

45th International Chemistry Olympiad
Moscow, July 15-24, 2013

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Dmitry Livanov

Minister of Science and Education of the Russian Federation

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The Formula of **Russia**



Amber is a unique natural decorative material, and over 90% of world amber reserve is accumulated in the Western part of Russia within Kaliningrad region. The unique amber-extracting industrial plant is located right here, therefore the regional capital of Kaliningrad city is also the world amber capital.



Ununoctium is the chemical element with so far the largest atomic number (118). It was synthesized in the Joint Institute for Nuclear Research in Dubna (Moscow region) in 2006. This town is also known as the place where one of the world's first particle accelerators (synchrotron) was built in 1957 and where a number of trans-uranic elements with atomic numbers of 104, 113, 114, 115, 116, 117 were first synthesized.



Russia is the world leader in natural gas extraction and export (mostly through Gazprom energy company). 90% of Russian and 20% of worldwide gas extraction accrues to a small region of Yamal peninsula located above the Arctic Circle.



The level of carbon dioxide emission is a measure of industry development. Russia here is the 4th in the world. Dozens of energy saving and CO₂ emission abatement projects are carried out in our country. The picture shows the world's biggest and one of the most efficient thermal power stations (located in Surgut).



Titanium, or the "black gold", is a chemical symbol of space exploration. First spaceships were made of titanium alloys. Russia was the first country to launch an artificial Earth satellite (1957) and perform a manned space mission (1961, Yuri Gagarin). To memorize this scientific breakthrough the monument to space explorers was built in Moscow. This monument is entirely covered with titanium plates.



Russia was the first country to start using nuclear energy for peaceful purposes. The world's first nuclear power station was built in Obninsk (1954). The first nuclear non-military ship (the icebreaker "Lenin", 1959) was constructed and launched in Russia as well.



Traditionally Russian orthodox churches are crowned by decorated onion-like gilded domes. In sunny days the shining gold makes domes look like burning candles. The domes are gilded either by galvanostatic plating or by coating them with thin gold leaves. The ancient Russian church of Dormition in Vladimir, one of the oldest Russian cities, was built in the 12th century.



Russian chemistry facebook



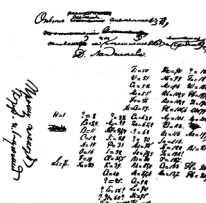
Mikhail Lomonosov (1711–1765)

The most famous Russian scientist and writer, one of the founders of physical chemistry. Discovered the mass conservation law (1748), contributed much to various natural sciences. In 1755 established the Moscow State University later named after him. The picture shows the oldest University building.



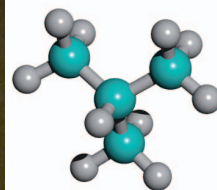
Dmitry Mendeleev (1834–1907)

The best-known Russian chemist. Discovered the Periodic law (1869), and by using it predicted 11 new elements. Later 5 of these have been found in nature or synthesized in laboratory. Predicted the existence of critical temperature for liquids. Author of the famous textbook «Foundations of chemistry».



Alexander Butlerov (1828–1886)

Famous Russian organic chemist. Made significant contribution to the theory of chemical structure of organic compounds (1861). Elaborated a number of important synthetic procedures, discovered the formose reaction (1861). The teacher for several generations of Russian chemists.



Russia has more than a thousand-year history. These centuries were rich with historical events as well as ambitious breakthroughs, periods of intense development and great scientific and cultural achievements. Nowadays Russia is an independent federal presidential state with the territory of over 17 mln square kilometers, thus being the largest of all the countries. 143 mln people of more than 200 nationalities inhabit this land; they are associated with different cultural traditions and religions, Orthodoxy being the widest-spread confession. Russia is a land of ancient culture and traditions, enormous natural resources and growing economy, currently ranked 7th in the world.

Russia has contributed to the world history as the first country to launch man into space. It is also known as the motherland of great writers and poets (Pushkin, Dostoevsky, Tolstoy, Akhmatova), artists (Repin, Shagal, Kandinsky), musicians (Chaikovsky, Glinka, Shostakovich) and scientists (chemist Mendeleev, mathematician Kolmogorov, physicist Landau, biologist Vavilov, physiologist Pavlov; see also our Chemistry Facebook).

²⁰¹Hg

As you know, mercury thermometers stem freeze at temperatures below -39°C (-38.2°F). In many regions of Russia one cannot use mercury devices throughout the whole year, as about 65% of the area is the permafrost zone. Oymyakon village in Siberia is known as the Cold Pole of the planet. The lowest temperature observed there was -67.8°C (-90°F).



⁵⁶Fe

Russia has the largest iron ore resources in the world. Since the 18th century the iron ore mining is most extensively carried out in the Ural region. Kasli, a small town in the Urals, keeps an exclusive technology of making art objects of cast iron.



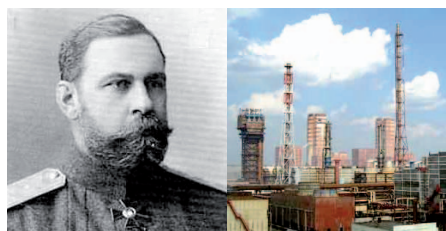
12°

25% of all world diamonds are mined in Yakutia region covering huge territory in the north-eastern part of Siberia. The "diamond capital" of Russia — the town of Mirny, was established in 1957 near the biggest diamond mine in the world (see the photo).



H₂O

Russia is the world's second fresh water reservoir after Brazil. The world's deepest lake Baikal situated in Siberia holds about 20% of all lake fresh water of the planet. Due to low mineralization its water is considered to be the purest natural water in the world.



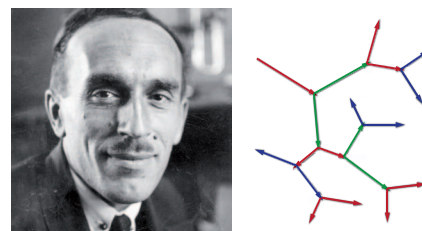
Vladimir Ipatyev (1867–1952)

Military chemist, one of the founders of chemical industry in Russia. Discovered the way to obtain butadiene from ethanol, was the first to conduct ethylene polymerization. In 1930 emigrated to the USA, where largely contributed to developing the national oil industry. Actually became one of the most important figures in the world petrochemistry.



Boris Belousov (1893–1970)

Military chemist, developed new protection methods against chemical weapons. Discovered the new class of oscillating chemical reactions currently known as BZ (Belousov-Zhabotinsky) reactions. This gave rise to new branches of physics and mathematics dealing with non-linear dynamics in complex systems.



Nikolay Semenov (1896–1986)

Physicist, the only Russian Nobel Prize winner in chemistry (1956). One of the founders of chemical physics. Studied branched chain reactions and discovered both experimentally and theoretically many new regularities in this field.



To participants and organizers of the 45th International Chemistry Olympiad,

It is a great honor for us to organize the 45th International Chemistry Olympiad, which I consider an international acknowledgement of the high level of Russian science and education. Moscow will be hosting participants of the 45th International Chemistry Olympiad in summer 2013. Student teams from 75 countries will get acquainted with Russia and its capital, meet scientists, who have made a valuable contribution to the international science. The Olympiad organizers will do their best to let you show your best expertise and practical skills. Each of you has covered a long way towards the International Olympiad. Having won a number of national contests you have proved your right to represent your countries at this prestigious intellectual world-stage competition.

I have no doubt that all of you as participants of the International Chemistry Olympiad form an extremely powerful force with enormous innovation potential. It is this creative, ambitious and energetic young generation that is going to be the vanguard of the world science in the near future, ensuring global progress and prosperity of the human society. I wish you creative achievements and a lot of success in your future scientific research!

Dmitry Livanov
Minister of Education and Science of the Russian Federation



Dear friends, It is going to be the third time Moscow State University is hosting the International Chemistry Olympiad.

This oldest Russian university bears the name of an outstanding Russian scientist, encyclopedist and chemist Mikhail Lomonosov, whose 300th anniversary was last year celebrated worldwide according to UNESCO decision.

Throughout its long history the University has gained recognition as one of the world scientific and educational centers, many famous scientists and researchers have graduated from here. Russian education these days is seeing significant changes with a major focus on higher education system. After joining the Bologna process in 2003 we have been taking special care of preserving the best traditions of national education: fundamental scientific background, advanced theoretical knowledge and practical skills. Still we highly value the broad international network we are a part of, which helps us taking contemporary challenges and exchanging the accumulated scientific expertise. The 45th International Chemistry Olympiad is just in line with these ambitions. So I do hope the Moscow State University will both give you a warm welcome and hospitality as the host of the Olympiad 2013, and hold a good platform for your achievements to help you in gaining a foothold on your future life. See you in Moscow!

Victor Sadovnichy
*Rector of Lomonosov Moscow State University,
Academician of the Russian Academy of Sciences*



Dear friends and colleagues,

I am honored to be the one who is in charge of arranging and holding the International Chemistry Olympiad already for the third time. Life runs fast. I remember the fireworks opening the 28th IChO in 1996 and 39th IChO in 2007 as if it were yesterday. Now we are about to host the 45th Olympiad. A lot has happened to science and education since then. The last-time prizewinners have become serious researchers determining the state of today's chemistry in Russia. As I have been organizing the IChOs for years, it is of great interest for me to follow evolution of the event, see how its weight grows, welcome new countries joining the forum, and witness increasing complexity of the IChO scientific program. These changes are inevitable, still as organizers we do our best to preserve the unique spirit of the event, its slight innocence and creative atmosphere typical of the first olympiads. The driving force in this direction is our Love to our profession and our science of Chemistry.

The IChO competition will take only two days of nine. All the rest time is expected to be used for networking. Hospitality is a true Russian feature, and I hope you will feel it and enjoy your stay in our country. Have a successful Olympiad. See you in Moscow in 2013.

Sincerely yours,
Valery Lunin
*Dean of the MSU Chemistry Department,
Academician of the Russian Academy of Sciences*



Dear friends,

I am most happy to welcome you at the MSU Chemistry Department. My best memories are associated with this place as well as with the International Olympiads I participated in. It is all about emotions: the thrill of getting to know a new country, the agitation of looking forward to the Olympiad, the anticipation of the results and, finally, the unbelievable feeling of being the winner. I sincerely wish you to live through these 10 days filled with bright impressions and exciting encounters.

Good luck in the contest.

Alexey Zeifman
*MSU Chemistry department graduate,
the absolute winner of IChOs in 2004 and 2005*

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