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7th IUPAC International Conference on Green Chemistry

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The 7th IUPAC International Conference on Green Chemistry was held from the second to the fifth of October of 2017 in Moscow on the base of D. Mendeleev University of Chemical Technology of Russia (MUCT). One hundred and fifty eight delegates from Germany, Italy, France, Japan, China, Turkey, Estonia, Romania, Belgium, Poland, Brazil, India, Thailand, South Africa and, of course, from Russia took part in its work. Individual activities, each of which deserves special discussion, also took place within the IUPAC Conference. This is a school of young scientists, symposia devoted to the activities of prominent Russian scientists, such as Academician Valentin A. Koptug and RAS Corresponding Member, Gennadii A. Jagodin, who brought the ideas of green chemistry and sustainable development in society and promoted them by their creativity both in the USSR and Russia, and abroad. The main sponsors of the passed Conference were the Moscow Government, and also FosAgro, Sinopec, the Organization for the Prohibition of Chemical Weapons (OPCW), etc.

The problem of assessing planetary boundaries for chemical pollutions was one of the most important issues of the conference and all activities carried out in its framework. The theory of planetary boundaries formulated by Johan

Rockström and colleagues describes 9 boundaries, exceeding of which jeopardizes the existence of the biosphere. Unfortunately, currently, mankind has already overcome 4 of 9 boundaries that allowed holding the Planet at a level comfortable for modern life. The Planet became to be transformed by us *via* deforestation, growing crops, and environmental pollution, which led to the extinction of plants and animals, and fast climate change. The crossing of the last 5 boundaries by us is quite close. During many centuries, our planet has been amortising the consequences of our actions and it has been our friend. However, the barbarous attitude towards the environment has made an enemy from a friend. One of nine planetary boundaries is directly related to the entrance of various chemicals created by humans into the environment. And currently, chemists of various areas and specializations are facing a vital issue

on liquidation of chemical pollution consequences and improvement of chemical technologies in order to prevent in the future further chemical environmental pollution and eliminate negative consequences of what has already been done by now. These are the challenges faced by scientists who have stood on the rails of green chemistry in support of

sustainable development.

The primary objective of the 7th IUPAC Conference on Green Chemistry held in Moscow was the exchange of experience and discussion of problems associated with modern chemical technology for further introduction of green chemistry ideas into practice.

General director of the Russian Scientific Fund Alexander V. Khlunov, professor of Ca' Foscari University of Venice, Pietro Tundo, Academician of RAS, dean of chemistry department of Lomonosov State University (MSU), Valerii V. Lunin, president of the Russian Union of Chemists Viktor P. Ivanov, president of IUPAC, RAS Corresponding Member, director of the Institute of Chemistry and Problems of Sustainable Development the Russian Chemical Technology University (RCTU), Natalia P. Tarasova, vice-rector for science of RCTU, Doctor of Chemistry, Anna A. Scherbina, counsellor of the general director of PhosAgro PJSC, Deputy Director General of PhosAgro-Cherepovets JSC, Boris V. Levin, representative of the United Nation Organization on Industrial Development (UNIDO), Maxim S. Eliseev addressed the opening of the conference.

The plenary session was concluded with presenting the award "Outstanding women in chemistry and chemical technology" to a leading researcher of the chemistry department of MSU, Doctor of Chemistry, Ekaterina S. Lokteva.

The work of the IUPAC conference was constructed according to the following thematic sections:

i) Section "Green industrial processes (clean production, green nanotechnology)". Pietro Tundo, professor of organic chemistry of Ca' Foscari University of Venice, Chairman of the intersection committee of the IUPAC on green chemistry for sustainable development, the organizer of a series of IUPAC conferences on green chemistry was the Chairman of the section.

ii) Section "Towards sustainable development and green chemistry". Anna Makarova, a leading researcher of the UNESCO Chair "Green chemistry for sustainable development" of RCTU was the Chairman of this one.

iii) Section "Nature-like technologies: supramolecular systems and life maintenance factors undertaken by non-living organic

matter". Irina Perminova, professor of the department of medicinal chemistry and fine organic synthesis of MSU was Chairman of this one.

iv) Section "Green materials, ionic liquids, and supercritical environment" Ekaterina Lokteva, Doctor of Chemical Sciences, a leading researcher of the Department of the physical chemistry of MSU was the Chairman of this section.

In addition, a round table "Building human capacity: education and scientific-technical cooperation" was conducted. Professor of Federal University San Carlo (Brazil) Vania Zuin and Professor Emeritus of the University of Venda (South Africa), member of the Subcommittee on green chemistry and the national representative of South Africa in the Department III IUPAC, Liliana Mammino were the moderators.

In total, 63 oral and 95 poster reports were presented.

A meeting of the heads of grants of the Russian Scientific Fund with Alexander V. Khlunov, the Director General of the RSF, was held in RCTU within the IUPAC Conference. Examination issues of RSF grants, the international collaboration within RSF projects, and development prospects of a series of fund programs were discussed during the meeting.

The Young Scientists School "Evaluation of planetary boundaries for chemical pollution" was held within the project of the Russian scientific Foundation "Development of methodology for the chemical footprint to study the effect of chemicals on the environment and the person, in view of planetary boundaries" during the conference the IUPAC. The main topics that were discussed at the School concerned the concept of planetary boundaries, chemical pollutions, green chemistry, and human health. Twenty nine young scientists took part in school work. Leading scientists and specialists from Russia and other countries held classes for them:

Nicholas Gathergood, Head of Chair of Green chemistry, Tallinn University of Technology;

Liberato Cardellini, Professor, Marche Polytechnic University, Ancona, Italy;

John Corish, Professor of chemistry, Dublin Trinity College, Ireland;

Natalia Pleshkova, Assistant Director of the Laboratory of ionic liquids, Queen's University of Belfast, UK;

Sir Martyn Poliakoff, Professor, School of Chemistry, University of Nottingham, UK;

Janet Scott, Professor of Chemistry, University of Bath, UK;

Natalia P. Tarasova, President of IUPAC, RAS Corresponding Member, Director of Institute of chemistry and problems of sustainable development, RCTU named after D. I. Mendeleev;

Faina I. Ingel, Doctor of Biology, Head of the Laboratory of genetic toxicology, A.N. Sysin Research Institute for Human Ecology and Environmental Health;

Evgeny V. Rozanov, Senior Researcher at Physical-Meteorological Observatory of Davos, Switzerland. He won the Noble Peace Prize in 2007 in the composition of the Intergovernmental Panel on Climate Change (IPCC) "for their efforts in the collection, analysis and dissemination of the vast amount of information about the human impact on climate change on Earth and justification of the measures needed to counteract such changes";

Halide Kh. Khamidullina, Professor of Hygiene of I.M. Sechenov First Moscow State Medical University;

Yury A. Shipunov, RAS Corresponding Member, Professor, Head of the Laboratory of colloid systems and interfacial processes, Institute of Chemistry, Far East Branch of RAS, Vladivostok, and other scientists.

The staff of the UNESCO chair "Green chemistry for sustainable development", RCTU named after D. I. Mendeleev: Professor Vladimir A. Kuznetsov, Associate Professor Anna S. Makarova, Head of laboratory, Evgenia G. Vasileva. The classes were held not only as lectures but there were also organized: a quiz "Green chemistry and sustainable development", workshops on modeling tools for sustainable development and modern methods for determination of chemical pollution.

In addition, within the conference, there was a Symposium in memory of RAS Corresponding Member, professor, G. A. Jagodin. Students and colleagues of the scientist who gave speeches at the Symposium remembered this remarkable man and great citizen of our country. A memorial plaque in memory of G. A. Yagodin was open in the main building of the complex of D. I. Mendeleev RCTU. Six students

and postgraduates of RSTU named after D. I. Mendeleev were awarded certificates of the Yagudin fellowship.

A. G. Majouga, the Acting rector of D. I. Mendeleev RCTU; A. M. Chekmarev, RAS Corresponding Member, Professor (RCTU named after D. I. Mendeleev); A. G. Asmolov, academician of the Russian Academy of education, Professor (M. V. Lomonosov MSU, Federal Institute for Education Development), N. N. Marfenin, Professor (M. V. Lomonosov MSU); A. Yu. Manusis, Professor (Moscow International University (MMU)); A. A. Ovsyannikov, Professor (Moscow State Institute for International Relations, MGIMO), and D. N. Kavtaradze (M. V. Lomonosov MSU) made speeches at the Symposium. The widow of the scientist Anna T. Jagodina, his daughter Tatiana and grandson Alexei became the honorary guests of the Symposium.

The Symposium in memory of a graduate of The Mendeljejevka, Valentin Koptug, academician, took place in D. I. Mendeleev RCTU on the 4th of October of 2017. The widow of the scientist, Irina F. Mikhailova, and his son, Igor V. Koptug, a professor took part in the work of the Symposium. Professor A. G. Majouga, professor N. P. Tarasova, RAS Corresponding Member; Sean Korish, Professor of physical chemistry of Trinity College (Dublin, Ireland); D. I. Mustafin, Professor of the department of the United Nations Educational, Scientific and Cultural Organization (UNESCO) "Green chemistry for sustainable development" (D. I. Mendeleev RSTU); E. A. Baum, a senior researcher of D. I. Mendeleev MSU, a member of the Union of Journalists of Russia; S. V. Morozov, the head of the Laboratory for environmental studies and chromatographic analysis of N.N. Vorozhtsov Novosibirsk Institute of Organic Chemistry, SB RAS, and M. N. Korotkevich, the winner of the Presidential Prize in Education, also participated in the Symposium.

The speakers spoke of the fact that academician Valentin A. Koptug had been an outstanding thinker, the greatest scientist, a very resolute man, the largest organizer of the scientific process on domestic and world levels, being the IUPAC President, *i.e.* the main legislative body in the world chemical science and technology that unites chemists from

almost all countries of the world.

The selection of the MUCT for holding the 7th IUPAC International Conference on Green Chemistry attests to the fact that a scientific and educational centre of the world level has developed here in this area, most important for the world civilization. It is here where back in 1983, on the initiative of professor, Gennadii A. Jagodin, the department of industrial ecology was organized for the first time in our country. And in 1995, three years after the United Nation Organization (UNO) conference in Rio de Janeiro had declared the need for the transition to sustainable development and pointed to the fact that stability of any society depends on education level, the department of sustainable development problems was created. It was the first chair in Russia and the world; professor, N. P. Tarasova headed it. The successful operation of the department allowed the creation of the Institute of Chemistry and Problems of Sustainable Development on its basis in 2000. It is curious that this happened two years prior to December of 2002, by the time that the UNO announced the decade of 2005–2014 the Decade

of Education for sustainable development. Thus, the Institute of Chemistry and Problems of Sustainable Development appeared to be in the vanguard of modern science and education. The UNESCO Chair in Green Chemistry for Sustainable Development that became the basis for holding the 7th International IUPAC Conference on Green Chemistry was created in the Institute by world scientific community initiative in 2013.

It is worth saying that many enterprises actively support the ideas of green chemistry and sustainable development. FosAgro PJSC and China Petrochemical Technology Co. Ltd. (Sinopec) are among them. FosAgro PJSC in collaboration with UNESCO and IUPAC have been involved in support of young scientists involved in the development of environmentally safe technologies within the Green Chemistry for Life project (Sinopec) for the last four years. The latter is a successful example of bringing together the efforts of science and industry in the generation of new progress ethics providing for high responsibility for the prosperity of future generations of Planet Earth.