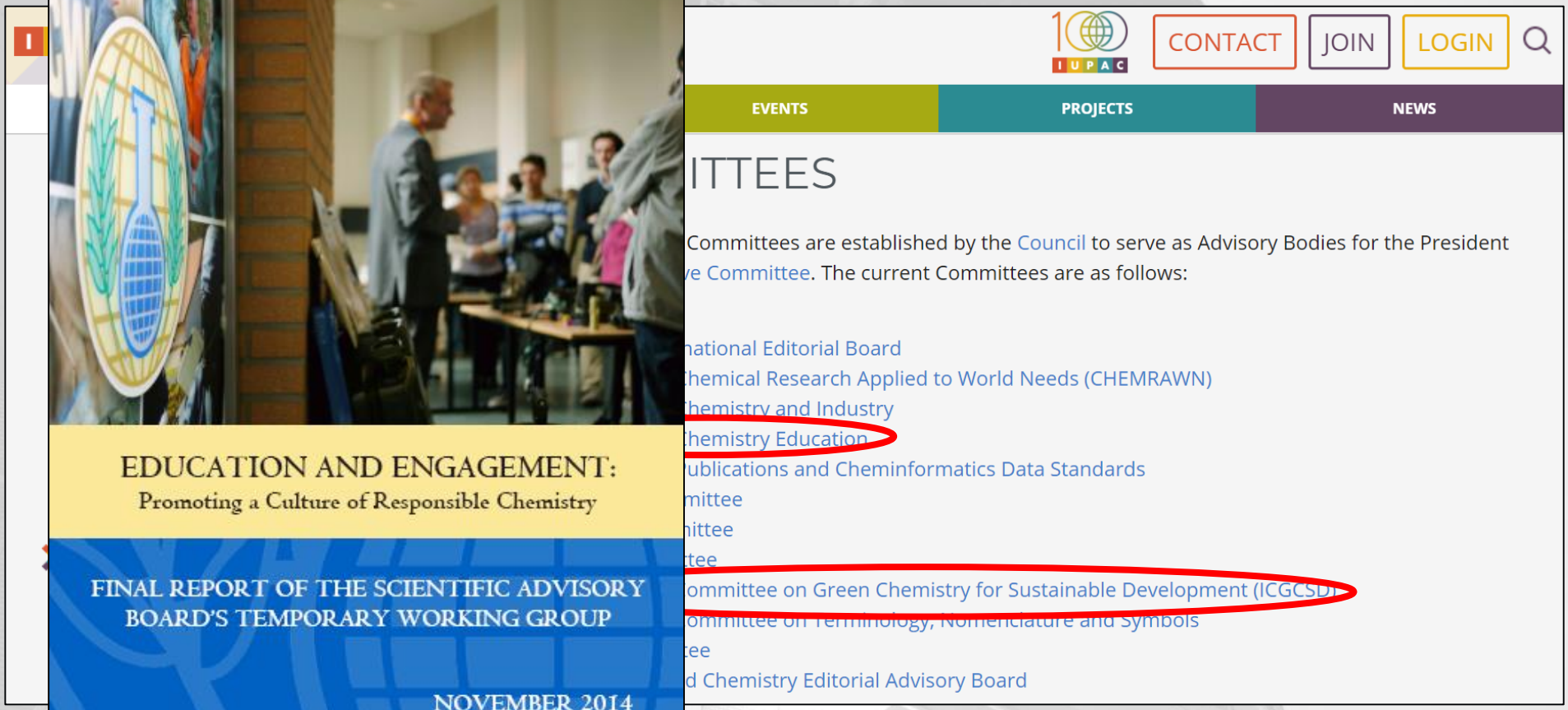
COMMITTEES

IUPAC Standing Committees are established by the Council to serve as Advisory Bodies for the President and the Executive Committee. The current Committees are as follows:

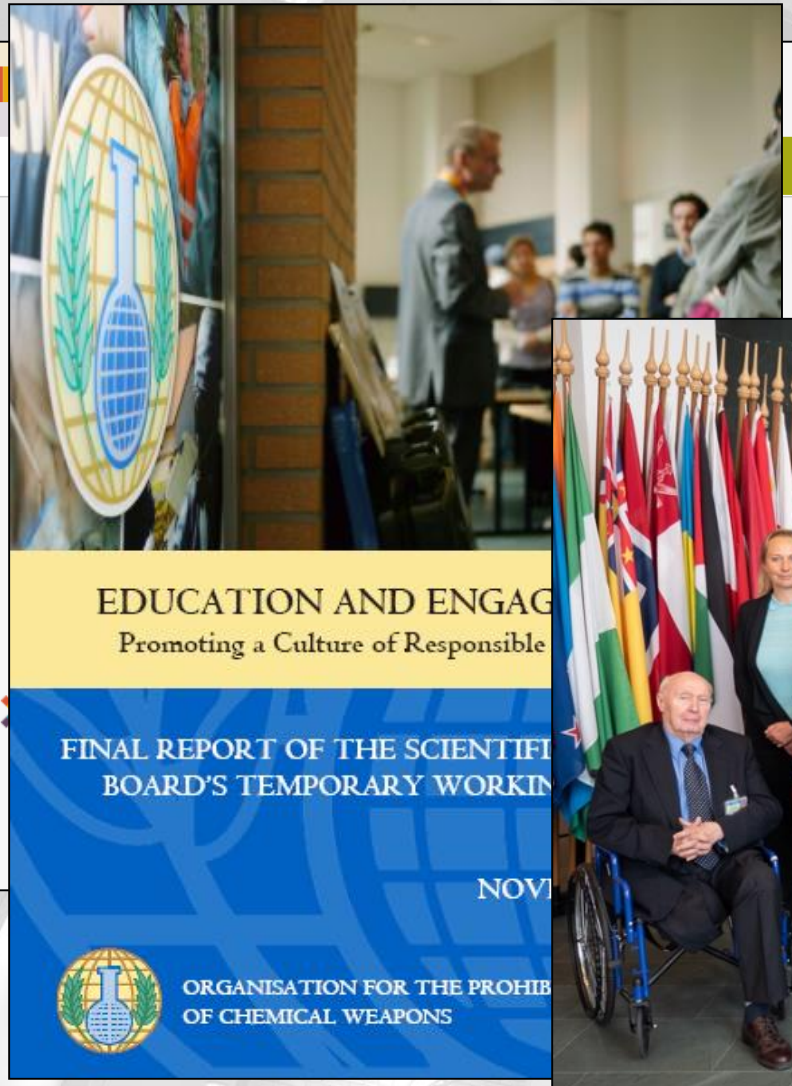
Bureau
Chemistry International Editorial Board
Committee on Chemical Research Applied to World Needs (CHEMRAWN)
Committee on Chemistry and Industry
Committee on Chemistry Education
Committee on Publications and Cheminformatics Data Standards
Evaluation Committee
Executive Committee
Finance Committee
Interdivisional Committee on Green Chemistry for Sustainable Development (ICGCSD)
Interdivisional Committee on Terminology, Nomenclature and Symbols
Project Committee
Pure and Applied Chemistry Editorial Advisory Board

Committees and Working Groups





Committees and Working Groups



IUPAC is a permanent observer to the ABEO

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Promoting OPCW in Scientific Literature

CCCE Members | ConfChem Archive | Newsletter Archive | Archives | ConfChem and Newsletter Discussion Protocols

DivCHED CCCE: Committee on Computers in Chemical Education

Home

2016 Spring ConfChem: Science, Disarmament, and Diplomacy in Chemical Education: The Example of the Organisation for the Prohibition of Chemical Weapons

05/02/16 to 07/01/16

Science plays a critical role in international disarmament policy and diplomacy; informing the negotiations of international agreements, and underpinning their articles and implementation. Of relevance to the science of chemistry, the disarmament of chemical weapons provides an opportunity to introduce students to the nexus of science and international diplomacy.

An international disarmament treaty banning chemical weapons, the Chemical Weapons Convention (CWC), has been in force since 1997. The treaty has 192 States Parties (the governments that have agreed to uphold the norms and obligations required by the treaty) and is implemented by the Organisation for the Prohibition of Chemical Weapons (OPCW); an international organization located in The Hague in the Netherlands and the recipient of the 2013 Nobel Peace Prize for its efforts in chemical disarmament.

The OPCW has existed since 1997 and has overseen the destruction of more than 90% of the world's declared military stockpiles of chemical weapons. The CWC is the most widely subscribed disarmament treaty in history. But the organization has not been widely recognized outside disarmament-focused diplomatic circles. This is in spite of the fact that the science of chemistry is an integral part of the CWC and the work of the OPCW, requiring that the organization interact with the greater chemistry community. In order to achieve its goals in the future, the OPCW will need to up its game in this area, reaching out to new stakeholders and strengthening its ties with its existing partners. To this end, the OPCW has been placing an increasing priority on education and engagement to raise awareness of its work and the contributions both from and to science in chemical disarmament.

This ConfChem Online Conference is designed to highlight the work of the OPCW and the important contribution of scientists and educators to achieving its goals, the science that underpins the Chemical Weapons Convention, and how scientific and technological advances will help to better implement the Convention in the future.

Papers and Discussion Schedule

May 2-6: **Education, outreach and the OPCW: growing partnerships for a global ban**
May 9-13 **Education and Engagement: Key Elements to Achieve a World Free of Chemical Weapons**
May 16-20 **Mainstreaming Multiple Uses of Chemicals in Chemistry Teacher Education Programs of Africa**
May 23-27 **The project Irresistible: Introducing Responsible Research and Innovation into the Secondary School Classroom**
May 30-June 3: **Citizen Science and International Collaboration through Environmental Monitoring with Simple Chemical Sensors**
June 6-10: **Painful chemistry! From barbeque smoke to riot control**
June 13-17: **Sampling and Analysis of Organophosphorus Nerve Agents: Analytical Chemistry in International Chemical Disarmament**

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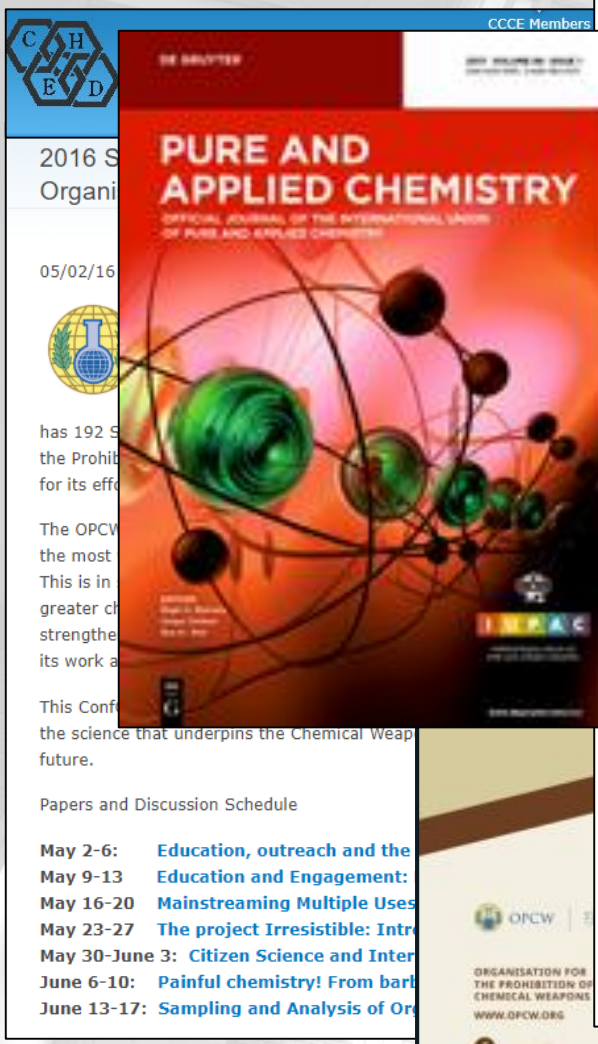

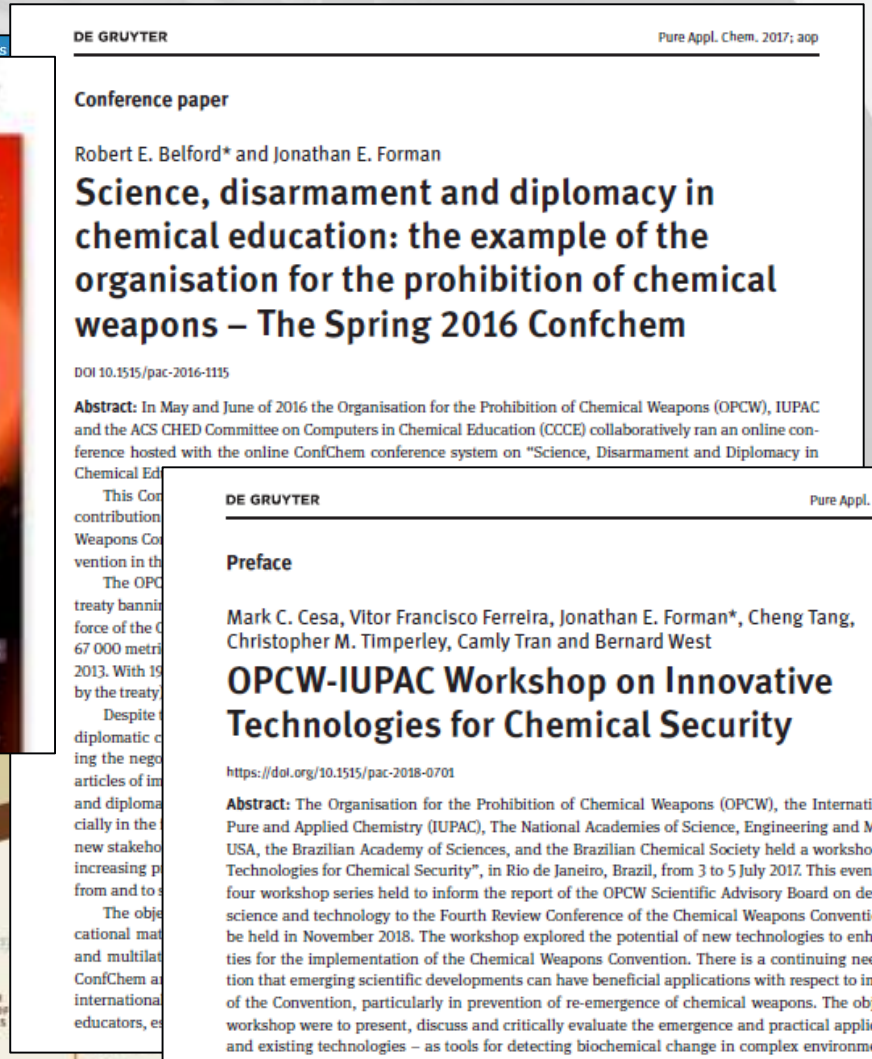

DE GRUYTER Pure Appl. Chem. 2017; aop

Conference paper

Robert E. Belford* and Jonathan E. Forman

Science, disarmament and diplomacy in chemical education: the example of the organisation for the prohibition of chemical weapons – The Spring 2016 Confchem

DOI 10.1515/pac-2016-1115

Abstract: In May and June of 2016 the Organisation for the Prohibition of Chemical Weapons (OPCW), IUPAC and the ACS CHED Committee on Computers in Chemical Education (CCCE) collaboratively ran an online conference hosted with the online ConfChem conference system on "Science, Disarmament and Diplomacy in Chemical Ed

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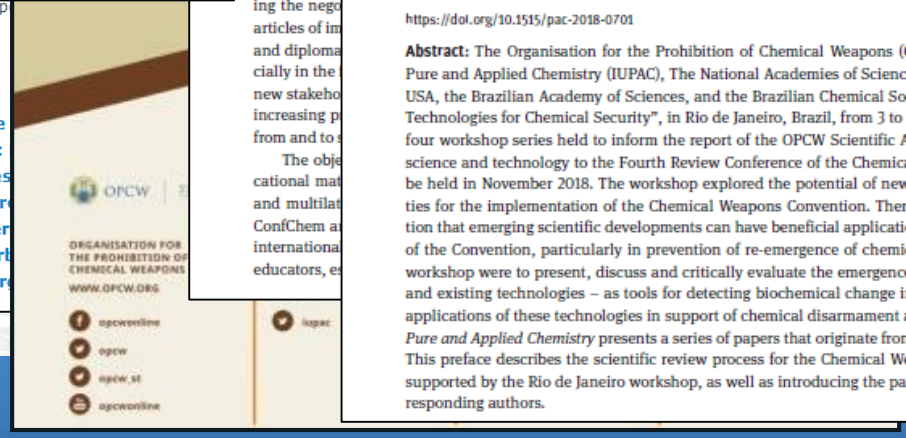

DE GRUYTER Pure Appl. Chem. 2018; aop

Preface

Mark C. Cesa, Vitor Francisco Ferreira, Jonathan E. Forman*, Cheng Tang, Christopher M. Timperley, Camly Tran and Bernard West

OPCW-IUPAC Workshop on Innovative Technologies for Chemical Security

https://doi.org/10.1515/pac-2018-0701

Abstract: The Organisation for the Prohibition of Chemical Weapons (OPCW), the International Union of Pure and Applied Chemistry (IUPAC), The National Academies of Science, Engineering and Medicine of the USA, the Brazilian Academy of Sciences, and the Brazilian Chemical Society held a workshop. "Innovative Technologies for Chemical Security", in Rio de Janeiro, Brazil, from 3 to 5 July 2017. This event was part of a four workshop series held to inform the report of the OPCW Scientific Advisory Board on developments in science and technology to the Fourth Review Conference of the Chemical Weapons Convention, which will be held in November 2018. The workshop explored the potential of new technologies to enhance capabilities for the implementation of the Chemical Weapons Convention. There is a continuing need for recognition that emerging scientific developments can have beneficial applications with respect to implementation of the Convention, particularly in prevention of re-emergence of chemical weapons. The objectives of this workshop were to present, discuss and critically evaluate the emergence and practical applications of new and existing technologies – as tools for detecting biochemical change in complex environments – and the applications of these technologies in support of chemical disarmament and chemical security. This issue of *Pure and Applied Chemistry* presents a series of papers that originate from topics discussed in the workshop. This preface describes the scientific review process for the Chemical Weapons Convention and how it was supported by the Rio de Janeiro workshop, as well as introducing the papers in the collection and their corresponding authors.

by

OPCW

Ethical Codes and Guidelines

Pure Appl. Chem., Vol. 78, No. 11, pp. 2169–2192, 2006.
doi:10.1351/pac200678112169
© 2006 IUPAC

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

COMMITTEE ON CHEMISTRY EDUCATION*

EDUCATION, OUTREACH, AND CODES OF CONDUCT TO FURTHER THE NORMS AND OBLIGATIONS OF THE CHEMICAL WEAPONS CONVENTION

(IUPAC Technical Report)

Prepared for publication by
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The 2005 Oxford Workshop leading to this technical report was organized by OPCW's R. Trapp and members of IUPAC Project 2004-048-1-020 (a joint OPCW/IUPAC Project on Education and Outreach regarding Chemical Weapons) P. W. Atkins (UK); E. D. Becker (USA); L. K. Sydnes (Norway); and N. P. Tarasova (Russia).

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OPCW

Ethical Codes and Guidelines

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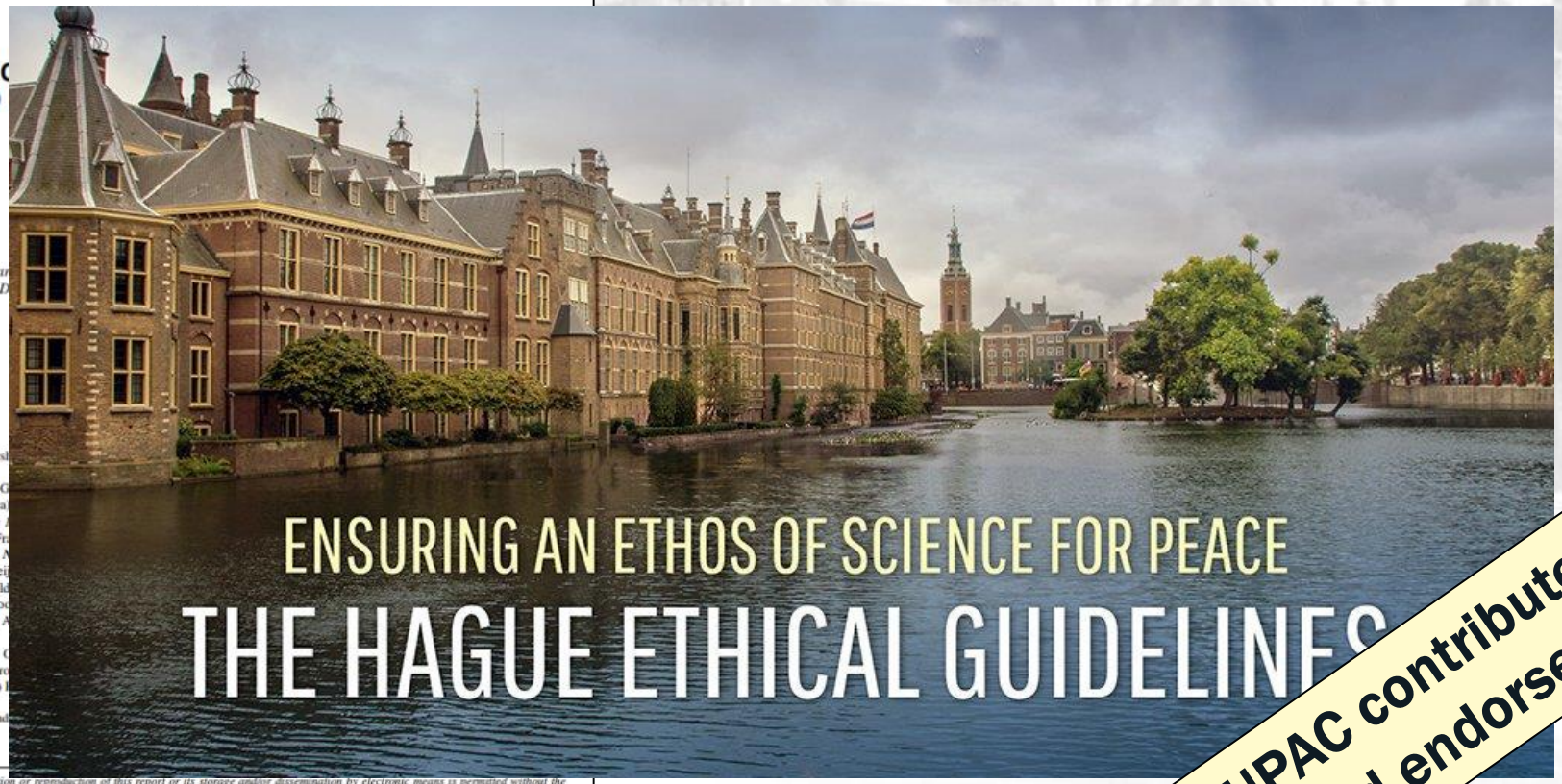

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IUPAC | INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY > LATEST IUPAC NEWS > ANNOUNCEMENTS > IUPAC AND THE ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS TAKE PARTNERSHIP TO NEW LEVEL

RECENT POSTS

- On the revision of the International System of Units
- Launch of the 2019 International Year of the Periodic Table of Chemical Elements
- On the discovery of new elements
- eTOC Alert 'Chemistry International' – Oct-Dec 2018
- OPCW to Further Enhance Contributions to United Nations' Sustainable Development Goals

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IUPAC AND THE ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS TAKE PARTNERSHIP TO NEW LEVEL

1 December 2016

The Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW), Ambassador Ahmet Üzümcü, and IUPAC President Professor Natalia Tarasova, signed a Memorandum of Understanding (MOU) today pledging to enhance cooperation to keep abreast of developments in chemistry, responsibility and ethics in science, and education and outreach.

OPCW Director-General Ahmet Üzümcü (right) and IUPAC President Natalia Tarasova signed a MOU pledging to enhance cooperation to keep abreast of developments in chemistry, responsibility and ethics in science, and education and outreach. (1 Dec 2016)

Ambassador Üzümcü remarked, "Promoting responsible science is a crucial endeavour to advance the goals of the Chemical Weapons Convention. Without scientists, there is no disarmament. IUPAC's unwavering commitment to a world permanently free of chemical weapons demonstrates the strength of this norm and the conviction of chemistry researchers and practitioners globally to protect it".

Professor Tarasova expressed, "Through the cooperation between our organisations, we look to help humanity achieve Sustainable Development Goals in a world free of chemical weapons and in a world in which achievements in chemical science and technology are used only for the benefit of humankind and the environment".

The MOU opens a new chapter and underscores the long-standing and productive relationship between the OPCW and IUPAC.

Background

As the implementing body for the Chemical Weapons Convention, the OPCW oversees the global endeavour to permanently eliminate chemical weapons. Since the Convention's entry into force in 1997 – with its 192 States Parties – it is the most successful disarmament treaty eliminating an entire class of weapons of mass destruction

OPCW

IUPAC-OPCW Collaboration

Prof Richard Hartshorn – IUPAC Secretary General
and members of the IUPAC Delegation

IUPAC VISION

IUPAC is an indispensable resource for chemistry.

IUPAC MISSION

The International Union of Pure and Applied Chemistry is the global organization that provides objective scientific expertise and develops the essential tools for the application and communication of chemical knowledge for the benefit of humankind and the world.

IUPAC MISSION

The International Union of Pure and Applied Chemistry accomplishes its mission by

- Fostering sustainable development
- Providing a common language for chemistry
- Advocating the free exchange of scientific information

Two Global Celebrations in 2019

IUPAC

100 YEARS of CREATING A COMMON LANGUAGE FOR CHEMISTRY

UNESCO

United Nations Educational, Scientific and Cultural Organization

2019 IYPT

International Year of the Periodic Table of Chemical Elements

IUPAC in it's First Century

Development of the Language of Chemistry

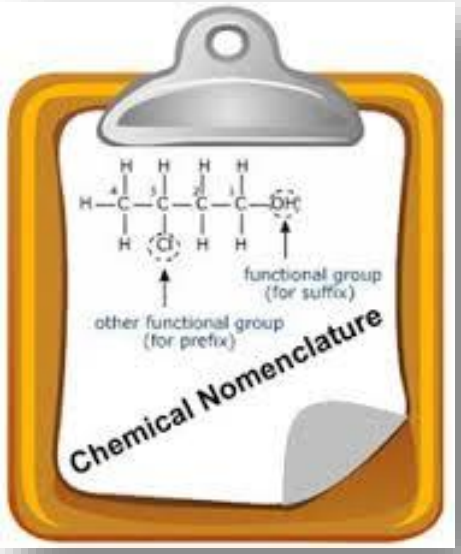
- Nomenclature, Symbols, Terminology

Standardisation of Chemistry Methods

- Data Presentation
- Study of Analytical Methods

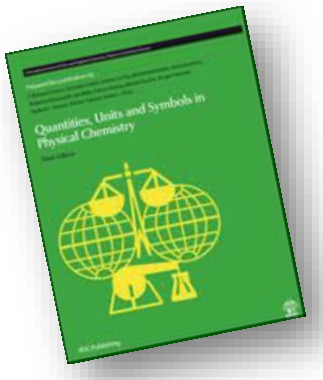
Critical Evaluation of Physico-Chemical Data

- Atomic Weights
- Thermodynamic Data
- Kinetic Data



More IUPAC Activities

- Data Exchange Standards for Computers and Instruments
- Endorsement of International Conferences
  - Biennial IUPAC Congress
  - More than 30 Specialised Symposia each Year
- Chemistry Education
- Industrial Safety and Environmental Programs
- ChemRAWN Conferences addressing Chemistry and World Needs
- ICGCSD Conferences and Summer Schools on Green Chemistry



IUPAC's Color Books

Chemical Terminology	Gold Book
Quantities Units and Symbols in Physical Chemistry	Green Book
Nomenclature in Organic Chemistry	Blue Book
Compendium of Polymer Terminology and Nomenclature	Purple Book
Analytical Terminology	Orange Book
Biochemical Terminology	White Book
Nomenclature in Inorganic Chemistry	Red Book
Compendium of Terminology and Nomenclature of Properties in Clinical Laboratory Science	Silver Book

What Will Our Second Century Look Like?

Big Data and the Rise of Cheminformatics

GO FAIR and the Chemistry Implementation Network (ChIN)

Tools to Support This:

- International Chemical Identifier (InChI and InChIKey)
- Reaction InChI and InChI for Mixtures
- Spectroscopic Data Standards (e.g. JCAMP-DX)

IUPAC-OPCW Collaboration

Prof Ron Weir – President IUPAC Division I

Physical and Biophysical Chemistry

Provides the world standard for clear definitions and meaning of terminology, nomenclature, symbols and units

Encourages compilation and documentation of critically evaluated physical, biophysical, biochemical chemical data including those related to chemical weapons, their detection and disposal

Promote future oriented activities in physical, biophysical, biochemistry chemistry important for sustainable development

IUPAC-OPCW Collaboration

Prof Jan Reedijk – IUPAC Division II
Inorganic Chemistry

IUPAC Division II – Inorganic Chemistry

The Division's **major areas** of focus are (1) *isotopic abundances and atomic weights*; (2) *molecular inorganic chemistry;* and (3) *solid-state inorganic and materials chemistry.*

Commission on Isotopic Abundances and Atomic Weights (CIAAW). *3 Subcommittees*: Isotopic Abundance Measurements; Stable Isotope Reference Material Assessment; Natural Assessment of Fundamental Understanding of Isotopes.

Interactive online version of the Periodic Table has been made and updated, as well as the Periodic Table of Isotopes.

Interdivisional Subcommittee on Materials Chemistry

The Inorganic Chemistry Division is also the body within IUPAC that works with IUPAP on the **verification of claims** for and the naming of **new chemical elements.**

4 New Chemical Elements recognized and named in 2017 (Nh, Mc, Ts, Og)

Even though such new elements have little current applicability, the approval of the discoveries and the naming of new elements is **a highly visible activity for IUPAC** that attracts significant public attention to the IUPAC Periodic Table of the Elements and in general for IUPAC.

In 2019: Celebration of the UN choice: *International Year of the Periodic Table*. See: www.iypt2019.org

IUPAC-OPCW Collaboration

Prof Nikolay Nifantiev – IUPAC Division III
Organic and Biomolecular Chemistry

IUPAC Division III - Organic and Biomolecular Chemistry

Division III could contribute to IUPAC-OPCW collaboration providing advice in :

- Defining criteria for selecting new toxicants and their cataloguing
- Selecting organic compounds for cataloguing as CW
- Selecting CW's metabolites (including bio-adducts) and destruction products for cataloguing
- Selecting potential antidotes that could be used
- Development of CWs destroying protocols and ecological monitoring

IUPAC-OPCW Collaboration

Marloes Peeters – IUPAC Division IV
Polymer Division

Polymer Division (IV)

Polymer: large molecule, composed of many repeating units

Polymer Terminology

-Defining standards : adding IUPAC boxes to Wiki

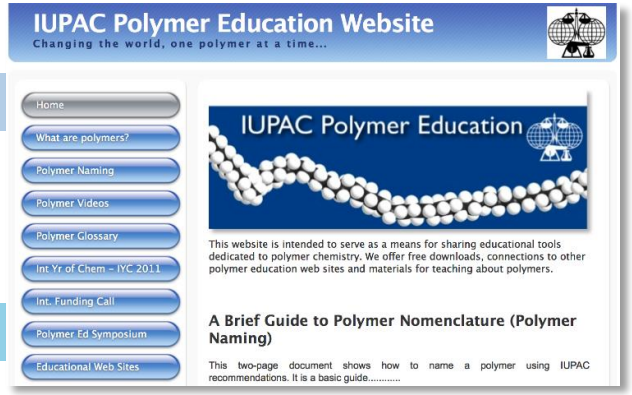
- >75 boxes added, plus concepts defined
- **New project OPCW: terminology / overview sensors**

IUPAC definition

A molecule of high relative molecular mass, the structure of which essentially comprises the multiple repetition of units derived, actually or conceptually, from molecules of low relative molecular mass.[2]

Modeling Polymerization Kinetics and Processes

- Critical paper: How fast is polymerization?
- >500 citations

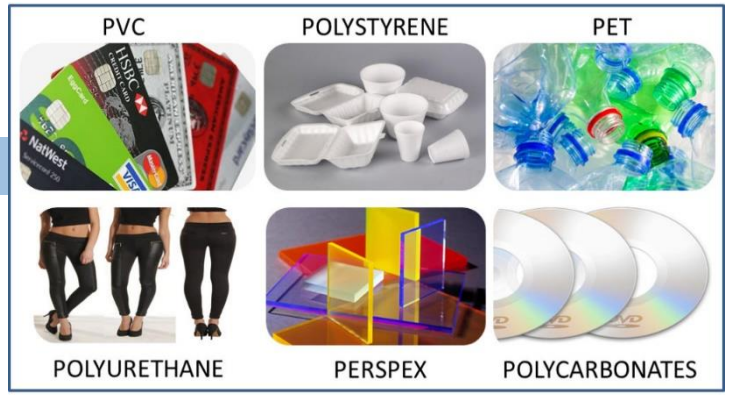


Polymer Education

-Free resources : website (different languages)
-Exchanging best practice

Subcommittee on Properties of Commercial Polymers

- Example projects: biodegradable materials
- Defining standard (ISO) procedures



IUPAC-OPCW Collaboration

Prof Hemda Garelick – IUPAC Division VI
Chemistry and the Environment

IUPAC Division VI - Chemistry and the Environment

We share the vision of OPCW especially on Chemistry for Peace and the sound management of chemicals.

The Division provides authoritative reviews and guidance on the fate, behaviour and risks of chemical compounds in food and the environment. It has an extensive network of experts around the globe.

Collaboration with OPCW should encompass :

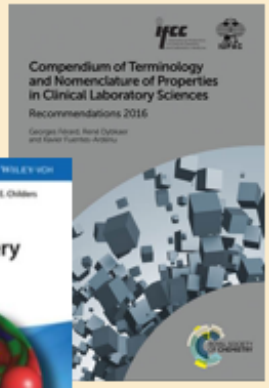
- Risk assessment of chemicals
- The environmental footprints of chemical and radioactive materials/weapons as well as their transformation products – during manufacture and if used.
- Safe disposal of restricted chemicals

IUPAC-OPCW Collaboration

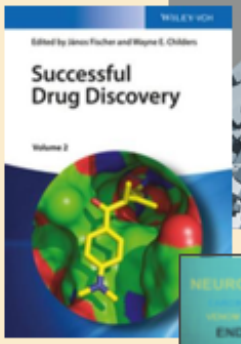
Michael Schwenk – IUPAC Division VII
Chemistry and Human Health

IUPAC Division VII
Chemistry and Human Health

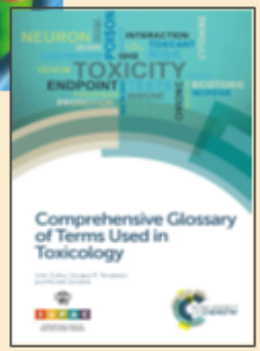
Nomenclature for Properties and Units:
Development of a universal terminology in Clinical Chemistry



Drug Discovery and Development:
International activities to promote the design of novel therapeutic drugs.



Toxicology and Risk Assessment:
Compilation of glossaries as worldwide basis for chemical risk assessment.



Possible Areas for Cooperation with OPCW
Global protection from chemical hazards and ban of chemical weapons.

IUPAC-OPCW Collaboration

Prof Ed Constable – IUPAC Division VIII
Chemical Nomenclature and Structure Representation

IUPAC Division VIII - Nomenclature

Development of unique and interoperable nomenclature for chemical materials

- Unique and unambiguous identification

Interface with databanks for properties through:

- Name
- Computer readable unique descriptor (InChI™ or SMILES)
- Structural formula

IUPAC-OPCW Collaboration

Prof Jan Apotheker – IUPAC CCE
Committee for Chemistry Education

IUPAC Committee on Chemistry Education

Organization of educational researchers and lecturers

- To develop relationships for working collaboratively with groups both inside and outside of IUPAC presentation of the IUPAC activities in the implementation of UN SDGs and of SAICM
- To continue supporting initiatives that raise awareness, social responsibility, and understanding the nature of science as well as of environmental and ethical issues that are related to chemistry;
- To initiate programs on promoting chemistry education and public understanding of chemistry for developing countries;

IUPAC-OPCW Collaboration

Prof Pietro Tundo – IUPAC ICGCSD

Interdivisional Committee on Green Chemistry for Sustainable Development

Interdivisional Committee on Green Chemistry for Sustainable Development, ICGCSD

The Interdivisional Committee initiates, promotes, and coordinates the work of the Union in the area of green and sustainable chemistry.

ICGCSD is responsible for the promulgation of the work of the Union in green and sustainable chemistry through interaction with other relevant international chemical and non-chemical organizations with a common interest.

IUPAC/Green Chemistry and OPCW

Peaceful utilization of Chemistry and the 17UNSDGs

1) Green reagents & Substitution of harmful chemicals
Practical Outcome: reduced needs of inspections

2) Chemical Safety through the Management of Chemicals
Responsible Care – Responsible Utilsation of Chemistry
Metrics, Standardization, LCA, Risk assessment
Regulatory Strategies, Enabling Policies

Practical Outcomes: SELF CONTROL on chemical manufacture

IUPAC-OPCW Collaboration

Prof Anna Makarova – IUPAC COCI
Committee for Chemistry and Industry

IUPAC Committee on Chemistry and Industry

Organization of scientists and a chemical industry collaboration

- development of a **Safety Training Programs** and **training for the implementation Responsible Care Program** (area of interest are developing countries: CEE, Central Asia, Africa)
- presentation of the IUPAC activities in the implementation of UN SDGs and of SAICM
- development together with ICGCSD of systems of criteria, standards, labeling and certification for assessing the compliance of chemical enterprises with the principles of Green Chemistry.

OPCW

Organisation for the Prohibition of Chemical Weapons

United Nations Educational, Scientific and Cultural Organization

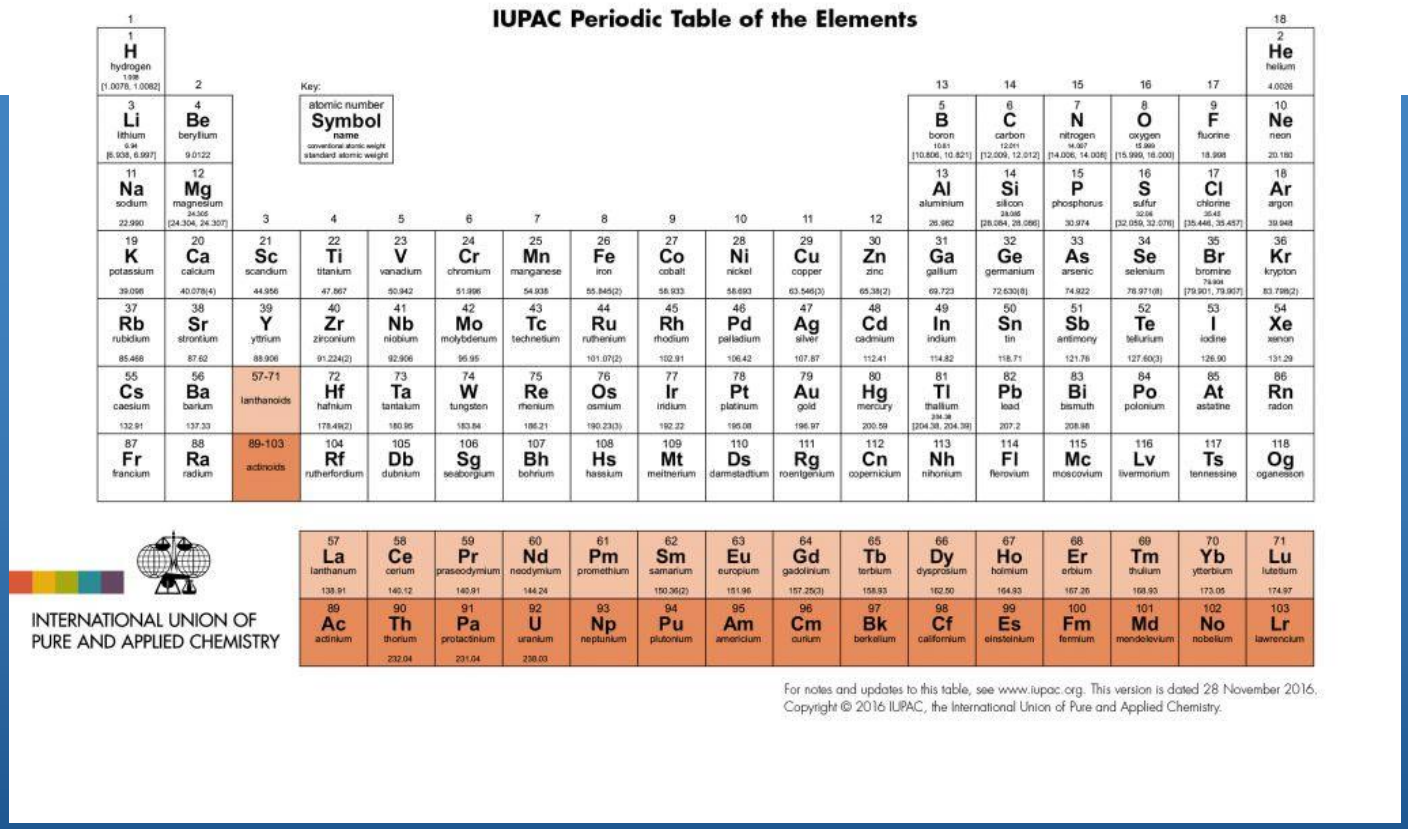
International Year of the Periodic Table of Chemical Elements

International Year of the Periodic Table of Chemical Elements (IYPT) 2019

Jo-Anne Rasmussen PhD, Inspector, Inspectorate Division
Technical Secretariat

21 November 2018

Periodic Table of the Elements

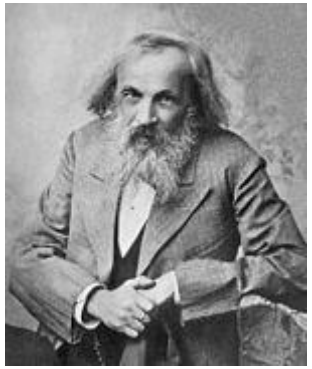


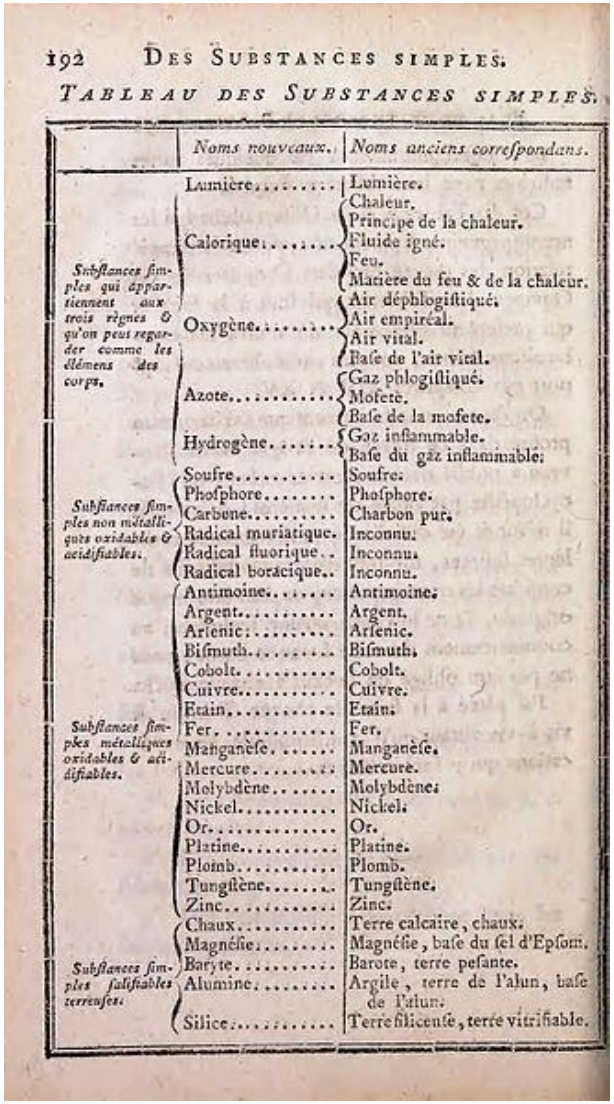
1869 – 2019 (150 Years)

OPCW

History

- The Russian chemist Dmitri Mendeleev was the first scientist to make a periodic table similar to the one used today.
- In 1869, the table was published in an obscure Russian journal and then republished in a German journal, *Zeitschrift für Chemie.*
- Built upon earlier discoveries by scientists such as Antoine-Laurent de Lavoisier and John Newlands, but who is nevertheless generally given sole credit for its development.
- Henry Moseley in 1914 created the new order that was in agreement with the chemical properties of these elements.

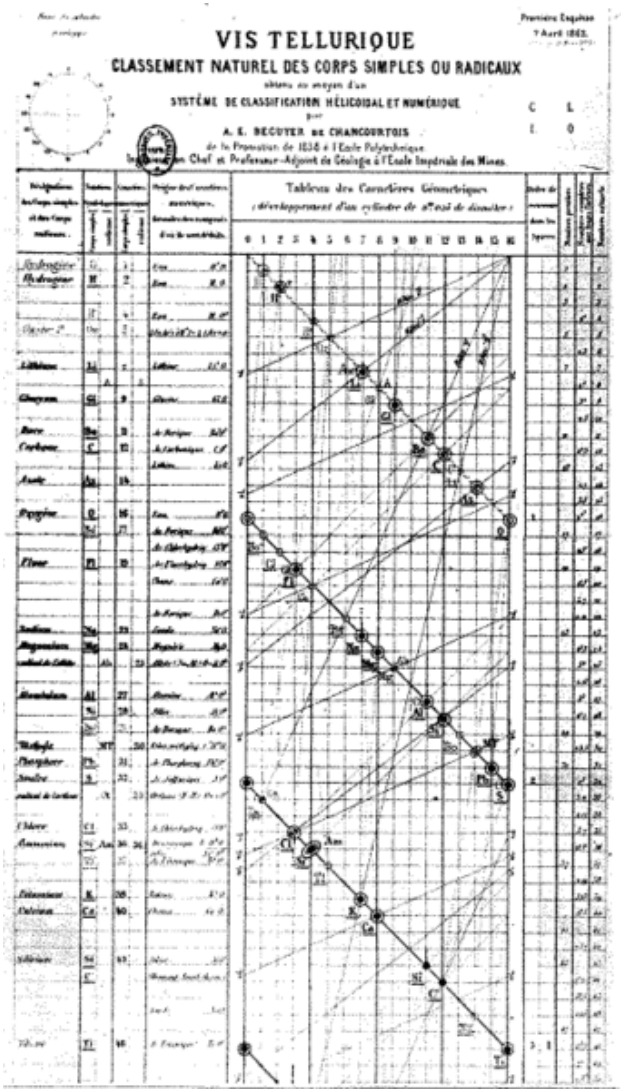


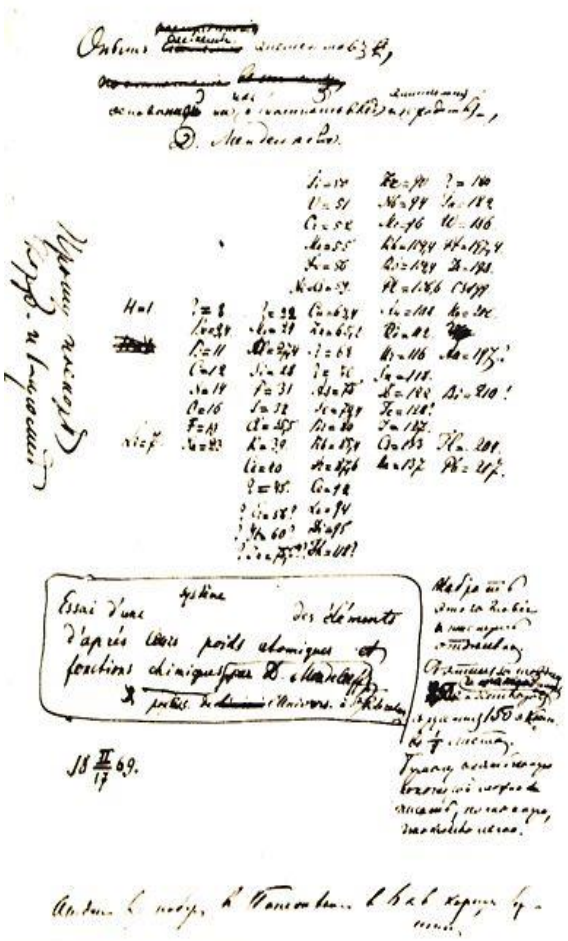


192 DES SUBSTANCES SIMPLES.

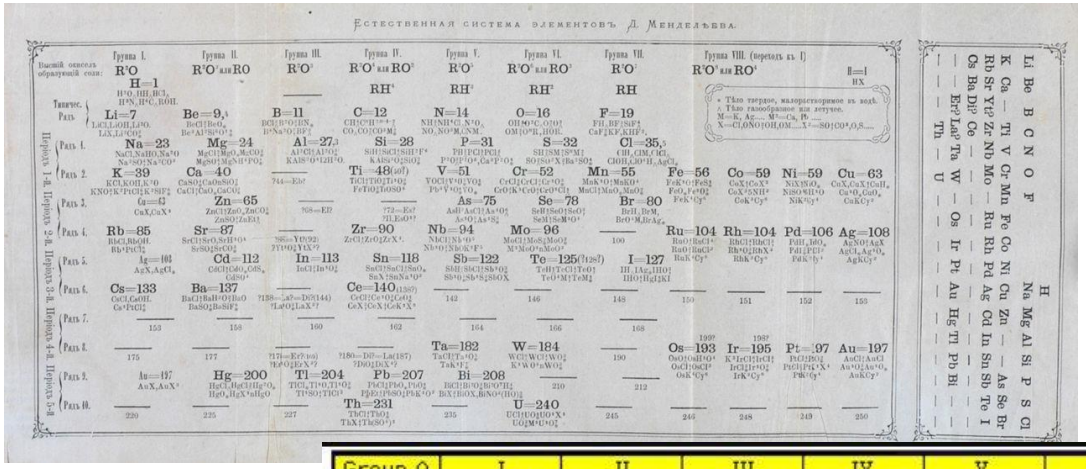
TABLEAU DES SUBSTANCES SIMPLES.

	Noms nouveaux.	Noms anciens correspondans.
Substances simples qui appartiennent aux trois règnes & qu'on peut regarder comme les élémens des corps.	Lumière	Lumière.
	Calorique	Chaleur. Principe de la chaleur. Fluide igné. Feu. Matière du feu & de la chaleur.
	Oxygène	Air déphlogistiqué. Air empiréal. Air vital. Base de l'air vital.
	Azote	Gaz phlogistiqué. Mofete. Base de la mofete.
	Hydrogène	Gaz inflammable. Base du gaz inflammable.
Substances simples non métalliques oxidables & acidifiables.	Soufre	Soufre.
	Phosphore	Phosphore.
	Carbone	Charbon pur.
	Radical muriatique	Inconnu.
	Radical fluorique	Inconnu.
	Radical boracique	Inconnu.
Substances simples métalliques oxidables & acidifiables.	Antimoine	Antimoine.
	Argent	Argent.
	Arsenic	Arsenic.
	Bismuth	Bismuth.
	Cobolt	Cobolt.
	Cuivre	Cuivre.
	Etain	Etain.
	Fer	Fer.
	Manganèse	Manganèse.
	Mercure	Mercure.
	Molybdène	Molybdène.
	Nickel	Nickel.
	Or	Or.
	Platine	Platine.
	Plomb	Plomb.
	Tungstène	Tungstène.
	Zinc	Zinc.
Substances simples salifiables terreuses.	Chaux	Terre calcaire, chaux.
	Magnésie	Magnésie, base du sel d'Epsom.
	Baryte	Barote, terre pesante.
	Alumine	Argile, terre de l'alun, base de l'alun.
	Silice	Terre silicenfe, terre vitrifiable.





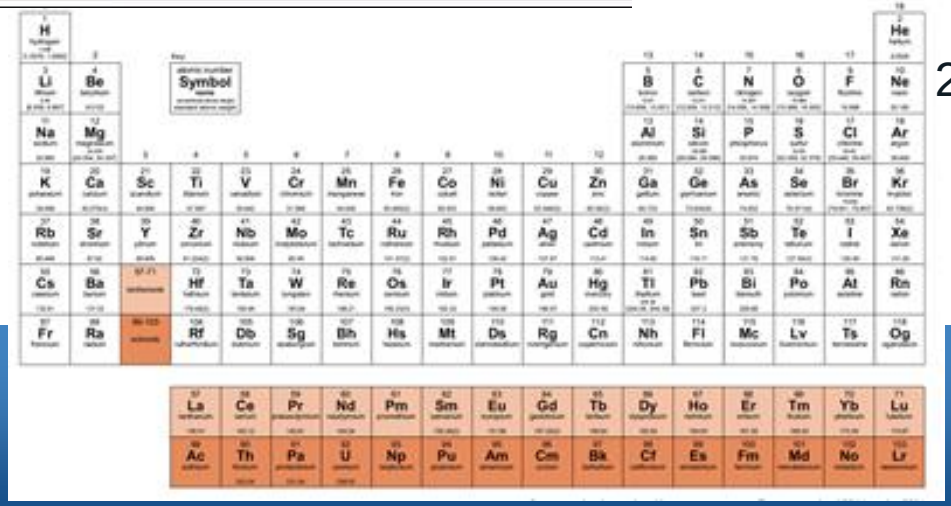
Lavoisier's 'Table of Simple substances' (1789); de Chancourtois' 'Telluric Screw' (1862); Mendeleev's hand-written periodic table (1869)



1871

Group 0	I a	I b	II a	II b	III a	III b	IV a	IV b	V a	V b	VI a	VI b	VII a	VII b	VIII
	H 1														
He 2	Li 3		Be 4		B 5			C 6		N 7		O 8		F 9	
Ne 10	Na 11		Mg 12		Al 13			Si 14		P 15		S 16		Cl 17	
Ar 18	K 19	Cu 29	Ca 20	Zn 30	Sc 21	Ga 31	Ti 22	Ge 32	V 23	As 33	Cr 24	Se 34	Mn 25	Br 35	Fe 26, Co 27, Ni 28
Kr 36	Rb 37	Ag 47	Sr 38	Cd 48	Y 39	In 49	Zr 40	Sn 50	Nb 41	Sb 51	Mo 42	Te 52	–	I 53	Ru 44, Rh 45, Pd 46
Xe 54	Cs 55	Au 79	Ba 56	Hg 80	57-71*	Tl 81	Hf 72	Pb 82	Ta 73	Bi 83	W 74	Po 84	Re 75	–	Os 76, Ir 77, Pt 78
Rn 86	–		Ra 88		Ac 89		Th 90		Pa 91		U 92				

1914



2019

OPCW

Periodic Table of States Parties to the Chemical Weapons Convention

In Honour of the International Year of the Periodic Table of Chemical Elements 2019

LEGEND

- Order of Entry Into Force
- Country Element
- Country Symbol
- Date of Deposit

Example: 1 H — Hydrogen — dd/mm/yyyy

- Western Europe and Other States (WEOG)
- Eastern Europe
- Africa
- Latin America and the Caribbean (GRULAC)
- Asia

1 SE Swedenium 17/06/1992																	2 NO Norwegium 07/04/1994
3 AU Australium 06/05/1994	4 ES Espanium 02/08/1994										5 BG Bulgarium 10/08/1994	6 DE Deutschium 12/08/1994	7 MX Mexicovium 29/08/1994	8 GR Greecium 22/12/1994	9 RO Romanium 15/02/1995	10 FR Franchium 02/03/1995	
11 HR Hrvatskium 23/05/1995	12 MC Monacovium 01/06/1995										13 DZ Algerium 14/08/1995	14 AT Osterreichium 17/08/1995	15 PL Polskovium 22/08/1995	16 JP Japonium 15/09/1995	17 CA Canadium 26/09/1995	18 AR Argentinium 02/10/1995	
19 NA Namibium 24/11/1995	20 IT Italium 08/12/1995	21 CI Côte d'Ivorium 18/12/1995			22 MA Moroccovium 28/12/1995	23 BR Brazilium 13/02/1996	24 GB Britanium 12/05/1996	25 MD Moldovium 08/07/1996	26 PT Portugalium 10/08/1996	27 HU Hungarium 21/10/1996	28 PH Philippinium 11/12/1996	29 BE Belgium 27/01/1997	30 LU Luxembourgium 27/01/1997	31 TN Tunisium 15/04/1997	32 TG Togovium 22/04/1997	33 CN Chinatium 25/04/1997	34 US Americanium 25/04/1997	35 ZW Zimbabwium 25/04/1997	36 IS Icelandium 28/04/1997
37 ML Malium 28/04/1997	38 MT Maltavium 28/04/1997	39 FJ Fijium 20/01/1992			40 MU Mauritiium 09/02/1992	41 AL Albanium 11/05/1994	42 CK Cook Islandium 15/02/1994	43 LK Sri Lankium 19/08/1994	44 PY Paraguayium 01/12/1994	45 TJ Tajikistanium 11/01/1995	46 MN Mongolium 17/01/1995	47 FI Finlandium 07/02/1995	48 CH Switzerium 10/02/1995	49 NL Netherlandium 20/06/1995	50 DK Denmarkium 12/07/1995	51 PE Peruvium 20/07/1995	52 EC Ecuadorium 06/09/1995	53 ZA South Africium 13/09/1995	54 SK Slovakium 17/11/1995
55 SV El Salvadorium 20/10/1995	56 GE Georgium 27/11/1995	57 CZ Czechium 06/02/1996			72 UY Uruguayium 06/10/1994	73 KE Kenyrium 24/07/1994	74 SA Saudis Arabium 09/08/1994	75 OM Omanium 08/02/1995	76 BH Bahrainium 28/04/1997	77 AM Armenium 27/01/1997	78 LC Saint Lucium 09/04/1997	79 LV Latvium 22/07/1996	80 LA Laovium 25/02/1997	81 SZ Eswatinium 20/11/1996	82 MV Maldivium 21/05/1994	83 TM Turkmenistanium 25/02/1997	84 LS Lesothium 07/12/1994	85 UZ Uzbekistanium 23/07/1996	86 BA Boanium 25/02/1997
87 SR Surinamium 28/04/1997	88 CU Cubatium 29/04/1997	89 TR Turkium 22/05/1997			104 RU Russium 05/11/1997	105 NP Nepalium 18/11/1997	106 VE Venezuelium 03/12/1997	107 MR Mauritanium 09/02/1998	108 LT Lithuanium 15/04/1998	109 BJ Beninium 14/05/1998	110 GM Gambium 19/05/1998	111 MW Malawium 11/06/1998	112 TZ Tanzanium 25/06/1998	113 SN Senegalium 20/07/1998	114 BO Bolivium 14/08/1998	115 CY Cyprusium 28/08/1998	116 BW Botswanium 21/09/1998	117 BI Burundium 04/09/1998	118 VN Vietnamium 20/09/1998
119 PA Panamanium 07/10/1998	120 UA Ukrainium 14/10/1998	121 ID Indonesiuum 12/11/1998			136 MZ Mozambiqium 15/08/2000	137 KI Kiribatium 07/09/2000	138 GA Gabonium 08/09/2000	139 JM Jamaicium 08/09/2000	140 YE Yemenium 02/10/2000	141 AE Emiratium 28/11/2000	142 ZM Zambium 09/02/2001	143 DM Dominicium 12/02/2001	144 NR Naunuvium 12/11/2001	145 UG Ugandium 20/11/2001	146 VC Vincentium 18/09/2002	147 WS Samoatium 27/09/2002	148 TH Thailandium 10/12/2002	149 PW Palauvium 05/02/2003	150 GT Guatemalium 12/02/2003
151 AD Andorrium 27/02/2003	152 TL Timor Lestium 07/05/2003	153 TO Tongovium 29/05/2003			168 NU Niuium 21/04/2005	169 GD Granadium 02/06/2005	170 KH Cambodium 19/07/2005	171 BT Bhutanium 18/08/2005	172 HN Honduraium 29/08/2005	173 AG Antigua barbudium 08/09/2006	174 VU Vanuatium 16/09/2005	175 CD Democratic Republic of the Congonium 09/02/2001	176 DJ Djiboutium 21/01/2006	177 HT Haitium 22/02/2006	178 LR Liberium 23/02/2006	179 ME Montenegrium 15/04/1998	180 KM Comoroium 18/08/2006	181 CF Central African Republic 21/01/2006	182 BB Barbadoium 07/02/2007
183 CG Congovium 04/12/2007	184 GW Guineabiium 20/05/2008	185 LB Lebanonium 20/11/2008																	
					58 PG Papua New Guinium 17/04/1996	59 ET Ethiopium 12/05/1996	60 CR Costa Ricium 21/05/1996	61 IE Irelandium 24/06/1996	62 BY Belarusium 11/07/1996	63 CL Chilium 12/07/1996	64 NZ Aotearoavium 15/07/1996	65 IN Indium 02/09/1996	66 CM Cameroonium 16/09/1996	67 NE Nigeritium 09/04/1997	68 BD Bangladesium 25/04/1997	69 GQ Equatorial Guinium 25/04/1997	70 KR Koreatium 28/04/1997	71 SC Seychellium 07/04/1992	
					90 SG Singaporium 21/05/1997	91 KW Kuwaitium 28/05/1997	92 GN Guinium 09/06/1997	93 SI Slovenium 11/06/1997	94 MK Macedonium 20/06/1997	95 TT Trinidagium 24/06/1997	96 BF Burkina Faseium 08/07/1997	97 GH Ghanium 09/07/1997	98 BN Brunium 28/07/1997	99 QA Qatarium 02/09/1997	100 GY Guyanium 12/09/1997	101 PK Pakistanium 28/10/1997	102 JO Jordanium 28/10/1997	103 IR Iraniscium 03/11/1997	
					122 VA Vaticanium 12/05/1999	123 NG Nigerium 20/05/1999	124 SD Sudanium 24/05/1999	125 EE Eriterium 26/05/1999	126 FM Micronesium 21/06/1999	127 NI Nicaragium 05/11/1999	128 LI Lichtenstenium 24/11/1999	129 SM Sanmarinium 16/12/1999	130 ER Eritrium 24/02/2000	131 AZ Azerbijanium 28/03/2000	132 KZ Kazakhstanium 23/02/2000	133 CO Colombium 05/04/2000	134 MY Malaysium 20/04/2000	135 RS Serbium 20/04/2000	
					154 AF Afghanistanium 24/09/2002	155 ST Saotomium 09/09/2002	156 KG Kyrgyzstanium 29/09/2002	157 CV Cabo Verdium 19/10/2002	158 BZ Belizium 01/12/2002	159 LY Libyatium 06/01/2004	160 TV Tuvalium 19/01/2004	161 TD Chadium 12/02/2004	162 RW Rwandium 21/02/2004	163 MH Marshallium 10/05/2004	164 KN Kitts-nevisium 21/05/2004	165 SB Solomonium 22/09/2004	166 SL Sierraleonium 20/09/2004	167 MG Madagascarium 20/10/2004	
					186 IQ Iraqium 12/01/2009	187 DO Dominicanium 27/02/2009	188 BS Bahamasium 21/04/2009	189 SO Somalium 29/05/2012	190 SY Syrium 14/09/2013	191 MM Myanmarium 06/07/2015	192 AO Angolium 16/09/2015	193 PS State of Palestinium 17/05/2018							

OPCW

IUPAC — INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

United Nations Educational, Scientific and Cultural Organization

2019 IYPT — International Year of the Periodic Table of Chemical Elements

Periodic Table of States Parties

- Names of the Elements are changed to States Parties Names
- Colour – Regional groups
- Only 118 elements but 193 States Parties
  - Is Diplomacy further advanced than Chemistry?
- Order is the Entry in to Force order
  - Firstly looked at Entry into Force date (several the same)
  - Secondly looked at Signing date (several the same)
  - Thirdly looked at Date of Deposit (unique)

What next?

Element Data Sheet?

3

3
AU
Australium
06/05/1994

Australium is the 3rd element on the Periodic Table of States Parties of the CWC.

AUSTRALIA

Signature	Date of Deposit, Ratification, Accession or Succession	Entry in Force
13 January 1993	6 May 1994	29 April 1997

Permanent Representative of Australia to the OPCW

H.E. Mr Matthew Neuhaus

Ambassador Extraordinary and Plenipotentiary

Presentation of Credentials: 29 August 2018
Carnegielaan 4
2517 KH The Hague
The Netherlands

https://netherlands.embassy.gov.au/thag/home.html

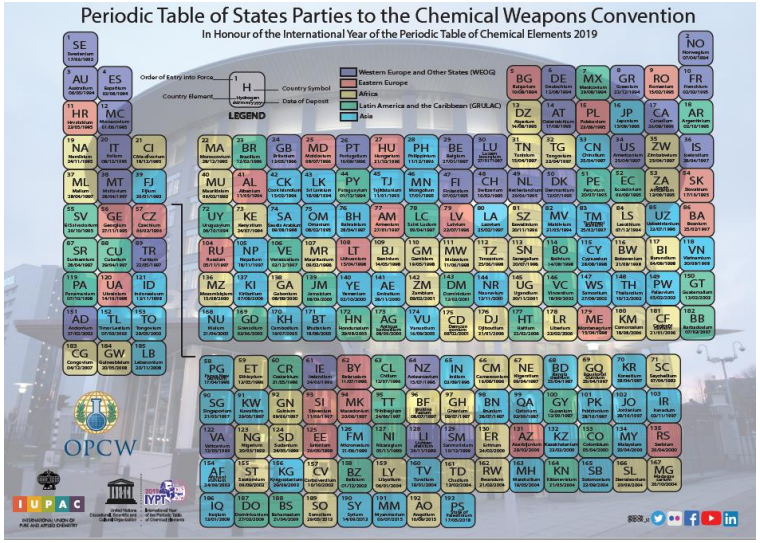
Department of Foreign Affairs and Trade – Australian Safeguards and Non-Proliferation Office (ASNO) – Chemical Weapons Convention Implementation Section

ASNO, R.G. Casey Building, John McEwen Crescent
Barton ACT 0221
Australia

https://dfat.gov.au/international-relations/security/non-proliferation-disarmament-arms-control/chemical-weapons/cwc/Pages/australias-national-authority-for-the-chemical-weapons-convention.aspx

Australia is the largest country in Oceania and Australia's capital is Canberra, and its largest city is Sydney. The country's other major metropolitan areas are Melbourne, Brisbane, Perth and Adelaide. Australia was inhabited by Indigenous Australians for about 60,000 years before the first British settlement in the late 18th century. Australia has a landmass of 7,617,930 square kilometres (2,941,300 sq mi). A megadiverse country, its size gives it a wide variety of landscapes, with deserts in the centre, tropical rainforests in the north-east and mountain ranges in the south-east. Australia is a highly developed country, with the world's 12th-largest economy. Australia is a federal parliamentary constitutional monarchy. Australia is a member of the United Nations, G20, Commonwealth of Nations, ANZUS, Organisation for Economic Co-operation and Development (OECD), World Trade Organization, Asia-Pacific Economic Cooperation, Pacific Islands Forum and the ASEAN Plus Six mechanism.

Interactive Table on Website?



Who would like to join in?

Links:

- www.iypt2019.org/
- iupac.org/
- www.opcw.org/
- www.opcw.org/resources/science-and-technology
- Download the Periodic Table of the States Parties

www.opcw.org/sites/default/files/documents/2018/11/Periodic%20Table%20of%20States%20Parties%20-%20Building.pdf (OPCW Building Background)

www.opcw.org/sites/default/files/documents/2018/11/Periodic%20Table%20of%20States%20Parties%20-%20flags.pdf (OPCW Flags Background)

OPCW

منظمة حظر الأسلحة الكيميائية

禁止化学武器组织

Organisation for the Prohibition of Chemical Weapons

Organisation pour l'Interdiction des Armes Chimiques

Организация по запрещению химического оружия

Organización para la Prohibición de las Armas Químicas