

# CHEMISTRY 2011 Chemistry – Our Life, Our Future



Partners for the

International Veer of Chemistry 2011

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## **IYC 2011**

All known matter – gas, liquid and solid – is composed of the chemical elements or of compounds made from those elements.

Humankind's understanding of the material nature of our world is grounded in our knowledge of chemistry. Indeed all living processes are controlled by chemical reactions.

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Pure and Applied

Chemistry

United Nations • Educational, Scientific and •

Cultural Organization

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## **IYC 2011**

The International Union of Pure and Applied **Chemistry (IUPAC) and The United Nations** Educational, Scientific and Cultural **Organization (UNESCO) strongly believe that** it is time to celebrate the achievements of chemistry and its contributions to the wellbeing of humankind.





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# **Background and Concept**

The concept of IYC 2011 started with the recognition by IUPAC that a number of scientific disciplines have achieved significant benefits from securing designation by the United Nations of an international year pertaining to their field.

The idea of holding a year of chemistry was first discussed in 2006, during the April meeting of the IUPAC Executive Committee.

- IUPAC Endorsement August 2007
- UNESCO Support April 2008
- UN Declaration December 2008

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## **UNESCO:**

# United Nations Educational, Scientific and Cultural Organization

Founded at 1945 and now it has 193 Member States and 6 Associate Members. Iran is one of its Member State From 6 Sep. 1948.



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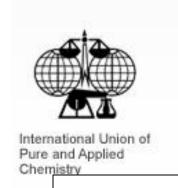




### **IUPAC:**

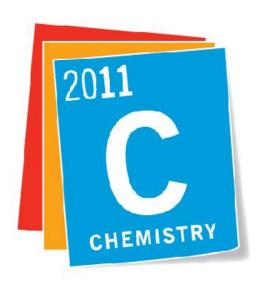
# International Union of Pure and Applied Chemistry

Founded at 1919 by chemists from academia and industry, has a truly global reach with 57 National Adhering Organizations, 4 Associate National Adhering Organizations and 36 Associate Adhering Organizations.



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# International Year of CHEMISTRY 2011

Chemistry - Our Life, Our Future

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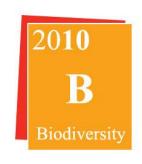
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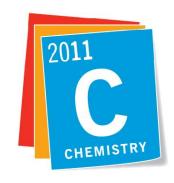
International Year of **Astronomy** 

2009 IYA



International Year of **Biodiversity** 

2010 IYB



International Year of CHEMISTRY
2011
IYC

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# Selection of the Year:

The year 2011:

Marks the one-hundredth anniversary of the Nobel Prize in Chemistry awarded to *Marie Sklodowska Curie*,

&

Also marks the one-hundredth anniversary of the founding in Paris of the International Association of Chemical Societies.

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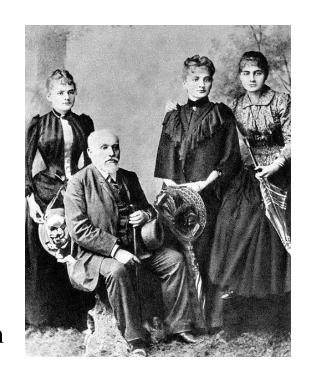


### Marie Sklodowska-Curie

was a Polish-born French physicist and chemist famous for her work on radioactivity.

She was born in Warsaw, Poland, on 7 November 1867. she was the fifth and youngest child of her family.

In October 1891, she decided to go to France and studying at the Sorbonne. In 1893 she was awarded a degree in physics and in 1894, earned a degree in mathematics.



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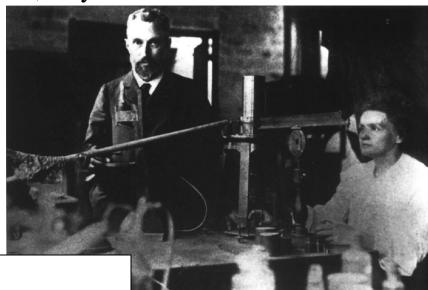


### Marie Sklodowska-Curie

At The same year, Pierre Curie entered her life. He was an instructor at the School of Physics and Chemistry.

it was their mutual interest in magnetism that drew Skłodowska and Curie together.

Almost a year later, in July 1895, they married.



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In 1896 Henri Becquerel discovered that uranium salts emitted rays (X-rays) that unlike phosphorescence, did not depend on an external source of energy, but seemed to arise spontaneously from uranium itself. He had, in fact, discovered radioactivity.



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Marie decided to look into uranium rays as a possible field of research for her thesis.

She used a clever technique to investigate samples. Fifteen years earlier, her husband and his brother had invented the electrometer, a sensitive device for measuring electrical charge.



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Using the Curie electrometer, she discovered that uranium rays caused the air around a sample to conduct electricity. Using this technique, her first result was the finding that the activity of the uranium compounds depended only on the quantity of uranium present. She had shown that the radiation was not the outcome of some interaction of molecules, but must come from the atom itself. In scientific terms, this was the most important single piece of work that she conducted.



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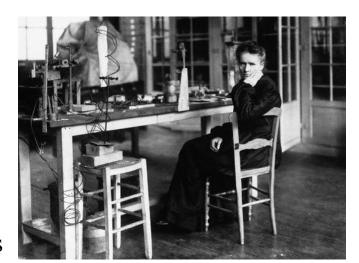


### Marie Sklodowska-Curie

Sklodowska—Curie's systematic studies had included two uranium minerals, pitchblende and torbernite.

Her electrometer showed that pitchblende was four times as active as uranium itself, and chalcolite twice as active.

She concluded that, if her earlier results relating the quantity of uranium to its activity were correct, then these two minerals must contain small quantities of some other substance that was far more active than uranium itself.



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### Marie Sklodowska-Curie

In July 1898, Sklodowska—Curie and her husband published a paper together, announcing the existence of an element which they named "polonium", in honor of her native Poland and on 26

December 1898 the Curies announced the existence of a second element, which they named "radium" for its intense *radioactivity*.





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Pitchblende is a complex mineral.

The discovery of polonium had been relatively easy; chemically it resembles the element bismuth, and polonium was the only bismuth-like substance in the ore.

Radium, however, was more elusive. It is closely related, chemically, to barium, and pitchblende contains *both* elements.



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### Marie Sklodowska-Curie

The Curies undertook the task of separating out radium salt by differential crystallization. From a ton of pitchblende, one-tenth of a gram of radium chloride was separated in 1902.

In 1903, under the supervision of Henri Becquerel, Marie was awarded her DSc from the University of Paris.



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### Marie Sklodowska-Curie

At the same year, the Royal Swedish Academy of Sciences awarded Pierre Curie, Marie Curie and Henri Becquerel the Nobel Prize in Physics, "in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel.



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In 1897 and 1904, respectively, Sklodowska–Curie gave birth to their daughters, Irène and Eve Curie.

On 19 April 1906 Pierre was killed in a street accident.

After that she was working without her husband and on 1910 she had isolated the pure radium metal.



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### Marie Sklodowska-Curie

Sklodowska—Curie was the first woman to be awarded a Nobel Prize. Eight years later, she would receive the 1911 Nobel Prize in Chemistry, "in recognition of her services to the advancement of chemistry by the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element."

A month after accepting her 1911 Nobel Prize, she was hospitalized with depression and a kidney ailment.



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### Marie Sklodowska-Curie

Sklodowska—Curie was the first person to win or share two Nobel Prizes.

She is one of only two people who have been awarded a Nobel Prize in two different fields, the other person being Linus Pauling (for chemistry and for peace)



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### Marie Sklodowska-Curie

Sklodowska—Curie's second Nobel Prize, in 1911, enabled her to talk the French government into funding the building of a private Radium Institute (Institut du radium, now the Institut Curie), which was built in 1914 and at which research was conducted in chemistry, physics, and medicine. The Institute became a crucible of Nobel Prize winners, producing four more, including her daughter Irène Joliot-Curie and her son-in-law, Frédéric Joliot-Curie.



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### Marie Sklodowska-Curie

Marie, on 4 July 1934, died, from aplastic anemia, which was almost certainly contracted from exposure to radiation.

The damaging effects of ionizing radiation were not known, and much of her work had been carried out without proper safety measures. She had carried test tubes containing radioactive isotopes in her pocket or stored desk drawer,



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### Marie Skłodowska-Curie

She was interred at the cemetery in Sceaux, alongside her husband Pierre. Sixty years later, in 1995, in honor of their achievements, the remains of both were transferred to the Paris Panthéon. She became the first – and so far the only – woman to be honored with interrment in the Panthéon on her own merits. Her laboratory is preserved at the Musée Curie.



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Because of their levels of radioactivity, her papers from the 1890s are considered too dangerous to handle. Even her cookbook is highly radioactive. They are kept in lead-lined boxes, and those who wish to consult them must wear protective clothing.



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# Irène Joliot-Curie

In 1935 Irene realised the alchemist's dream of turning one element into another, creating radioactive nitrogen from boron and then radioactive isotopes of phosphorus from aluminum and silicon from magnesium.

In 1956, she was admitted to the Curie hospital in Paris where she died on 17 March at the age of 58 from leukemia.



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# Ève Denise Curie Labouisse

She was a French-American writer, journalist and pianist of Polish descent.

In 1965, Ève's husband became the Executive Director of the United Nations Children's Fund UNICEF. Labouisse held this office till 1979, actively supported by his wife, who also worked for the organization and was often called "the First Lady of UNICEF". Together, they visited more than 100 countries, mostly in the Third World, which were beneficiaries of UNICEF's help. In 1965, Labouisse, accompanied by his wife, accepted the Nobel Peace Prize, which was awarded to his organization. Ève Curie died in her sleep on 22 October 2007 aged 103 years.



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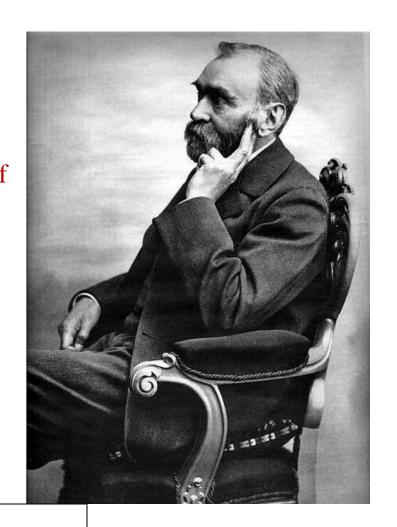
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### The Nobel Prize



The Nobel Prize in Chemistry is awarded annually by the Royal Swedish Academy of Sciences to scientists in the various fields of chemistry. It is one of the five Nobel Prizes established by the will of Alfred Nobel in 1895, awarded for outstanding contributions in chemistry, physics, literature, peace, and physiology or medicine.



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Jacobus Henricus van 't Hoff (1852–1911) Netherlands was the first person to receive the Nobel Prize in Chemistry, for his discovery of the laws of chemical dynamics and osmotic pressure in solutions.



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Hermann Emil Fischer
Germany
for his work on sugar and purine syntheses

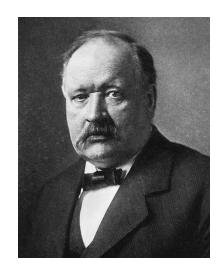


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Svante August Arrhenius Sweden for his electrolytic theory of dissociation



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Ernest Rutherford
United Kingdom/New Zealand
for his investigations into the
disintegration of the elements, and the
chemistry of radioactive substances



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Marie Sklodowska-Curie
France
for the discovery of the elements
radium and polonium



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Victor Grignard
France
for the discovery of the Grignard
reagent



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Alfred Werner
Switzerland
for his work on the linkage of atoms in
molecules especially in inorganic
chemistry



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for the synthesis of ammonia from its
elements

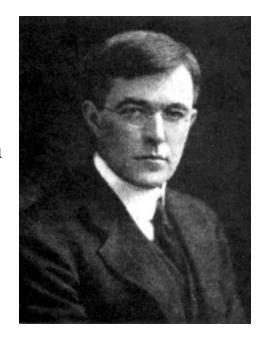


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Irving Langmuir
United States
for his discoveries and investigations in
surface chemistry



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Irène Joliot-Curie &
Frédéric Joliot
France
for their synthesis of new radioactive
elements





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Netherlands
or his work on molecular structure
through his investigations on dipole
moments and the diffraction of X-rays
and electrons in gases

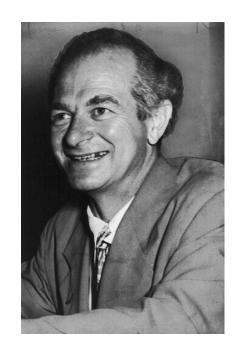


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Linus Carl Pauling
United States
for his research into the nature of the
chemical bond and its application to the
elucidation of the structure of complex
substances



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### Chemistry - Our Life, Our Future



## The Nobel Prize in Chemistry 1963

Karl Ziegler
Federal Republic of Germany &
Giulio Natta
Italy
for their discoveries in the field of
chemistry and technology of high
polymers



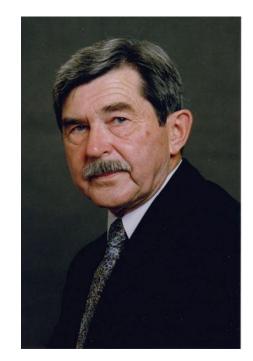


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Henry Taube
United States
for his work on the mechanisms of
electron transfer reactions, especially in
metal complexes



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Ahmed H. Zewail
Egypt/United States
for his studies of the transition states of
chemical reactions using femtosecond
spectroscopy



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### The Nobel Prize in Chemistry 2010

Richard F. Heck & Ei-ichi Negishi & Akira Suzuki for palladium-catalyzed cross couplings in organic synthesis







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# Objectives of the International Year of Chemistry

- Increase the public appreciation and understanding of chemistry in meeting world needs
- Encourage interest of young people in chemistry
- Generate enthusiasm for the creative future of chemistry
- Celebrate the role of women in chemistry and major historical events in chemistry, including the centenaries of Mme. Curie's Nobel Prize

Conversation between Chemistry and Society about the future shape of chemistry for sustainability set in the context of chemistry's achievements

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The Iranian Chemical Society <a href="http://www.ics-ir.org">http://www.ics-ir.org</a>

Dr. Shamsipour

Dr. Tarrasoli



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# IYC is a chance that will not come again for some time . . .

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