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Summary of

WORLD CONFERENCE CHEMRAWN VIII

devoted to

CHEMICAL ASPECTS OF ENVIRONMENTAL PROBLEMS OF INDUSTRY
AND REUSE OF WASTES AS RAW MATERIALS

CHEMRAWN is acronym for Chemical Research Appplied to World Needs. The purpose of IUPAC CHEMRAWN Conferences is identifying and supporting research and applied directions that help to solve global human problems.

I. The concept and main purposes of CHEMRAWN VIII

Among many global needs the mankind has recognized at the end of the 20th century the most important one is the need of sustainable development in situation when population is growing, natural non-renewable resources becoming more and more limited, environmental degradation - more and more visible and dangerous. The cumulative impact of mankind's activities has reached the point where the life on Planet Earth is at risk in connection with global environmental changes.

The concept of sustainable development has been defined by United Nations ("World Conservation Strategy", 1980; "Our Common Future" report, 1987) as "development without destruction" or "development that meets the needs of the present without compromising the ability of future generations to meet them". It means among others to develop a policy of more economical use of energy and materials, conservation of water and soil, recycling and reuse of wastes and efficient protection of the environment. The non-renewable resources should not run out before acceptable substitutes are available.

A decisive role in realization of the sustainable development strategy will play the science and in particular the chemistry.

There are many criteria for estimating the extent of accordance of industrial development with the sustainable development concept. One of them is a scale of industrial impact on the environment. Indeed, the volume and composition of emissions reflect the level of main technological processes. The situation of today is critical in many respects. We should have in mind that over the past century the total increase in industrial production is estimated as fifty-fold. Since the 1950's the chemical industry, for example, has increased annual world production of chemicals from 2 to nearly

100 million tons. About 90 000 chemicals have been produced by the chemical industries nowadays (4000 account of 99.9% of the total production volume).

Environmental problems caused by industrial production are attracting more and more attention of public and governments of all countries. They have become an important element in the international scientific, technical and technological collaboration, because the mankind has received a combine threat of global ecological disaster and reaching the limit of many non-renewable natural resources. The mankind should go over to a new level of advanced technologies - more environmentally acceptable and more efficient from the point of view of complete using of raw materials.

Chemistry can and should play an important role in overcoming today's environmental problems of industry based on chemical processes and in movement towards sustainable development.

It is desirable therefore to analyse the present and possible future contribution of the chemistry in realization of sustainable development strategy "through the prism" of two question - how the chemistry sets affairs in order "at its own home", that is in chemical industry, and how it helps and will help to solve accumulated problems in other branches of industry and in the environment ?

The Conference will help to transform the information on new scientific achievements and advanced chemical technologies into strategical recommendations ~~for~~ for reconstruction and rational development of today the most environmentally dangerous branches of industry. Such recommendations are very important for future actions of governmants, intergovernmental and non-governmental bodies, industrial companies, broad scientific circles, and public. A CHEMRAWN Conference devoted to above mentioned problems will also serve for improving public image of chemistry.

In connection with the above mentioned circumstances the main purposes of CHEMRAWN VIII can be formulated as follows:

- ① To define the requirements for the development of various branches of industry based on chemical processes from the point of view of sustainable development concept.

It is evident that principally new level of relationships should be formed in the nearest future between

industry and the environment. The "polluter-pays principle" (PPP) is very important, of course, for current situation but it is not sufficient for the future. Only permanent analysis of new scientific achievements, advanced technologies, new approaches to efficient use of natural resources, materials and energy, minimization of emissions and waste generation, recycling and reuse of waste can lead to environmentally acceptable low- or non-waste production with closed or almost closed production cycles. Of course this will require a lot of investments and strong governmental supporting.

Therefore scientists, technologists, environmentalists, economists, and governmental policy makers should collaborate actively with industry in order to recognize new horizons and to define short- and long-term goals optimized from ecological and economical points of view for various branches of chemical industry.

- ② To characterize the present state of chemical branches of industry and existing national and international programmes of their reconstruction for minimization damaging impacts on the environment using modern achievements in chemical science and technology; to distribute the information on new realized technologies; to identify knowledge gaps and define research priorities.

Some countries have developed prospects of national policy for sustainable industrial development (see UNEP's Industry and Environment review, vol. 12, No. 3-4, December 1989) and these documents permit to select some information related to chemical branches of industry.

Besides, the UNEP Industry and Environment Office has published during last years a large set of technical guides on environmental aspects of various branches of industry (see Compilative Information prepared for IUPAC by Prof. V.Koptyug),

UNEP and International Chamber of Commerce (located at Paris) has organized in 1984 a special World

Industry Conference of Environmental Management (WICEM). The WICEM-II Conference is planned to be at April 1991 in Rotterdam.

The SCPOE Scientific Programme (1990-1992) contains a special subprogramme "Sustainable Development Cluster" that has the section "Use of Scientific Information for Sustainable Development". Among other aims of this section it is mentioned the following - to evaluate and further develop the current and potential use existing technologies to provide and communicate such information.

International Chamber of Commerce (Paris) has created in 1986 a special division, the Geneva based International Environmental Bureau (IEB), to work primarily as a trans-industry clearing house for environmental management information. The IEB is backed by about 25 multinationals which have agreed to make non-proprietary technology available without charge to enterprises throughout the world.

UNEP Industry and Environment Office are creating a special network on the exchange and dissemination of information on cleaner technologies and production. For advertising this activity UNEP IEO has established a newsletter entitled Cleaner Production (No.1 - April 1990).

Some interesting information may be obtained also from ETAD (Ecological and Toxicological Association of the Dye-stuff Manufacturing Industry).

IUPAC activity such as First IUPAC Workshop on Safety in Chemical Production also should be taken into account.

A special attention should be paid to the role of catalysis in modern and future chemical industry.

Maybe the most difficult things from organizing point of view are to identify gaps in scientific and technological efforts of movement to sustainable development and to define corresponding research priorities.

- ③ To recognize scientific achievements that can lead to fundamentally new clean technologies in chemical production, in prevention of emissions^{*} and waste generation, in waste recycling and reuse; to stimulate international and regional co-operation in perspective direction.

A particular attention should be paid to:

- adoption of natural chemical processes for industrial needs;
- Biotechnological possibilities in production of chemicals;
- selective catalysis;
- technological possibilities of solid state chemistry (environmentally safe ore treatment, exclusion of solvents from some chemical processes, etc.);
- use of ionising radiation;
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The leaders of IUPAC project "The Chemistry for 21st Century" should be invited for discussion of this section contents.

- ④ To elaborate strategical recommendations for policy- and decision-makers on the development that branches of industry which have the most dangerous chemical impact on the environment and on the health of population.

These recommendation should illuminate in particular:

- Policy of movement to technologies of 21st century;
- development and teaching of industrial environmental economics;
- environmental auditing on chemical companies;
- setting up codes of environmental behavior of chemical industry associations;

* It seems not desirable to discuss on this conference the situation with emission of SO₂, CO₂, NO_x in connection with energetics and transportation as well CFCs problem taking into account that many international agreements have been ratified and there is a considerable progress in these areas in a number of countries.

- attraction of attention to responsibility on the fate of produced chemicals taking into account that not only main pollutants but also minor components may be very dangerous in result of accumulation and migration through food chain; the weighing of risks and benefits is required in both the production and use of chemical compounds;
- promotion of the inclusion of the sustainable development as an important element in the programmes of large chemical research institutes and universities;
- incorporation of sustainable development concept in the design stage of technological development of chemically processing industry;
- organization of constructive dialogue between chemical industry and public environmental movement;
- governmental support and public assistance to sustainable development of chemical industry;
- dissemination of information on clean and efficient technologies;
- priorities in scientific research and development in respect of sustainable development of chemically processing industry;
- advertising role of chemistry in solution of many environmental problems;
- etc., etc...

II. Proposal on CHEMRAWN VIII Programme

Plenary session and contributed poster paper sessions will be scheduled on the following subjects:

- * The sustainable development concept and requirements to the future development of chemical branches of industry
- * Recent progress in low- and non-waste technologies, pollution control and protection of the environment in the following branches of industry:
 - ferrous and non-ferrous ores processing, including metallurgy and waste treatment on all stages;

- petrochemical industry;
- industry of polymers, dyes, drugs, and some other basic organic chemicals;
- pulp and paper industry;
- electronic industry;
- galvanic (electroplating) processes;
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- * Waste as a raw material
- * New tendencies in science that are important for future development of industry based on chemical processes
- * Data bases related to main topics of the Conference; the channels of dissemination of information on clean technologies waste recycling and reuse; international collaboration today and tomorrow
- * Chemical methods of eliminating large-scale environmental pollution and rehabilitation of natural systems.

III. Place and date of CHEMRAWN VIII Conference

It was proposed on preceding stage to organize CHEMRAWN VIII Conference in Moscow (USSR) under sponsorship of the USSR Academy of Sciences ^{and} USSR branches of chemical industry.

The fixation of date is more questionable. The problems of the environment are now moved to the top of political priority. It is known that the United Nations has approved the organization of very high level Conference on Environment and Development (June 1992, Rio-de-Janeiro, Brazil). The national and international organizations are now very active in discussion of environmental problems (see Appendix 1). The IUPAC should enhance its efforts in this area also, It will be a good response of the IUPAC to new environmental initiative of the United Nations to organize two CHEMRAWN conferences (VII and VIII) before the UN Conference on Environment and Development.

It seems therefore desirable to carry out CHEMRAWN VIII Conference quite soon after CHEMRAWN VII (December 1991), possibly in April-May 1992.

Two such remarkable actions will be very important for the enhancement of the Union's role in the environmental efforts of world scientific community.

IV. The IUPAC bodies that can be responsible for organization of CHEMRAWN VIII

- the CHEMRAWN Committee,
- the Committee on Chemistry and Industry,
- the Coordinating Committee on Chemistry and the Environment Programme,
- the Coordinating Group of the publication series "Chemistry for 21st Century".

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Some International Conferences and Congresses
partly overlapping with topics of CHEMRAWN VIII

1993

- 34th IUPAC Congress "Chemistry for 21st Century", August-September 1993, Beijing, China (provisionally)
Section 2 in Scientific Programme: Chemistry for a Better Environment and Analytical Chemistry

1992

- United Nations Conference on Environment and Development, June 1992, Rio-de-Janeiro, Brazil
- International IUPAC Symposium "Biotechnology and the Environment", Autumn 1991 - Spring 1992, Berlin (provisionally)

1991

- CHEMRAWN VII. The Chemistry of the Atmosphere - its Impact on Global Change, December 1991, Baltimore, MD, USA
- *- Congress International: Getting Ready for the 21st Century - Innovation, Industrial Progress and Environment, June 1991, Strasbourg, France (Societe des Ingenieurs et Scientifiques de France)
- *- World Industry Conference on Environmental Management (WICEM-II) under UNEP sponsorship, April 1991, Rotterdam
- The Second IUPAC International Symposium "Organic Chemistry - Technological Perspectives", March 1991, Baden-Baden, Germany

1990

- *- International Conference on Pollution Prevention - Clean Technologies and Clean Products, June 1990, Washington, DC (US EPA and International Association for Clean Technology)
- *- Industrial Waste Water Treatment and Disposal, November 1990, Nicosia, Cyprus (IAWPRC)

- *- The First IUPAC Workshop on Safety in Chemical Production, September 1990, Basel, Switzerland
- *- First International Symposium on Oil and Gas Waste Management Practices, September 1990, New Orleans, USA (US EPA)
- Hazardous Wastes - Safe Disposal and Control of Health Risks, (Report and Resolution of 43rd World Health General Assembly), March 1990
- *- Globe-90 (Global Opportunities for Business and the Environment) - International Conference (Policy and Legislation, Business Development, Technology and Research) and Trade Fair. March 1990, Vancouver, Canada
- *- Discussion Meeting "Technology in the Third Millennium - the Environment. Approaches to the handling and treatment of wastes" February 1990, London, UK (The Royal Society)
- *- Wastewater Sludge Treatment and Disposal, January 1990, Los Angeles, USA (IAWPRC)

* It is desirable to receive published or preliminary materials

