

# CHEMRAWN: Report - 2000

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# CHEMRAWN

- **CHEM**ical **R**esearch **A**ppplied to **W**orld **N**eeds
- IUPAC committee organizes world-wide conferences



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# Members

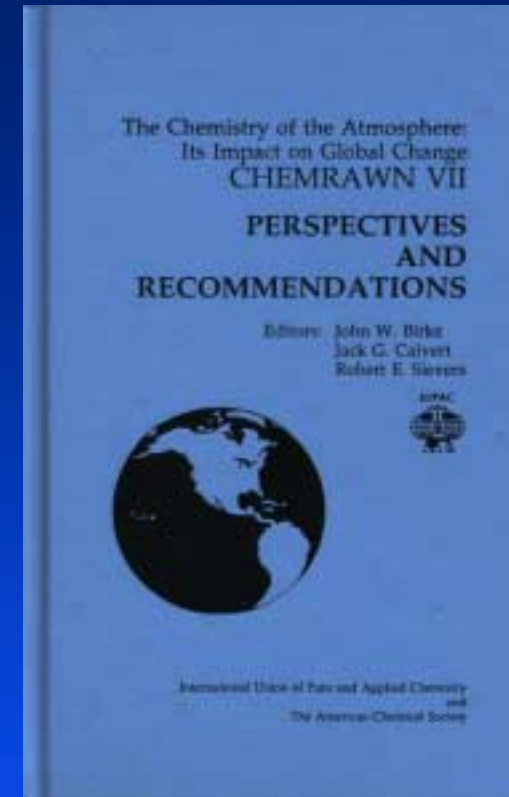
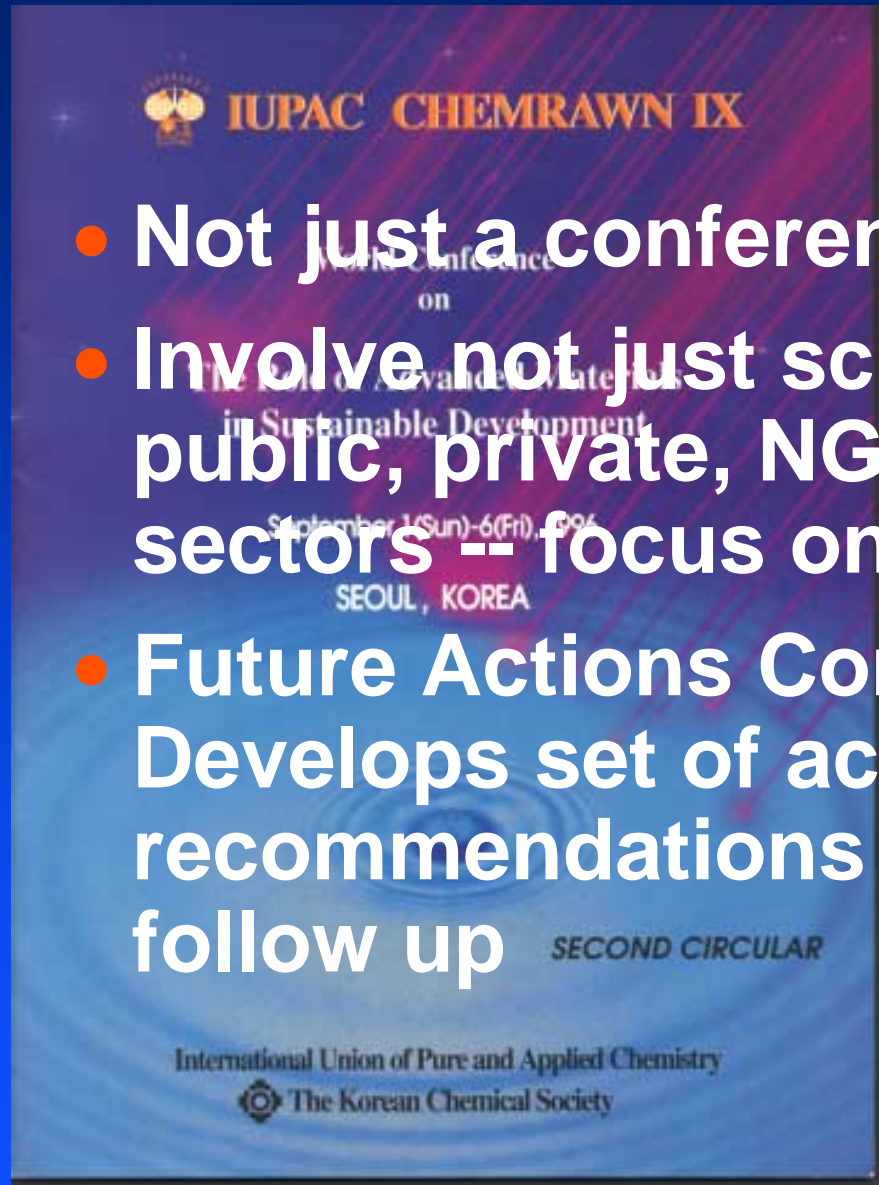
- Prof. Erwin Buncel Canada
- Dr. Min Che Chon Republic of Korea
- Prof. Michael J. Droscher Germany
- Prof. Raymond Hamelin France
- Dr. Makoto Imanari Japan
- Prof. Jerzy A. Kopytowski Poland
- Prof. Fedor A. Kuznetsov Russia
- Dr. John Malin USA
- Dr. Patrick Moyna Brazil/Uruguay
- Dr. Parry Norling USA
- Prof. Ikenna Onyido Nigeria
- Dr. Swaminathan Sivaram India
- Dr. Alan Smith UK
- Dr. Christoph F. Buxtorf -Switzerland
- (Prof. Fosong Wang China)\*



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# CHEMRAWN Conferences are different

- Not just a conference
- Involve not just scientists but public, private, NGO's, academic sectors -- focus on issues
- Future Actions Committee: Develops set of actionable recommendations -- and works on follow up



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# 10 CHEMRAWN Conferences since 1978

- I-- Toronto, Canada (1978) Future Sources of Organic Raw Materials
- II-- Manila, Philippines (1982) Chemistry and World Food Supplies: The New Frontiers
- III-- The Hague, the Netherlands (1984) Resources Material Conversion
- IV-- Keystone, Colorado, USA (1985) Modern Chemistry and Chemical Technology Applied to the Ocean and Its Resources
- V-- Heidelberg, Germany (1986) Current and Future Contributions of Chemistry to Health



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# 10 CHEMRAWN Conferences since 1978

- VI-- Tokyo, Japan (1987) Advanced Materials for Innovations in Energy, Transportation, and Communications
- VII Baltimore, Maryland, USA (1991) The Chemistry of the Atmosphere: Its Impact on Global Change
- VIII-- Moscow, Russia (1992) Chemistry and Sustainable Development
- IX-- Seoul, Korea (1996) Advanced Materials and Sustainable Development
- XI-- Montevideo, Uruguay (1998): Latin American Symposium on Environmental Analytical Chemistry



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# Planning 5 Conferences

- **CHEMRAWN X: The Globalization of Chemical Education-- Preparing Chemical Scientists and Engineers for Transnational Industries**
- **CHEMRAWN XII: African Food Security and Natural Resource Management: The New Scientific Frontiers**
- **CHEMRAWN XIII: Chemistry for Cleaner Energy**
- **CHEMRAWN XIV: Toward Environmentally Benign Processes and Products -- Boulder Colorado June 9-13, 2001**
- **CHEMRAWN ? Water: Dealing with the Crisis**



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**Topic: Should a CHEMRAWN conference concern itself with chemical education?**

**“The Globalization of Chemical Education: Preparing Chemical Scientists and Engineers for Transnational Industries”**

- **What is CHEMRAWN?**
- **What might be the focus of the conference?**
- **What are some of the issues?**
- **What should we do next?**



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# The Path to CHEMRAWN X

1990's: much discussion about education  
as a subject for a CHEMRAWN Conference???

late 1990's: what  
is the focus?

"pre-CHEMRAWN's" at  
ICCE, ACS, Pacificchem

Committee  
Survey

1998/9: focus and  
organizer

Next steps????



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# Next Steps to CHEMRAWN X?

Major funded conference  
2002-2004

virtual conference/  
web discussion

more "pre-CHEMRAWN's"  
with structure

regional CHEMRAWN  
conferences

Educational component  
in future CHEMRAWN's



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# The Focus: CHEMRAWN X

- The globalization of chemical education --  
Preparing Chemical Scientists and Engineers  
for Transnational Industries



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# Chemical education applied to World Needs-Washington

- **Mary Good - Multinational chemical employment: educational needs**
- **Anthony K Smith: International student and teacher exchange**
- **Ed Wasserman: Preparation for industrial research**
- **Morton Hoffman: Molecular science: New Curriculum pathways for world needs**
- **Lunch in honor of Ernest Eliel**



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# Chemical education applied to World Needs-Washington

- Paul Walter: Africa- a unique opportunity
- Edmond J Collier: National Security Education Program
- Janet Osteryoung: We are prepared for the 1960's
- Parry Norling: Industry Expectations: Chemical education for researchers
- Scott Lockledge: Improving the nation's K-12 science education
- John P. Ferraris: Preparing problem solvers for the chemical industry: DChem program



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# Chemical education applied to World Needs-ICCE

- NP Tarasova: Education for Sustainable Development: From slogans to action
- JE Boggs: The two faces of undergraduate study abroad
- PM Norling/JA Kopytowski: Industry expectations in regard to Chemical education standards
- JD Bradley: Chemical education responding to developing world needs
- N Mohamed and Z Ismail: Perceptions of students' difficulties in first year chemistry
- PM Norling/JA Miller: Preparation for Industrial Research



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# Determining Factors

- Funding, organizing ----
- Are there important issues for discussion that can lead to actionable recommendations?
- Is this a subject appropriate for the the CHEMRAWN format -- and not being duplicated elsewhere?

Trying to answer these questions at Budapest, Washington, and Honolulu



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# Some issues

- Industry expectations seem to differ country to country; are the differences real?
- Can an education in one part of the world be used in another? (Issue for developing countries?)
- Does graduate education need to be tailored for those going into industrial research? How does industry make its needs known?
- Can the time to a degree be “contained”?
- How do universities instill the desire for continual learning?





# Survey- CHEMRAWN

- Approach 40 companies around the world
- Growth rate in new employment for PhD's
- Needs for specialized or broad education?
- Specific educational topics
- Needs for orientation of new employees
- Other capabilities
- Market competition
- Industry/academia interactions



# 13 Companies

- Air Products - USA
  - BASF - Germany
  - Cantabria IFC - Spain
  - Degussa - Germany
  - Eastman Chemical - USA
  - Honam Petrochemical - Korea
  - LG Petrochemicals - Korea
  - Mitsubishi Chemical - Japan
  - Nippon Shokubai - Japan
  - Rohm and Haas - USA
  - S Corporation - Korea
  - Union Carbide - USA
  - Witco - USA
- Sales: \$40-28,500 million**
- R&D: 0.3-1350 million**
- PhD's: 5-2000**
- Growth in new PhD's: most 4-5%/yr**



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# Educational Needs

20% broad --40% specialized--40% highly specialized

## Special needs:

- process chemistry (process technology)
- biomedical technology
- computational and combinatorial chemistry
- organo-metallic chemistry
- surface chemistry (photo-related chemistry)
- material sciences (nano technology)
- electronic materials (chemistry)



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- Still in doubt -- difficult funding
- Need is still there
- IUPAC interest in Africa



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- Proposal on the table
- To be discussed at committee meeting in November



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# Other suggestions

- Food purity
- biodiversity





# Continuing issues - Three F's

- Funding
- Format
- Future Actions



# Summary

- CHEMRAWN remains an important initiative of IUPAC
- The CHEMRAWN concept is valued
- Numerous opportunities for conferences
- Seeking different, possibly novel, ways to assure that CHEMRAWN has impact

