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1901-2026: THE GLORIOUS 125 YEARS OF NOBEL PRIZE IN CHEMISTRY

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ABSTRACT

A Nobel Committee is a working body responsible for most of the work involved in selecting Nobel Prize laureates. There are five Nobel Committees, one for each Nobel Prize. Four of these committees (for prizes in physics, chemistry, physiology or medicine, and literature) are working bodies within their prize awarding institutions, the Royal Swedish Academy of Sciences, Karolinska Institutet, and the Swedish Academy. These four Nobel Committees only propose laureates, while the final decision is taken in a larger assembly. This assembly is composed of the entire academies for the prizes in physics, chemistry, and literature, as well as the 50 members of the Nobel Assembly at the Karolinska Institute for the prize in physiology or medicine. The fifth Nobel Committee is the Norwegian Nobel Committee, responsible for the Nobel Peace Prize. This committee has a different status since it is both the working body and the deciding body for its prize. Nomination to the Nobel Prize in Chemistry is by invitation only. The names of the nominees and other information about the nominations cannot be revealed until 50 years later. The Nobel Committee for Chemistry sends confidential forms to persons who are competent and qualified to nominate.

KEYWORDS: Alfred Nobel, Nobel Award, Nobel Lecture, Nobel Citation, Nobel Banquet.



Nobel Prize Award Ceremony

Qualified Nominators

The right to submit proposals for the award of a Nobel Prize in Chemistry shall, by statute, be enjoyed by:

1. *Swedish and foreign members of the Royal Swedish Academy of Sciences;*
2. *Members of the Nobel Committees for Chemistry and Physics;*
3. *Nobel Laureates in Chemistry and Physics;*
4. *Permanent professors in the sciences of Chemistry at the universities and institutes of technology of Sweden, Denmark, Finland, Iceland and Norway, and Karolinska Institutet, Stockholm;*
5. *Holders of corresponding chairs in at least six universities or university colleges selected by the Academy of Sciences with a view to ensuring the appropriate distribution over the different countries and their centers of learning; and*
6. *Other scientists from whom the Academy may see fit to invite proposals.*

The Nobel Committee for Chemistry is the Nobel Committee responsible for proposing laureates for the Nobel Prize in Chemistry. The Nobel Committee for Chemistry is appointed by the Royal Swedish.



Royal Swedish Academy of Sciences

Academy of Sciences. It usually consists of Swedish professors of chemistry who are members of the Academy, although the Academy in principle could appoint anyone to the Committee. The Committee is a working body without decision power, and the final decision to award the Nobel Prize for Chemistry is taken by the entire Royal Swedish Academy of Sciences, after having a first discussion in the Academy's Class for Chemistry.

Decisions as to the selection of the teachers and scientists referred to in paragraphs 5 and 6 above shall be taken each year before the end of the month of September. Selection of Nobel Laureates: The Royal Swedish Academy of Sciences is responsible for the selection of the Nobel Laureates in Chemistry from among the candidates recommended by the Nobel Committee for Chemistry. The Nobel Committee is the working body that screens the nominations and selects the final candidates. It consists of five members, but for many years the Committee has also adjunct members with the same voting rights as members.

Who is eligible for the Nobel Prize in Chemistry?

The candidates eligible for the Chemistry Prize are those nominated by qualified persons who have received an invitation from the Nobel Committee to submit names for consideration. No one can nominate himself or herself.

Below is a brief description of the process involved in selecting the Nobel Laureates in Chemistry:

September-October *– Nomination forms are sent out. The Nobel Committee sends out confidential forms to around 3,000 people — selected professors at universities around the world, Nobel Laureates in Physics and Chemistry, and members of the Royal Swedish Academy of Sciences, among others.*

February *– Deadline for submission of nominations. The completed nomination forms must reach the Nobel Committee no later than 31 January of the following year. The Committee screens the nominations and selects the preliminary candidates. About 250–350 scientists are nominated as several nominators often submit the same name.*



March-May *– Consultation with experts. The Nobel Committee evaluates preliminary candidates, advised by specially appointed experts for their assessment of the candidates' work.*

June-August *– Writing of the report. The Nobel Committee puts together a report with recommendations to be submitted to the Academy. The report is signed by all members of the Committee.*

September *– Committee submits recommendations. The Nobel Committee submits its report with recommendations on the final candidates to the members of the Academy. The report is discussed at two meetings of the Chemistry Section of the Academy.*

October *– Nobel Laureates are chosen. In early October, the Academy selects the Nobel Laureates in Chemistry through a majority vote. The decision is final and without appeal. The names of the Nobel Laureates are then announced.*

December *– Nobel Laureates receive their Prize. The Nobel Prize Award Ceremony takes place on 10 December in Stockholm, where the Nobel Laureates receive their Nobel Prize, which consists of a Nobel Medal and Diploma, and a document confirming the prize amount.*

The statutes of the Nobel Foundation restrict disclosure of information about the nominations, whether publicly or privately, for 50 years. The restriction concerns the nominees and nominators, as well as investigations and opinions related to the award of a prize.

Preface



Figure 1: The Nobel Prize in Chemistry was established in the 1895 will of Swedish chemist Alfred Nobel.

The Nobel Prize in Chemistry (Swedish: *Nobelpriset i kemi*) 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. This award is administered by the Nobel Foundation and awarded by Royal Swedish Academy of Sciences on proposal of the Nobel Committee for Chemistry which consists of five members elected by Academy. The award is presented in Stockholm at an annual ceremony on December 10, the anniversary of Nobel's death.



Figure 2: Nobel award ceremony and Nobel lecture.

The first Nobel Prize in Chemistry was awarded in 1901 to Jacobus Henricus van 't Hoff, of the Netherlands, "*for his discovery of the laws of chemical dynamics and osmotic pressure in solutions*." From 1901 to 2016, the award has been bestowed on a total of 174 individuals, of which four have been women.



Figure 3: Nobel banquet.

The committee and institution serving as the selection board for the prize typically announce the names of the laureates in October. The prize is then awarded at formal ceremonies held annually on December 10, the anniversary of Alfred Nobel's death. "The highlight of the Nobel Prize Award Ceremony in Stockholm is when each Nobel Laureate steps forward to receive the prize from the hands of His Majesty the King of Sweden. The Nobel Laureate receives three things: **a diploma, a medal and a document confirming the prize amount**" ("What the Nobel Laureates Receive"). Later the Nobel Banquet is held in Stockholm City Hall.

A maximum of three laureates and two different works may be selected. The award can be given to a maximum of **three recipients** per year. It consists of a gold medal, a diploma, and a cash grant. A Chemistry Nobel Prize laureate earns a gold medal, a diploma bearing a citation, and a sum of money.

Nobel Prize medals: The Nobel Prize medals, minted by Myntverket in Sweden and the Mint of Norway since 1902, are registered trademarks of the Nobel Foundation. Each medal features an image of Alfred Nobel in left profile on the obverse (front side of the medal). The Nobel Prize medals for Physics, Chemistry, Physiology or Medicine, and Literature have identical obverses, showing the image of Alfred Nobel and the years of his birth and death (1833–1896). Nobel's portrait also appears on the obverse of the Nobel Peace Prize medal and the Medal for the Prize in Economics, but with a slightly different design. The image on the reverse of a medal varies according to the institution awarding the prize. The reverse sides of the Nobel Prize medals for Chemistry and Physics share the same design.

Nobel Prize diplomas: Nobel laureates receive a diploma directly from the hands of the King of Sweden. Each diploma is uniquely designed by the prize-awarding

institutions for the laureate that receives it. The diploma contains a picture and text which states the name of the laureate and normally a citation of why they received the prize.

Award money: The laureate is given a sum of money when they receive the Nobel Prize, in the form of a document confirming the amount awarded; in 2009 the monetary award was 10 million SEK (US$1.4 million). Due to budget cuts, in 2012, the amount for each Nobel Prize was 8 million Swedish Krona, or US$1.1 million. The amount of prize money may differ depending on how much money the Nobel Foundation can award that year. If there are two laureates in a particular category, the award grant is divided equally between the recipients. If there are three, the awarding committee has the option of dividing the grant equally, or awarding one-half to one recipient and one-quarter to each of the others.



Figure 4: Nobel Prize award.

There is nothing in this world which is free from chemistry. Chemistry is such a subject which is standing on its four pillars: **why, when, how & where**. **Why** the reaction has taken place; **When** the reaction has taken place; **How** the reaction has taken place & **Where** the reaction has taken place. This subject focuses on the reactivity of two or more than two reactants according to the functional groups present in the molecule because in any chemical reaction the following five parameters are considered as the caretaker of the event: **reagent, reactant, time, temperature & catalyst**. Lacking of any one of these will hamper the chemical reaction with desired yield. It is a playground where the functional groups play a game by following why, when, how & where with reagent, reactant, time, temperature & catalyst. Most funny matter is the breaking of the word chemistry it gives: chemist+try because the last three words try gives indication to perform the reaction by try, try, try until you get the desired expectations.[1-4]

Chemistry is a branch of physical science that studies the composition, structure, properties and change of matter. Chemistry includes topics such as the properties of individual atoms, how atoms form chemical bonds to create chemical compounds, the interactions of substances through intermolecular forces that give matter its general properties and the interactions between substances through chemical reactions to form different substances. Chemistry is sometimes called the central science because it bridges other natural sciences, including physics, geology and biology. Scholars disagree about the etymology of the word chemistry. The history of chemistry can be traced to alchemy, which had been practiced for several millennia in various parts of the world. Chemistry may be *in-vivo*, *in-vitro*, *in-situ* or *in-silico*; but everywhere it acts a playground of functional groups of playing chemicals.[5-8]

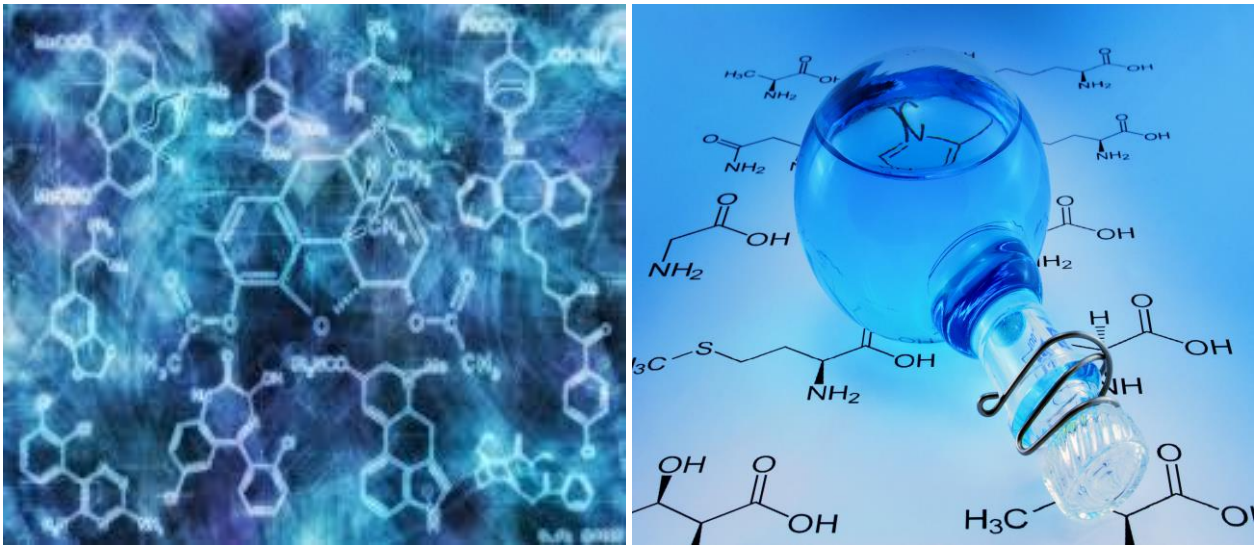


Figure 5: Theoretical and practical molecules.

Known as the central science, chemistry is integral to our understanding of the natural world around us. In this chapter, you'll be introduced to the field of chemistry, learning about its history and its modern applications.

What Is Chemistry?

When you hear the word 'chemistry,' there are likely certain images that come to mind - molecules, test tubes, the periodic table, maybe even some cool explosions in a movie but chemistry is so much more than these things! In fact, chemistry is known as the central science because it touches all other natural sciences, like biology, physics, geology and more. Chemistry is a physical science, and it is the study of the properties of and interactions between matter and energy. In other words, chemistry is a way to study the properties, characteristics, and physical and chemical changes of matter. Matter is pretty important because it's anything that has mass and takes up space - basically, all of the 'stuff' that makes up our world! Chemists study atoms, which are the basic building blocks of matter, as well interactions between atoms. They also study subatomic particles, which are smaller than atoms, and these include things like protons, neutrons, and electrons. Since everything on Earth is made of matter, and matter is made of atoms, you can see how this creates the overlap between chemistry and other sciences. You can't have 'stuff' to study if you don't have 'stuff' in the first place. In other words, matter really matters![9-12]

Chemistry Has a Rich History. Your understanding of chemistry may be shiny and new, but chemistry itself has been around for a very long time. Basic chemistry dates back to ancient times and is described as originating from alchemists who were very thorough scientists. They ran experiments and recorded their results, which is a key component of good science.

Classified chemistry: Analytical chemistry, Agrochemistry, Astrochemistry, Atmospheric chemistry, Biochemistry, Chemical biology, Chemical engineering, Cheminformatics, Combinatorial chemistry, Electrochemistry, Environmental chemistry, Femtochemistry, Flavor chemistry, Flow chemistry, Geochemistry, Green chemistry, Histochemistry, Hydrogenation chemistry, Immunochemistry, Inorganic chemistry, Marine chemistry, Materials chemistry, Materials science, Mathematical chemistry, Mechanochemistry, Medicinal chemistry, Molecular biology, Molecular mechanics, Nanochemistry, Natural product chemistry, Neurochemistry, Nuclear chemistry, Oenology, Organic chemistry, Organometallic chemistry, Petrochemistry, Pharmacological chemistry, Photochemistry, Physical chemistry, Physical organic chemistry, Phytochemistry, Polymer chemistry, Radiochemistry, Solid−state chemistry, Sonochemistry, Supramolecular chemistry, Surface chemistry, Synthetic chemistry, Theoretical chemistry, Thermochemistry.

Modern chemistry dates back to the 17th century, and credited as one of the founders of this scientific field is Robert Boyle. Boyle is one of the developers of the scientific method, which is an organized set of steps to gain knowledge and answer questions. Boyle believed in rigorous, tested experimentation and was a strong advocate of proving scientific theories before calling them 'truths.' Though not always considered a formal science, chemistry has been performed throughout human history. People have been fermenting food and drink for centuries. Extracting metal from ores is another form of 'natural' chemistry, as is making glass, soap, and extracting plant components for medicinal purposes. Archaeologists find pottery at their dig sites, and both the pots and the glazes used to protect them come from knowledge of chemistry as well.[13]

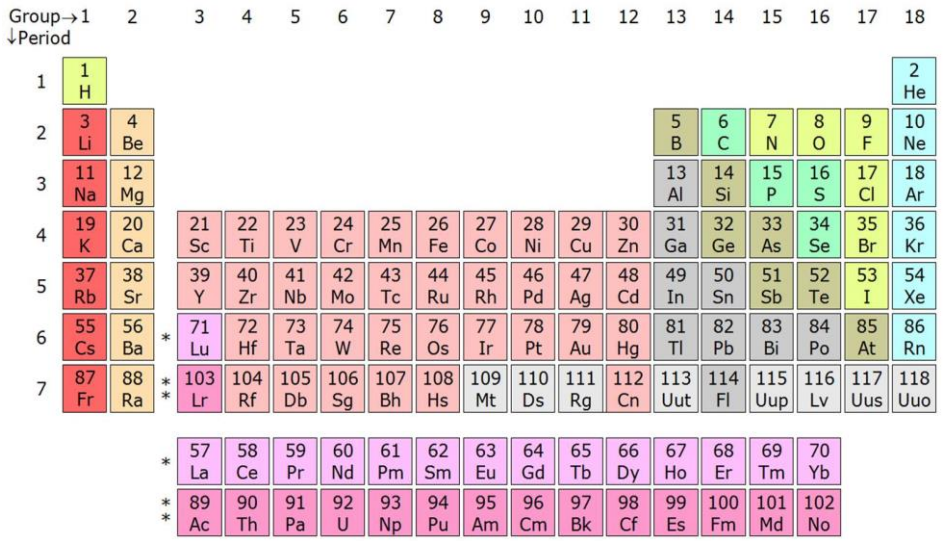
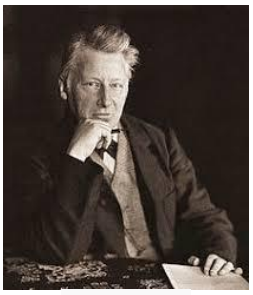


Figure 6: Periodic table: the origin of chemical molecules.

List of Nobel Laureates in Chemistry (1901-2016)[14]

1901 (One person)

Jacobus Henricus van't Hoff



Netherlands

Born: 30 August 1852, Rotterdam, Netherlands
Died: 1 March 1911, Steglitz, Berlin, Germany

Jacobus Henricus van't Hoff, Jr. was a Dutch physical chemist. A highly influential theoretical chemist of his time, van't Hoff was the first winner of the Nobel Prize in Chemistry for his work on discovery of the laws of chemical dynamics and osmotic pressure in solutions.

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1902 (One person)

Hermann Emil Fischer



Germany

Born: 9 October 1852, Euskirchen, Germany
Died: 15 July 1919, Berlin, Germany

Hermann Emil Louis Fischer FRS, FRSE, FCS was a German chemist and 1902 recipient of the Nobel Prize in Chemistry for his work on sugar and purine syntheses. He also discovered the Fischer esterification. He developed the Fischer projection, a symbolic way of drawing asymmetric carbon atoms.

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1903 (One person)

Svante August Arrhenius



Sweden

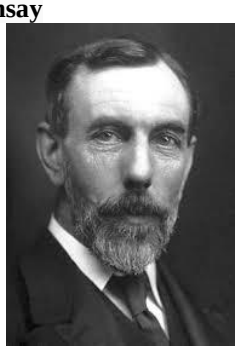
Born: 19 February 1859, Balingsta församling
Died: 2 October 1927, Stockholm, Sweden

Svante August Arrhenius was a Nobel-Prize winning Swedish scientist, originally a physicist, but often referred to as a chemist, and one of the founders of the science of physical chemistry for his work on electrolytic theory of dissociation.

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1904 (One person)

Sir William Ramsay



United Kingdom

Born: 2 October 1852, Glasgow, United Kingdom
Died: 23 July 1916, High Wycombe, United Kingdom

Sir William Ramsay KCB, FRS, FRSE was a British chemist who discovered the noble gases and received the Nobel Prize in Chemistry in 1904 in recognition of his services in the discovery of the inert gaseous elements in air for his work on discovery of the inert gaseous elements in air and his determination of their place in the periodic system.

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1905 (One person)

Johann Friedrich Wilhelm Adolf von Baeyer



Germany

Born: 31 October 1835, Berlin, Germany
Died: 20 August 1917, Starnberg, Germany

Johann Friedrich Wilhelm Adolf von Baeyer was a German chemist who synthesised indigo, developed a nomenclature for cyclic compounds and was the 1905 recipient of the Nobel Prize in Chemistry for his work on the advancement of organic chemistry and the chemical industry, through his work on organic dyes and hydroaromatic compounds.

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1906 (One person)

Henri Moissan



France

Born: 28 September 1852, Paris, France
Died: 20 February 1907, Paris, France

Ferdinand Frederick Henri Moissan was a French chemist who won the 1906 Nobel Prize in Chemistry for his work in isolating fluorine from its compounds. Moissan was one of the original members of the International Atomic Weights Committee.

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1907 (One person)

Eduard Buchner



Germany

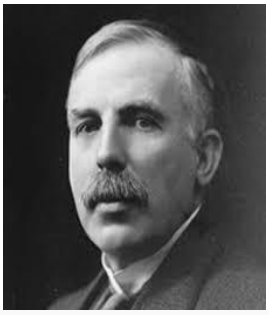
Born: 20 May 1860, Munich, Germany
Died: 13 August 1917, Focşani, Romania

Eduard Buchner was a German chemist and zymologist, awarded the 1907 Nobel Prize in Chemistry for his work on biochemical researches and his discovery of cell-free fermentation.

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1908 (One person)

Ernest Rutherford



United Kingdom, New Zealand

Born: 30 August 1871, Brightwater, New Zealand
Died: 19 October 1937, Cambridge, United Kingdom

Ernest Rutherford, 1st Baron Rutherford of Nelson, OM, FRS was a New Zealand-born British physicist who came to be known as the father of nuclear physics. He was awarded Nobel Prize in Chemistry in 1908 for his investigations into the disintegration of the elements, and the chemistry of radioactive substances.

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1909 (One person)

Wilhelm Ostwald



Germany

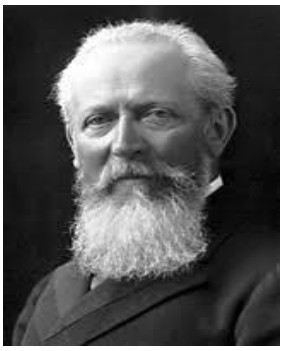
Born: 2 September 1853, Riga, Latvia
Died: 4 April 1932, Großbothen, Germany

Friedrich Wilhelm Ostwald was a German chemist. He received the Nobel Prize in Chemistry in 1909 for his work on catalysis, chemical equilibria and reaction velocities.

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1910 (One person)

Otto Wallach



Germany

Born: 27 March 1847, Königsberg, Germany
Died: 26 February 1931, Göttingen, Germany

Otto Wallach was a German chemist and recipient of the 1910 Nobel Prize in Chemistry for his work on organic chemistry and the chemical industry by his pioneer work in the field of alicyclic compounds.

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1911 (One person)

Maria Sklodowska-Curie



Poland, France

Born: 7 November 1867, Warsaw, Poland
Died: 4 July 1934, Sancellemoz

Marie Skłodowska Curie was a Polish and naturalized-French physicist and chemist who conducted pioneering research on radioactivity. She was awarded Nobel Prize in Chemistry in 1911 for 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.

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1912 (Two persons)

Victor Grignard

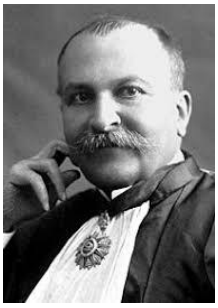


France

Born: 6 May 1871, Cherbourg-Octeville, France
Died: 13 December 1935, Lyon, France

François Auguste Victor Grignard was a Nobel Prize-winning French chemist in 1912 for the discovery of the Grignard reagent. Grignard was the son of a sail maker. After studying mathematics at Lyon he transferred to chemistry and discovered the synthetic reaction bearing his name in 1900.

Paul Sabatier



France

Born: 5 November 1854, Carcassonne, France
Died: 14 August 1941, Toulouse, France

Paul Sabatier FRS was a French chemist, born in Carcassonne. In 1912, Sabatier was awarded the Nobel Prize in Chemistry along with Victor Grignard for his method of hydrogenating organic compounds in the presence of finely disintegrated metals.

****

1913 (One person)

Alfred Werner



Switzerland

Born: 12 December 1866, Mulhouse, France
Died: 15 November 1919, Zürich, Switzerland

Alfred Werner was a Swiss chemist who was a student at ETH Zurich and a professor at the University of Zurich. He won the Nobel Prize in Chemistry in 1913 for proposing the octahedral configuration of transition metal complexes especially in inorganic chemistry.

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1914 (One person)

Theodore William Richards



United States

Born: 31 January 1868, Germantown, Philadelphia, Pennsylvania, United States
Died: 2 April 1928, Cambridge, Massachusetts, United States

Theodore William Richards was the first American scientist to receive the Nobel Prize in Chemistry in 1914, earning the award in recognition of his exact

determinations of the atomic weights of a large number of the chemical elements.

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1915 (One person)

Richards Martin Willstätter



Germany

Born: 13 August 1872, Karlsruhe, Germany
Died: 3 August 1942, Muralto, Switzerland

Richard Martin Willstätter, ForMemRS was a German organic chemist whose study of the structure of plant pigments, chlorophyll included, won him the 1915 Nobel Prize for Chemistry for his researches on plant pigments, especially chlorophyll.

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1916 (Not awarded)

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1917 (Not awarded)

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1918 (One person)

Fritz Haber



Germany

Born: 9 December 1868, Wrocław, Poland
Died: 29 January 1934, Basel, Switzerland

Fritz Haber was a German chemist who received the Nobel Prize in Chemistry in 1918 for his invention of the Haber–Bosch process, a method used in industry to synthesize ammonia from nitrogen gas and hydrogen gas.

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1919 (Not awarded)

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1920 (One person)

Walther Hermann Nernst



Germany

Born: 25 June 1864, Wąbrzeźno, Poland
Died: 18 November 1941, Niwica, Żary County, Poland

Walther Hermann Nernst, ForMemRS was a German chemist who is known for his work in thermodynamics; his formulation of the Nernst heat theorem helped pave the way for the third law of thermodynamics. He was awarded Nobel Prize in Chemistry in 1920 for his work in thermochemistry.

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1921 (One person)

Frederick Soddy



United Kingdom

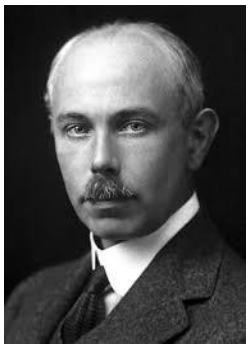
Born: 2 September 1877, Eastbourne, United Kingdom
Died: 22 September 1956, Brighton, United Kingdom

Frederick Soddy FRS was an English radiochemist who explained, with Ernest Rutherford, that radioactivity is due to the transmutation of elements, now known to involve nuclear reactions. He was awarded Nobel Prize in Chemistry in 1921 for his contributions to our knowledge of the chemistry of radioactive substances, and his investigations into the origin and nature of isotopes.

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1922 (One person)

Francis William Aston



United Kingdom

Born: 1 September 1877, Harborne, United Kingdom
Died: 20 November 1945, Cambridge, United Kingdom

Francis William Aston FRS was an English chemist and physicist who won the 1922 Nobel Prize in Chemistry for his discovery, by means of his mass spectrograph, of isotopes, in a large number of non-radioactive elements, and for his enunciation of the whole number rule. He was a fellow of the Royal Society and Fellow of Trinity College, Cambridge.

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1923 (One person)

Fritz Pregl



Austria

Born: 3 September 1869, Ljubljana, Slovenia
Died: 13 December 1930, Graz, Austria

Fritz Pregl, was a Slovenian and Austrian chemist and physician from a mixed Slovene-German-speaking background. He won the Nobel Prize in Chemistry in 1923 for making important contributions to quantitative organic microanalysis, one of which was the improvement of the combustion train technique for elemental analysis.

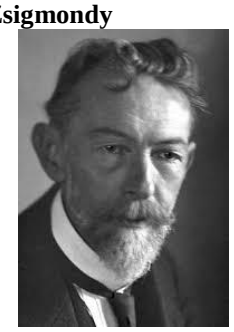
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1924 (Not awarded)

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1925 (One person)

Richard Adolf Zsigmondy



Germany, Hungary

Born: 1 April 1865, Vienna, Austria
Died: 23 September 1929, Göttingen, Germany

Richard Adolf Zsigmondy was an Austrian-Hungarian chemist. He was known for his research in colloids, for which he was awarded the Nobel Prize in chemistry in 1925 for his demonstration of the heterogeneous nature of colloids solutions and for the methods he used. The crater Zsigmondy on the Moon is named in his honour.

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1926 (One person)

The (Theodor) Svedberg



Sweden

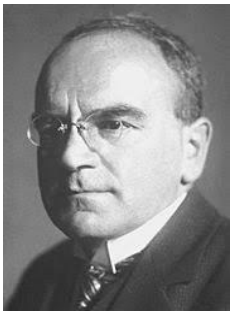
Born: 30 August 1884, Valbo, Sweden
Died: 25 February 1971, Kopparberg, Sweden

Theodor Svedberg was a Swedish chemist and Nobel laureate, active at Uppsala University. He was awarded Nobel Prize in 1926 in Chemistry for his work on disperse system.

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1927 (One person)

Heinrich Otto Wieland



Germany

Born: 4 June 1877, Pforzheim, Germany
Died: 5 August 1957, Starnberg, Germany

Heinrich Otto Wieland was a German chemist. He won the 1927 Nobel Prize in Chemistry for his research into constitution of and related substances.

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1928 (One person)

Adolf Otto Reinhold Windaus



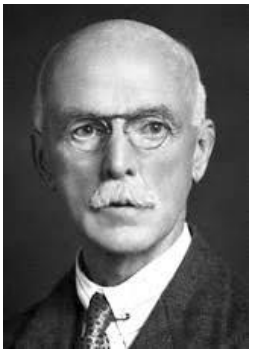
Germany
Born: 25 December 1876, Berlin, Germany
Died: 9 June 1959, Göttingen, Germany

Adolf Otto Reinhold Windaus was a German chemist who won a Nobel Prize in Chemistry in 1928 for his work on sterols and their relation to vitamins. He was the doctoral advisor of Adolf Butenandt who also won a Nobel Prize in Chemistry in 1939.

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1929 (Three persons)

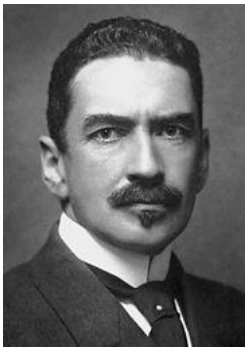
Arthur Harden



United Kingdom
Born: 12 October 1865, Manchester, United Kingdom
Died: 17 June 1940, Bourne End, United Kingdom

Sir Arthur Harden, FRS was a British biochemist. He shared the Nobel Prize in Chemistry in 1929 with Hans Karl August Simon von Euler-Chelpin for their investigations into the fermentation of sugar and fermentative enzymes.

Hans Karl August Simon von



Sweden
Born: 15 February 1873, Augsburg, Germany
Died: 6 November 1964, Stockholm, Sweden

Hans Karl August Simon von Euler-Chelpin was a German-born Swedish biochemist. He won the Nobel Prize in Chemistry in 1929 with Arthur Harden for their investigations on the fermentation of sugar and enzymes.

Euler-Chelpin



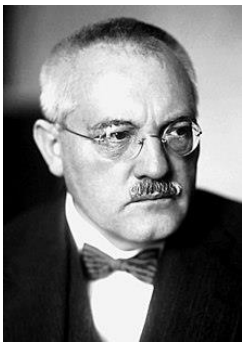
Sweden
Born: 15 February 1873, Augsburg, Germany
Died: 6 November 1964, Stockholm, Sweden

Euler-Chelpin was a German-born Swedish biochemist. He won the Nobel Prize in Chemistry in 1929 with Arthur Harden for their investigations on the fermentation of sugar and enzymes.

****

1931 (Two persons)

Carl Bosch



Germany
Born: 27 August 1874, Cologne, Germany
Died: 26 April 1940, Heidelberg, Germany

Carl Bosch was a German chemist and engineer and Nobel laureate in chemistry in 1931. He was a pioneer in the field of high-pressure industrial chemistry and founder of IG Farben, at one point the world's largest chemical company.

Friedrich Bergius



Germany

Born: 11 October 1884, Wrocław, Poland

Died: 30 March 1949, Buenos Aires, Argentina

Friedrich Karl Rudolf Bergius was a German chemist known for the Bergius process for producing synthetic fuel from coal, Nobel Prize in Chemistry in recognition of contributions to the invention and development of chemical high-pressure methods.

****

1932 (One person)

Irving Langmuir



United States

Born: 31 January 1881, Brooklyn, New York City, New York, United States

Died: 16 August 1957, Woods Hole, Falmouth, Massachusetts, United States

Irving Langmuir was awarded the 1932 Nobel Prize in Chemistry for his work in surface chemistry.

****

1933 (Not awarded)

****

1934 (One person)

Harold Clayton Urey



United States

Born: 29 April 1893, Walkerton, Indiana, United States

Died: 5 January 1981, La Jolla, California, United States

Harold Clayton Urey was an American physical chemist whose pioneering work on isotopes earned him the Nobel Prize in Chemistry in 1934 for the discovery of deuterium.

****

1935 (Two persons)

Frédéric Joliot



France

Born: 19 March 1900, Paris, France

Died: 14 August 1958, Paris, France

Jean Frédéric Joliot-Curie born Jean Frédéric Joliot, was a French physicist, husband of Irène Joliot-Curie and Nobel laureate in 1935 in Chemistry for their synthesis of new radioactive elements.

Iréne Joliot-Curie



France

Born: 12 September 1897, Paris, France

Died: 17 March 1956, Paris, France

Irène Joliot-Curie was a French scientist, the daughter of Marie Curie and Pierre Curie and the wife of Frédéric Joliot-Curie. Jointly with her husband, Joliot-Curie was awarded the Nobel Prize for Chemistry in 1935 for their discovery of artificial radioactivity. This made the Curies the family with the most Nobel laureates to date. Both children of the Joliot-Curies, Hélène and Pierre, are also esteemed scientists.

****

1936 (One person)

Petrus (Peter) Josephus Wilhelmus Debye



Netherlands

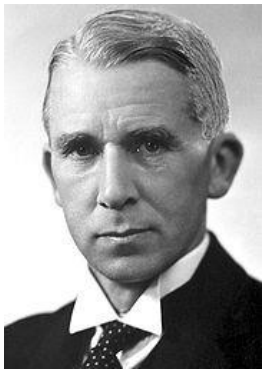
Born: 24 March 1884, Maastricht, Netherlands
Died: 2 November 1966, Ithaca, New York, United States

Peter Joseph William Debye ForMemRS was a Dutch-American physicist and physical chemist, and Nobel laureate in Chemistry in 1936 for his work on molecular structure through his investigations on dipole moments and the diffraction of X-rays and electrons in gases.

****

1937 (Two persons)

Walter Norman Haworth



United Kingdom

Born: 19 March 1883, Chorley, United Kingdom
Died: 19 March 1950, Barnt Green, United Kingdom

Sir (Walter) Norman Haworth FRS was a British chemist best known for his groundbreaking work on ascorbic acid (vitamin C) while working at the University of Birmingham. He received the 1937 Nobel Prize in Chemistry for his investigations on carbohydrates and vitamin C. The prize was shared with Swiss chemist Paul Karrer for his work on other vitamins. Haworth worked out the correct structure of a number of sugars, and is known among organic chemists for his development of the Haworth projection that translates three-dimensional sugar structures into convenient two-dimensional graphical form.

Paul Karrer



Switzerland

Born: 21 April 1889, Moscow, Russia
Died: 18 June 1971, Zürich, Switzerland

Prof Paul Karrer FRS, FRSE, FCS was a Swiss organic chemist best known for his research on vitamins. He and Walter Haworth won the Nobel Prize for Chemistry in 1937 for his investigations on carotenoids, flavins and vitamins A and B_2.

****

1938 (One person)

Richard Kuhn



Germany

Born: 3 December 1900, Vienna, Austria
Died: 1 August 1967, Heidelberg, Germany

Richard Johann Kuhn was an Austrian-German biochemist who was awarded the Nobel Prize in Chemistry in 1938 for his work on carotenoids and vitamins.

1939 (Two persons)

Adolf Friedrich Johann Butenandt

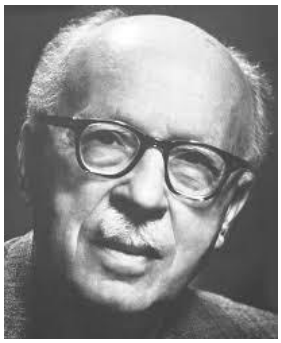


Germany

Born: 24 March 1903, Bremerhaven, Germany
Died: 18 January 1995, Munich, Germany

Adolf Friedrich Johann Butenandt was a German biochemist. He was awarded the Nobel Prize in Chemistry in 1939 for his work on sex hormones.

Leopold Ruzicka



Switzerland

Born: 13 September 1887, Vukovar, Croatia
Died: 26 September 1976, Mammern, Switzerland

Leopold Ružička ForMemRS was a Croatian scientist and joint winner of the 1939 Nobel Prize in Chemistry for his work on polymethylenes and higher terpenes who worked most of his life in Switzerland. He received eight honoris causa doctorates in science, medicine, and law; seven prizes and medals; and twenty-four honorary memberships in chemical, biochemical, and other scientific societies.

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1940 (Not awarded)

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1941 (Not awarded)

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1942 (Not awarded)

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1943 (One person)

George de Hevesy



Germany

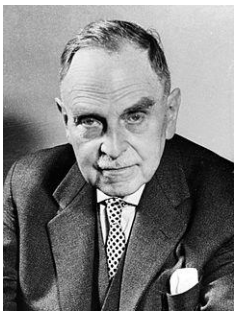
Born: 1 August 1885, Budapest, Hungary
Died: 5 July 1966, Freiburg im Breisgau, Germany

George Charles de Hevesy was a Hungarian radiochemist and Nobel laureate, recognized in 1943 for his key role in the development of radioactive tracers to study chemical processes such as in the metabolism of animals. He also co-discovered the element hafnium.

****

1944 (One person)

Otto Hahn



Germany

Born: 8 March 1879, Frankfurt, Germany
Died: 28 July 1968, Göttingen, Germany

Otto Hahn, OBE, ForMemRS was a German chemist and pioneer in the fields of radioactivity and radiochemistry. He was exclusively awarded the Nobel Prize in Chemistry in 1944 for the discovery and the radiochemical proof of nuclear fission. He is referred to as the father of nuclear chemistry.

****

1945 (One person)

Artturi Ilmari Virtanen



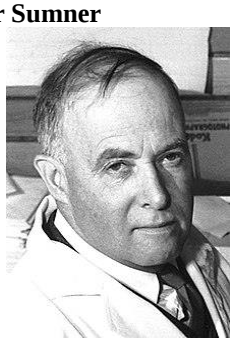
Finland

Born: 15 January 1895, Helsinki, Finland
Died: 11 November 1973, Helsinki, Finland
Artturi Ilmari was a Finnish chemist and recipient of the 1945 Nobel Prize in Chemistry for his research and inventions in agricultural and nutrition chemistry, especially for his fodder preservation method. He invented AIV silage which improved milk production and a method of preserving butter, the AIV salt, which led to increased Finnish butter exports.

****

1946 (Three persons)

James Batcheller Sumner



United States
Born: 19 November 1887, Canton, Massachusetts, United States
Died: 12 August 1955, Buffalo, New York, United States

James Batcheller Sumner was an American chemist. He discovered that enzymes can be crystallized, for which he shared the Nobel Prize in Chemistry in 1946 with John Howard Northrop and Wendell Meredith Stanley. He was also the first to prove that enzymes are proteins and those can be crystallized.

John Howard Northrop



United States
Born: 5 July 1891, Yonkers, New York, United States
Died: 27 May 1987, Wickenburg, Arizona, United States

John Howard Northrop was an American biochemist who won, with James Batcheller Sumner and Wendell Meredith Stanley, the 1946 Nobel Prize in Chemistry. The award was given for these scientists' isolation, crystallization, and study of enzymes, proteins, and viruses. Northrop was a Professor of Bacteriology and Medical Physics, Emeritus at University of California, Berkeley.

Wendell Meredith Stanley

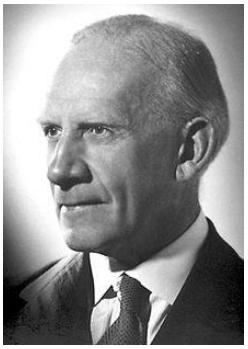


United States
Born: 16 August 1904, Ridgeville, Indiana, United States
Died: 15 June 1971, Salamanca, Spain
Wendell Meredith Stanley was an American biochemist, virologist and Nobel laureate in 1946.

****

1947 (One person)

Sir Robert Robinson



United Kingdom
Born: 13 September 1886, Derbyshire, United Kingdom
Died: 8 February 1975, Great Missenden, United Kingdom
Sir Robert Robinson OM, PRS, FRSE was an English organic chemist and Nobel laureate recognized in 1947 for his research on plant dyestuffs (anthocyanins) and alkaloids. In 1947, he also received the Medal of Freedom with Silver Palm.

****

1948 (One person)

Arne Wilhelm Kaurin Tiselius



Sweden

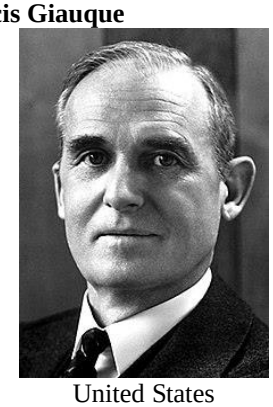
Born: 10 August 1902, Stockholm, Sweden
Died: 29 October 1971, Uppsala, Sweden

Arne Wilhelm Kaurin Tiselius was a Swedish biochemist who won the Nobel Prize in Chemistry in 1948 for his research on electrophoresis and adsorption analysis, especially for his discoveries concerning the complex nature of the serum proteins.

****

1949 (One person)

William Francis Giauque



United States
Born: 12 May 1895, Niagara Falls, Canada
Died: 28 March 1982, Berkeley, California, United States

William Francis Giauque was an American chemist and Nobel laureate recognized in 1949 for his studies in the properties of matter at temperatures close to absolute zero and for his contributions in the field of chemical thermodynamics, particularly concerning the behaviour of substances at extremely low temperatures. He spent virtually all of his educational and professional career at the University of California, Berkeley.

****

1950 (Two persons)

Otto Paul Hermann Diels



West Germany
Born: 23 January 1876, Hamburg, Germany
Died: 7 March 1954, Kiel, Germany

Otto Paul Hermann Diels was a German chemist. His most notable work was done with Kurt Alder on the Diels–Alder reaction, a method for diene synthesis. The pair was awarded the Nobel Prize in Chemistry in 1950 for their work. Their method of synthesizing cyclic organic compounds proved valuable for the manufacture of synthetic rubber and plastic. He completed his education at the University of Berlin, where he later worked. Diels was employed at the University of Kiel when he completed his Nobel Prize–winning work.

Kurt Alder



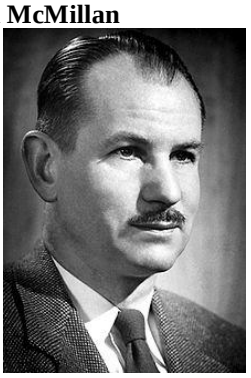
West Germany
Born: 10 July 1902, Chorzów, Poland
Died: 20 June 1958, Cologne, Germany

Kurt Alder was a German chemist and Nobel laureate in Chemistry in 1950 for the discovery of Diels-Alder synthesis jointly with Otto Paul Hermann Diels.

****

1951 (Two persons)

Edwin Mattison McMillan



United States
Born: 18 September 1907, Redondo Beach, California, United States
Died: 7 September 1991, El Cerrito, California, United States

Edwin Mattison McMillan was an American physicist and credited with being the first-ever to produce a transuranium element, neptunium. For this, he shared the Nobel Prize in Chemistry with Glenn Seaborg in 1951.

Glenn Theodore Seaborg



United States

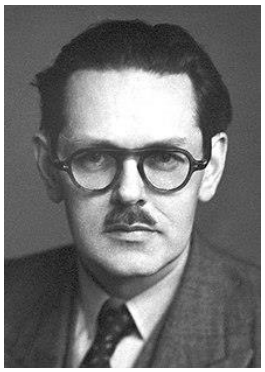
Born: 19 April 1912, Ishpeming, Michigan, United States
Died: 25 February 1999, Lafayette, California, United States

Glenn Theodore Seaborg was an American chemist whose involvement in the synthesis, discovery and investigation of ten transuranium elements earned him a share of the 1951 Nobel Prize in Chemistry.

****

1952 (Two persons)

Archer John Porter Martin

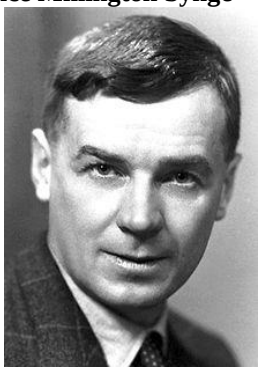


United Kingdom

Born: 1 March 1910, London, United Kingdom
Died: 28 July 2002, Llangarron, United Kingdom

Archer John Porter Martin, FRS was an English chemist who shared the 1952 Nobel Prize in Chemistry for the invention of partition chromatography with Richard Synge.

Richard Laurence Millington Synge



United Kingdom

Born: 28 October 1914, Liverpool, United Kingdom
Died: 18 August 1994, Norwich, United Kingdom

Richard Laurence Millington Synge FRS was a British biochemist, and shared the 1952 Nobel Prize in Chemistry for the invention of partition chromatography with Archer Martin.

****

1954 (One person)

Linus Carl Pauling



United States

Born: 28 February 1901, Portland, Oregon, United States
Died: 19 August 1994, Big Sur, California, United States

Linus Carl Pauling was an American chemist, biochemist, peace activist, author, and educator. He published more than 1,200 papers and books, of which about 850 dealt with scientific topics. New Scientist called him one of the 20 greatest scientists of all time, and as of 2000, he was rated the 16th most important scientist in history. Pauling was one of the founders of the fields of quantum chemistry and molecular biology. Pauling also worked on DNA's structure, a problem which was solved by James Watson, Francis Crick, Rosalind Franklin and Maurice Wilkins. In his later years he promoted nuclear disarmament, as well as orthomolecular medicine, megavitamin therapy, and dietary supplements. None of the latter have gained acceptance in the mainstream scientific community. For his scientific work, Pauling was awarded the Nobel Prize in Chemistry in 1954. In 1962, for his peace activism for his research into the nature of the chemical bond and its application to the elucidation of the structure of complex substances, he was awarded the Nobel Peace Prize. He is one of four individuals to have won more than one Nobel Prize (the others being Marie Curie, John Bardeen and Frederick Sanger). Of these, he is the only to be awarded two unshared Nobel Prizes and one of two people to be awarded Nobel Prizes in different fields, the other being Marie Curie.

****

1955 (One person)

Vincent du Vigneaud



United States

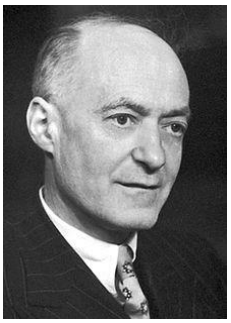
Born: 18 May 1901, Chicago, Illinois, United States
Died: 11 December 1978, Ithaca, New York, United States

Vincent du Vigneaud was an American biochemist. He won the 1955 Nobel Prize in Chemistry "for his work on biochemically important sulphur compounds, especially for the first synthesis of a polypeptide hormone, a reference to his work on the cyclic peptide oxytocin.

****

1956 (Two persons)

Sir Cyril Norman Hinshelwood

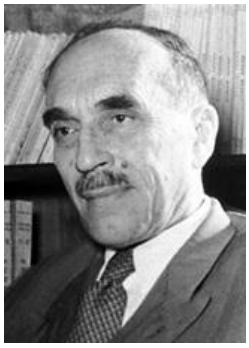


United Kingdom

Born: 19 June 1897, London, United Kingdom
Died: 9 October 1967, Chelsea, London, United Kingdom

Sir Cyril Norman Hinshelwood OM PRS was an English physical chemist and a Nobel Prize laureate in 1956 in Chemistry for the researches into the mechanism of chemical reactions.

Nikolay Nikolaevich Semenov



Soviet Union

Born: 15 April 1896, Saratov, Russia
Died: 25 September 1986, Moscow, Russia

Nikolay Nikolayevich Semyonov, ForMemRS was a Russian/Soviet physicist and chemist. Semyonov was awarded the 1956 Nobel Prize in Chemistry for his work on the mechanism of chemical transformation.

****

1957 (One person)

Lord (Alexander R.) Todd



United Kingdom

Born: 2 October 1907, Cathcart
Died: 10 January 1997, Oakington, United Kingdom

Alexander Robertus Todd, Baron Todd OM, PRS, FRSE was a British biochemist whose research on the structure and synthesis of nucleotides, nucleosides, and nucleotide coenzymes gained him the Nobel Prize for Chemistry in 1957.

****

1958 (One person)

Frederick Sanger



United Kingdom

Born: 13 August 1918, Rendcomb, United Kingdom
Died: 19 November 2013, Cambridge, United Kingdom

Frederick Sanger OM, CH, CBE FAA, was a British biochemist who twice won the Nobel Prize in Chemistry, one of only two people to have done so in the same category (the other is John Bardeen in physics), the fourth person overall with two Nobel Prizes, and the third person overall with two Nobel Prizes in the sciences. In 1958, he was awarded a Nobel Prize in chemistry for his work on the structure of proteins, especially that of insulin. In 1980, Walter Gilbert and

Sanger shared half of the chemistry prize for their contributions concerning the determination of base sequences in nucleic acids. The other half was awarded to Paul Berg for his fundamental studies of the biochemistry of nucleic acids, with particular regard to recombinant DNA.

****

1959 (One person)

Jaroslav Heyrovský



Czechoslovakia

Born: 20 December 1890, Prague, Czech Republic
Died: 27 March 1967, Prague, Czech Republic

Jaroslav Heyrovský was a Czech chemist and inventor. Heyrovský was the inventor of the polarographic method, father of the electroanalytical method, and recipient of the Nobel Prize in 1959 for his discovery and development of the polarographic methods of analysis. His main field of work was polarography.

****

1960 (One person)

Willard Frank Libby



United States

Born: 17 December 1908, Grand Valley
Died: 8 September 1980, Los Angeles, California, United States

Willard Frank Libby was an American physical chemist noted for his role in the 1949 development of radiocarbon dating, a process which revolutionized archaeology and palaeontology. For his contributions to the team that developed this process, Libby was awarded the Nobel Prize in Chemistry in 1960 for his method to use carbon-14 for age determination in archaeology, geology, geophysics, and other branches of science.

****

1961 (One person)

Melvin Calvin



United States

Born: 8 April 1911, Saint Paul, Minnesota, United States
Died: 8 January 1997, Berkeley, California, United States

Melvin Ellis Calvin was an American biochemist most famed for discovering the Calvin cycle along with Andrew Benson and James Bassham, for which he was awarded the 1961 Nobel Prize in Chemistry for his research on the carbon dioxide assimilation in plants.

****

1962 (Two persons)

Max Ferdinand Perutz



United Kingdom

Born: 19 May 1914, Vienna, Austria
Died: 6 February 2002, Cambridge, United Kingdom

Max Ferdinand Perutz OM, CH, CBE FRS was an Austrian-born British molecular biologist, who shared the 1962 Nobel Prize for Chemistry with John Kendrew, for their studies of the structures of haemoglobin and myoglobin.

John Cowdery Kendrew



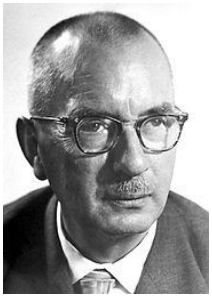
United Kingdom
Born: 24 March 1917, Oxford, United Kingdom
Died: 23 August 1997, Cambridge, United Kingdom

Sir John Cowdery Kendrew, CBE, FRS was an English biochemist and crystallographer who shared the 1962 Nobel Prize in Chemistry with Max Perutz; their group in the Cavendish Laboratory investigated the structure of heme-containing proteins.

****

1963 (Two persons)

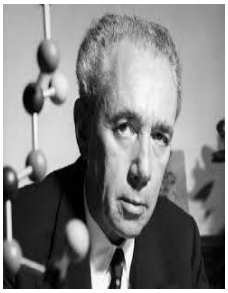
Karl Ziegler



West Germany
Born: 26 November 1898, Helsa, Germany
Died: 12 August 1973, Mülheim, Germany

Karl Waldemar Ziegler was a German chemist who won the Nobel Prize in Chemistry in 1963, with Giulio Natta, for work on polymers.

Giulio Natta



Italy
Born: 26 February 1903, Imperia, Italy
Died: 2 May 1979, Bergamo, Italy

Giulio Natta was an Italian chemist and Nobel laureate. He won a Nobel Prize in Chemistry in 1963 with Karl Ziegler for work on high polymers. He was also a recipient of Lomonosov Gold Medal in 1969.

****

1964 (One person)

Dorothy Crowfoot Hodgkin



United Kingdom
Born: 12 May 1910, Cairo, Egypt
Died: 29 July 1994, Crab Mill, Broughall, United Kingdom

Dorothy Mary Crowfoot Hodgkin OM, FRS was a British chemist who developed protein crystallography by X-ray techniques of the structures of important biochemical substances, for which she won the Nobel Prize in Chemistry in 1964.

****

1965 (One person)

Robert Burns Woodward



United States
Born: 10 April 1917, Boston, Massachusetts, United States
Died: 8 July 1979, Cambridge, Massachusetts, United States

Robert Burns Woodward was an American organic chemist. He is considered by many to be the preeminent organic chemist of the twentieth century, having made many key contributions to the subject, especially in the synthesis of complex natural products and the determination of their molecular structure. He also worked closely with Roald Hoffmann on theoretical studies of chemical reactions. He was awarded the Nobel Prize in Chemistry in 1965 for his outstanding achievements in the art of organic synthesis.

****

1966 (One person)
Robert S. Mulliken



United States
Born: 7 June 1896, Newburyport, Massachusetts, United States
Died: 31 October 1986, Arlington County, Virginia, United States

Robert Sanderson Mulliken ForMemRS was an American physicist and chemist, primarily responsible for the early development of molecular orbital theory, i.e. the elaboration of the molecular orbital method of computing the structure of molecules. He was awarded the Nobel Prize in Chemistry in 1966 for his fundamental work concerning chemical bonds and the electronic structure of molecules by the molecular orbital method.

****

1967 (Three persons)

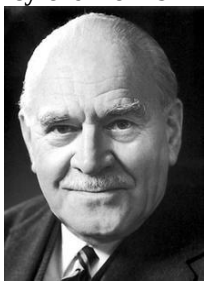
Manfred Eigen



West Germany
Born: 9 May 1927 (age 90), Bochum, Germany

Manfred Eigen is a German biophysical chemist who won the 1967 Nobel Prize in Chemistry for work on measuring fast chemical reactions effected by disturbing the equilibrium by means of very short pulses of energy.

Ronald George Wreyford Norrish



United Kingdom
Born: 9 November 1897, Cambridge, United Kingdom
Died: 7 June 1978, Cambridge, United Kingdom

Ronald George Wreyford Norrish FRS was a British chemist who was awarded the Nobel Prize in Chemistry in 1967.

George Porter



United Kingdom
Born: 6 December 1920, Stainforth, United Kingdom
Died: 31 August 2002, Canterbury, United Kingdom
George Hornidge Porter, Baron Porter of Luddenham OM, PRS was a British chemist. He was awarded the Nobel Prize in Chemistry in 1967.

****

1968 (One person)

Lars Onsager



United States
Born: 27 November 1903, Oslo, Norway
Died: 5 October 1976, Coral Gables, Florida, United States

Lars Onsager was a Norwegian-born American physical chemist and theoretical physicist. He held the Gibbs Professorship of Theoretical Chemistry at Yale University. He was awarded the Nobel Prize in Chemistry in 1968 for the discovery of the reciprocal relations bearing his name, which are fundamental for the thermodynamics of irreversible processes.

****

1969 (Two persons)

Derek H. R. Barton



United Kingdom

Born: 8 September 1918, Gravesend, United Kingdom
Died: 16 March 1998, College Station, Texas, United States

Sir Derek Harold Richard Barton FRS, FRSE was an English organic chemist and Nobel Prize laureate for 1969 for the contributions to the development of the concept of conformation and its application in chemistry.

Odd Hassel



Norway

Born: 17 May 1897, Oslo, Norway
Died: 11 May 1981, Oslo, Norway

Odd Hassel was a Norwegian physical chemist and Nobel Laureate in Chemistry in 1969.

****

1970 (One person)

Luis F. Leloir



Argentina

Born: 6 September 1906, Paris, France
Died: 2 December 1987, Buenos Aires, Argentina

Luis Federico Leloir ForMemRS was an Argentine physician and biochemist who received the 1970 Nobel Prize in Chemistry for his discovery of sugar nucleotides and their role in the biosynthesis of carbohydrates.

****

1971 (One person)

Gerhard Herzberg



Canada, West Germany

Born: 25 December 1904, Hamburg, Germany
Died: 3 March 1999, Ottawa, Canada

Gerhard Heinrich Friedrich Otto Julius Herzberg, PC, CC, FRSC, FRS was a German-Canadian pioneering physicist and physical chemist, who won the Nobel Prize for Chemistry in 1971, for his contributions to the knowledge of electronic structure and geometry of molecules, particularly free radicals. Herzberg's main work concerned atomic and molecular spectroscopy. He is well known for using these techniques that determine the structures of diatomic and polyatomic molecules, including free radicals which are difficult to investigate in any other way.

****

1972 (Three persons)

Christian B. Anfinsen



United States

Born: 26 March 1916, Monessen, Pennsylvania, United States
Died: 14 May 1995, Randallstown, Maryland, United States

Christian Boehmer Anfinsen, Jr. as an American biochemist. He shared the 1972 Nobel Prize in Chemistry with Stanford Moore and William Howard Stein for work on ribonuclease, especially concerning the connection between the amino acid sequence and the biologically active conformation.

Stanford Moore



United States
Born: 4 September 1913, Chicago, Illinois, United States
Died: 23 August 1982, New York City, New York, United States

Stanford Moore was an American biochemist. He shared a Nobel Prize in Chemistry in 1972 (with Christian B. Anfinsen and William Howard Stein, for work done at Rockefeller University on the structure of the enzyme ribonuclease and for contributing to the understanding of the connection between the chemical structure and catalytic activity of the ribonuclease molecule.

William H. Stein



United States
Born: 25 June 1911, New York City, New York, United States
Died: 2 February 1980, New York City, New York, United States

William H. Stein won a Nobel Prize in Chemistry in 1972 with Christian Boehmer Anfinsen and Stanford Moore, for their work on ribonuclease and for their contribution to the understanding of the connection between chemical structure and catalytic activity of the ribonuclease molecule.

****

1973 (One person)

Ernst Otto Fischer Geoffrey Wilkinson



West Germany, United Kingdom
Born: 10 November 1918
Solln, near Munich, German Empire
Died: 23 July 2007

Ernst Otto Fischer was a German chemist who won the Nobel Prize for pioneering work in the area of organometallic chemistry for the pioneering work, performed independently, on the chemistry of the organometallic, so called sandwich compounds.

****

1974 (One person)

Paul J. Flory



United States
Born: 19 June 1910, Sterling, Illinois, United States
Died: 9 September 1985, Big Sur, California, United States

Paul John Flory was an American chemist and Nobel laureate who was known for his work in the field of polymers, or macromolecules. He was a leading pioneer in understanding the behavior of polymers in solution, and won the Nobel Prize in Chemistry in 1974 for his fundamental achievements, both theoretical and experimental, in the physical chemistry of macromolecules.

****

1975 (Two persons)

John Warcup Cornforth



Australia, United Kingdom
Born: 7 September 1917, Sydney, Australia
Died: 8 December 2013, Sussex, United Kingdom

Sir John Warcup "Kappa" Cornforth, Jr., AC, CBE, FRS, FAA, was an Australian–British chemist who won the Nobel Prize in Chemistry in 1975 for his work on the stereochemistry of enzyme-catalysed reactions,

becoming the only Nobel laureate born in New South Wales.

Vladimir Prelog



Yugoslavia, Switzerland

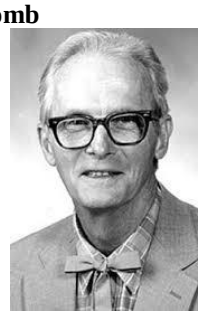
Born: 23 July 1906, Sarajevo, Bosnia and Herzegovina
Died: 7 January 1998, Zürich, Switzerland

Vladimir Prelog ForMemRS was a Croatian-Swiss organic chemist who received the 1975 Nobel Prize in chemistry for his research into the stereochemistry of organic molecules and reactions.

****

1976 (One person)

William N. Lipscomb



United States

Born: 9 December 1919, Cleveland, Ohio, United States
Died: 14 April 2011, Cambridge, Massachusetts, United States

William Nunn Lipscomb, Jr. was a Nobel Prize-winning American inorganic and organic chemist in 1976 working in nuclear magnetic resonance, theoretical chemistry, boron chemistry, and biochemistry. He won Nobel Prize for his studies on the structure of boranes illuminating problems of chemical bonding.

****

1977 (One person)

Ilya Prigogine



Belgium

Born: 25 January 1917, Moscow, Russia
Died: 28 May 2003, Brussels, Belgium

Viscount Ilya Romanovich Prigogine was a Belgian physical chemist and Nobel Laureate noted for his work on dissipative structures, complex systems, and irreversibility. He won Nobel Prize in Chemistry in 1977 for his contributions to non-equilibrium thermodynamics, particularly the theory of dissipative structures.

****

1978 (One person)

Peter D. Mitchell



United Kingdom

Born: 29 September 1920, Mitcham, United Kingdom
Died: 10 April 1992, Bodmin, United Kingdom

Peter Dennis Mitchell, FRS was a British biochemist who was awarded the 1978 Nobel Prize for Chemistry for his discovery of the chemiosmotic mechanism of ATP synthesis**.**

****

1979 (Two persons)

Herbert C. Brown



United States

Born: 22 May 1912, London, United Kingdom
Died: 19 December 2004, Lafayette, Indiana, United States

Herbert Charles Brown was an English-born American chemist and recipient of the 1979 Nobel Prize in Chemistry for his work with organoboranes and for development of the use of boron- and phosphorus-containing compounds, respectively, into important reagents in organic synthesis.

Georg Wittig



West Germany

Born: 16 June 1897, Berlin, Germany
Died: 26 August 1987, Heidelberg, Germany

Georg Wittig was a German chemist who reported a method for synthesis of alkenes from aldehydes and ketones using compounds called phosphonium ylides in the Wittig reaction. He shared the Nobel Prize in Chemistry with Herbert C. Brown in 1979.

****

1980 (Three persons)

Paul Berg



United States

Born: 30 June 1926 (age 91), Brooklyn, New York City, New York, United States

Paul Berg is an American biochemist and professor emeritus at Stanford University. He was the recipient of the Nobel Prize in Chemistry in 1980, along with Walter Gilbert and Frederick Sanger. The award recognized their contributions to basic research involving nucleic acids for his fundamental studies of the biochemistry of nucleic acids, with particular regard to recombinant-DNA.

Walter Gilbert



United States

Born: 21 March 1932 (age 85), Boston, Massachusetts, United States

Walter Gilbert is an American biochemist, physicist, molecular biology pioneer, and Nobel laureate for the contributions concerning the determination of base sequences in nucleic acids.

Frederick Sanger



United Kingdom

Born: 13 August 1918, Rendcomb, United Kingdom
Died: 19 November 2013, Cambridge, United Kingdom

Frederick Sanger OM, CH, CBE FAA was a British biochemist who twice won the Nobel Prize in Chemistry, one of only two people to have done so in the same category (the other is John Bardeen in physics), the fourth person overall with two Nobel Prizes, and the third person overall with two Nobel Prizes in the sciences. In 1958, he was awarded a Nobel Prize in chemistry for his work on the structure of proteins, especially that of insulin. In 1980, Walter Gilbert and Sanger shared half of the chemistry prize for their contributions concerning the determination of base sequences in nucleic acids. The other half was awarded to Paul Berg for his fundamental studies of the biochemistry of nucleic acids, with particular regard to recombinant DNA.

****

1981 (Two persons)

Kenichi Fukui



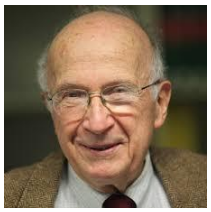
Japan

Born: 4 October 1918
Died: 9 January 1998, Kyoto, Kyoto Prefecture, Japan

Kenichi Fukui was a Japanese chemist, known as the first Asian scientist to receive a chemistry Nobel Prize. Professor Fukui was co-recipient of the Nobel Prize in Chemistry in 1981 with Roald Hoffmann, for their independent investigations into the mechanisms of chemical reactions. His prize-winning work focused on the role of frontier orbitals in chemical reactions: specifically that molecules share loosely bonded

electrons which occupy the frontier orbitals, that is the Highest Occupied Molecular Orbital (HOMO) and the Lowest Unoccupied Molecular Orbital (LUMO).

Roald Hoffmann



United States

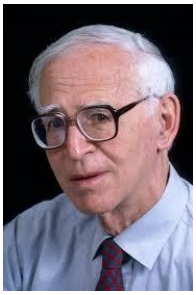
Born: 18 July 1937 (age 80), Zolochiv, Ukraine

Roald Hoffmann is an American theoretical chemist who won the 1981 Nobel Prize in Chemistry.

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1982 (One person)

Aaron Klug



United Kingdom

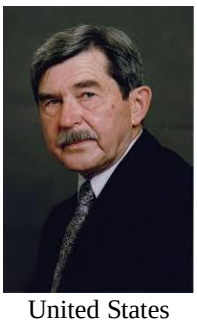
Born: 11 August 1926 (age 91), Lithuania

Sir Aaron Klug OM, HonFRMS PRS, is a Lithuanian-born British chemist and biophysicist, and winner of the 1982 Nobel Prize in Chemistry for his development of crystallographic electron microscopy and his structural elucidation of biologically important nucleic acid-protein complexes.

****

1983 (One person)

Henry Taube



United States

Born: 30 November 1915, Neudorf, Canada

Died: 16 November 2005, Palo Alto, California, United States

Henry Taube, Ph.D, M.Sc, B.Sc., FRSC was a Canadian-born American chemist noted for having been awarded the 1983 Nobel Prize in Chemistry for his work in the mechanisms of electron-transfer reactions, especially in metal complexes. He was the second Canadian-born chemist to win the Nobel Prize, and remains the only Saskatchewanian-born Nobel laureate.

****

1984 (One person)

Robert Bruce Merrifield



United States

Born: 15 July 1921, Fort Worth, Texas, United States

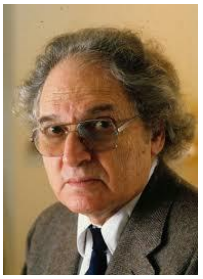
Died: 14 May 2006, Cresskill, New Jersey, United States

Robert Bruce Merrifield was an American biochemist who won the Nobel Prize in Chemistry in 1984 for the invention of solid phase peptide synthesis.

****

1985 (Two persons)

Herbert A. Hauptman



United States

Born: 14 February 1917, New York City, New York, United States

Died: 23 October 2011, Buffalo, New York, United State

Herbert Aaron Hauptman was an American mathematician and Nobel laureate. He pioneered and developed a mathematical method that has changed the whole field of chemistry and opened a new era in research in determination of molecular structures of crystallized materials. Today, Hauptman's direct methods, which he continued to improve and refine, are routinely used to solve complicated structures. It was the application of this mathematical method to a wide variety of chemical structures that led the Royal Swedish Academy of Sciences to name Hauptman and Jerome Karle recipients of the 1985 Nobel Prize in Chemistry.

Jerome Karle



United States

Born: 18 June 1918, Brooklyn, New York City, New York, United States
Died: 6 June 2013, Annandale, Virginia, United States

Jerome Karle was an American physical chemist. Jointly with Herbert A. Hauptman, he was awarded the Nobel Prize in Chemistry in 1985, for the direct analysis of crystal structures using X-ray scattering techniques.

****

1986 (Three persons)

Dudley R. Herschbach



United States

Born: 18 June 1932 (age 85), San Jose, California, United States

Dudley Robert Herschbach is an American chemist at Harvard University. He won the 1986 Nobel Prize in Chemistry jointly with Yuan T. Lee and John C. Polanyi for their contributions concerning the dynamics of chemical elementary processes.

Yuan T. Lee



United States, Taiwan

Born: 19 November 1936 (age 80), Shinchiku Prefecture

Yuan Tseh Lee is a Taiwanese chemist. He was the first Taiwanese Nobel Prize laureate, who, along with the Hungarian-Canadian John C. Polanyi and American Dudley R. Herschbach, won the Nobel Prize in Chemistry in 1986 for the contributions to the dynamics of chemical elementary processes.

John C. Polanyi



Canada, Hungary

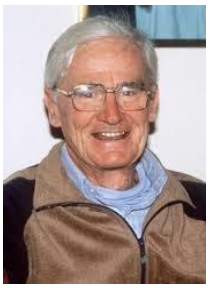
Born: 23 January 1929 (age 88), Berlin, Germany

John Charles Polanyi, PC, CC, FRSC, OOnt FRS is a Hungarian-Canadian chemist who won the 1986 Nobel Prize in Chemistry, for his research in chemical kinetics.

****

1987 (Three persons)

Donald J. Cram



United States

Born: 22 April 1919, Chester, Vermont, United States
Died: 17 June 2001, Palm Desert, California, United States

Donald James Cram was an American chemist who shared the 1987 Nobel Prize in Chemistry with Jean-Marie Lehn and Charles J. Pedersen for the development and use of molecules with structure-specific interactions of high selectivity.

Jean-Marie Lehn



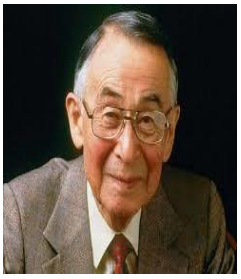
France

Born: 30 September 1939 (age 77), Rosheim, France

Jean-Marie Lehn is a French chemist. He received the Nobel Prize in Chemistry together with Donald Cram and Charles Pedersen in 1987 for his synthesis of cryptands. Lehn was an early innovator in the field of supramolecular chemistry, i.e., the chemistry of host-

guest molecular assemblies created by intermolecular interactions, and continues to innovate in this field.

Charles J. Pedersen



United States

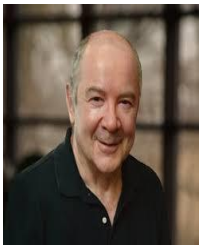
Born: 3 October 1904, Busan, South Korea
Died: 26 October 1989, Salem, New Jersey, United State

Charles John Pedersen was an American organic chemist best known for describing methods of synthesizing crown ethers. He shared the Nobel Prize in Chemistry in 1987 with Donald J. Cram and Jean-Marie Lehn. His Japanese first name was Yoshio. He is the only Nobel Prize laureate born in Korea other than Peace Prize laureate Kim Dae-jung.

****

1988 (Three persons)

Johann Deisenhofer

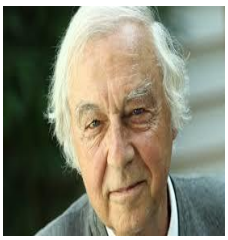


West Germany

Born: 30 September 1943 (age 73), Zusamaltheim, Germany

Johann Deisenhofer is a German biochemist who, along with Hartmut Michel and Robert Huber, received the Nobel Prize for Chemistry in 1988 for their determination of the first three-dimensional crystal structure of an integral membrane protein, a membrane-bound complex of proteins and co-factors that is essential to photosynthesis reaction centre.

Robert Huber



West Germany

Born: 20 February 1937 (age 80), Munich, Germany

Robert Huber is a German biochemist and Nobel laureate in 1988 in Chemistry.

Hartmut Michel



West Germany

Born: 18 July 1948 (age 69), Ludwigsburg, Germany

Hartmut Michel is a German biochemist, who received the 1988 Nobel Prize in Chemistry.

****

1989 (Two persons)

Sidney Altman

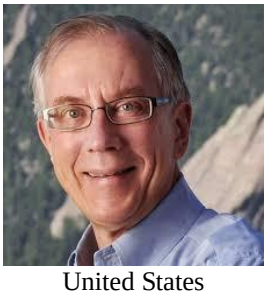


Canada, United States

Born: 7 May 1939 (age 78), Montreal, Canada

Sidney Altman is a Canadian and American molecular biologist, who is the Sterling Professor of Molecular, Cellular, and Developmental Biology and Chemistry at Yale University. In 1989 he shared the Nobel Prize in Chemistry with Thomas R. Cech for their work on the catalytic properties of RNA.

Thomas Cech



United States

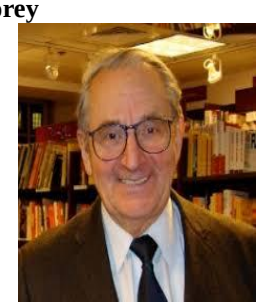
Born: 8 December 1947 (age 69), Chicago, Illinois, United States

Thomas Robert Cech is an American chemist who shared the 1989 Nobel Prize in Chemistry with Sidney Altman, for their discovery of the catalytic properties of RNA. Cech discovered that RNA could itself cut strands of RNA, which showed that life could have started as RNA.

****

1990 (One person)

Elias James Corey



United States

Born: 12 July 1928 (age 89), Methuen, Massachusetts, United States

Elias James Corey is an American organic chemist. In 1990, he won the Nobel Prize in Chemistry for his development of the theory and methodology of organic synthesis, specifically retrosynthetic analysis.

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1991 (One person)

Richard R. Ernst



Switzerland

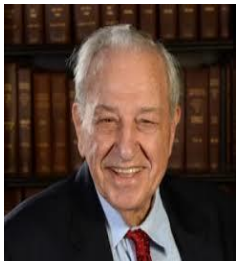
Born: 14 August 1933 (age 84), Winterthur, Switzerland

Richard Robert Ernst is a Swiss physical chemist and Nobel Laureate. Ernst was awarded the Nobel Prize in Chemistry in 1991 for his contributions towards the development of Fourier transform Nuclear Magnetic Resonance (NMR) spectroscopy.

****

1992 (One person)

Rudolph A. Marcus



United States, Canada

Born: 21 July 1923 (age 94), Montreal, Canada

Rudolph Arthur Marcus is a Canadian-born chemist who received the 1992 Nobel Prize in Chemistry for his contributions to the theory of electron transfer reactions in chemical systems.

****

1993 (Two persons)

Kary B. Mullis



United States

Born: 28 December 1944 (age 72), Lenoir, North Carolina, United States

Kary Banks Mullis is a Nobel Prize-winning American biochemist. In recognition of his improvement of the DNA-based chemistry and polymerase chain reaction (PCR) technique, he shared the 1993 Nobel Prize in Chemistry with Michael Smith and earned the Japan Prize in the same year.

Michael Smith



Canada

Born: 26 April 1932, Blackpool, England
Died: 4 October 2000 Vancouver, British Columbia, Canada

Michael Smith CC, OBC, FRS was a British-born Canadian biochemist and businessman. He shared the 1993 Nobel Prize in Chemistry with Kary Mullis for his work in developing site-directed mutagenesis. His work was on for contributions to the developments of methods within DNA-based chemistry for his fundamental contributions to the establishment of oligonucleotide-based, site-directed mutagenesis and its development for protein studies.

****

1994 (One person)

George A. Olah



United States, Hungary
Born: 22 May 1927, Budapest, Hungary

George Andrew Olah was a Hungarian and American chemist. His research involved the generation and reactivity of carbocations via superacids. For this research, Olah was awarded a Nobel Prize in Chemistry in 1994 for his contribution to carbocation chemistry.

****

1995 (Three persons)

Paul J. Crutzen



Netherlands
Born: 3 December 1933 (age 83), Amsterdam, Netherlands

Paul Jozef Crutzen is a Dutch, Nobel Prize-winning, atmospheric chemist in 1995 in Chemistry. He is known for work on climate change research and for popularizing the term Anthropocene to describe a proposed new era when human actions have a drastic effect on the Earth for the work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone.

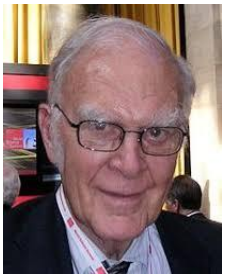
Mario J. Molina



Mexico
Born: 19 March 1943 (age 74), Mexico City, Mexico

Mario José Molina-Pasquel Henríquez (born March 19, 1943) is a Mexican chemist reputed for his pivotal role in the discovery of the Antarctic ozone hole. In 2004 he became professor at the University of California, San Diego and the Center for Atmospheric Sciences at the Scripps Institution of Oceanography. He was a co-recipient of the 1995 Nobel Prize in Chemistry for his role in elucidating the threat to the Earth's ozone layer of chlorofluorocarbon gases (or CFCs), becoming the first Mexican-born citizen to ever receive a Nobel Prize in Chemistry.

F. Sherwood Rowland



United States
Born: 28 June 1927, Delaware, Ohio, United States
Died: 10 March 2012, Corona del Mar, Newport Beach, California, United States

Frank Sherwood Rowland was an American Nobel laureate in 1995 in Chemistry and a professor of chemistry at the University of California, Irvine. His research was on atmospheric chemistry and chemical kinetics. His best-known work was the discovery that chlorofluorocarbons contribute to ozone depletion.

****

1996 (Three persons)

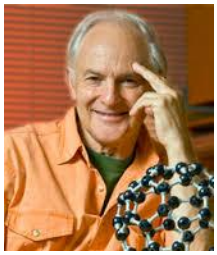
Robert F. Curl Jr.



United States
Born: 23 August 1933 (age 83), Alice, Texas, United States

Robert Floyd Curl, Jr. is a University Professor Emeritus, Pitzer-Schlumberger Professor of Natural Sciences Emeritus, and Professor of Chemistry Emeritus at Rice University. He was awarded the Nobel Prize in Chemistry in 1996 for the discovery of the nanomaterial buckminsterfullerene, along with Richard Smalley (also of Rice University) and Harold Kroto of the University of Sussex.

Sir Harold W. Kroto

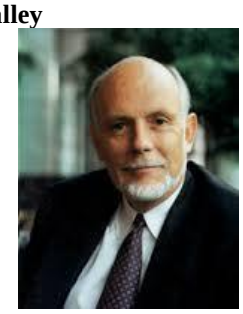


United Kingdom

Born: 7 October 1939, Wisbech, United Kingdom
Died: 30 April 2016, Lewes, United Kingdom

Sir Harold Walter Kroto, FRS known as Harry Kroto, was an English chemist. He shared the 1996 Nobel Prize in Chemistry with Robert Curl and Richard Smalley for their discovery of fullerenes.

Richard E. Smalley



United States

Born: 6 June 1943, Akron, Ohio, United States
Died: 28 October 2005, University of Texas MD Anderson Cancer Center, Houston, Texas, United States

Richard Errett Smalley was the Gene and Norman Hackerman Professor of Chemistry and a Professor of Physics and Astronomy at Rice University, in Houston, Texas. In 1996, along with Robert Curl, also a professor of chemistry at Rice, and Harold Kroto, a professor at the University of Sussex, he was awarded the Nobel Prize in Chemistry for the discovery of a new form of carbon, buckminsterfullerene, also known as buckyballs.

****

1997 (Three persons)

Paul D. Boyer



United States

Born: 31 July 1918 (age 99), Provo, Utah, United States

Paul Delos Boyer shared the 1997 Nobel Prize in Chemistry for research on the enzymatic mechanism underlying the biosynthesis of adenosine triphosphate (ATP) (ATP synthase) with John E. Walker, making Boyer the only Utah-born Nobel laureate; the remainder of the Prize in that year was awarded to Danish chemist Jens Christian Skou for his discovery of the Na+/K+-ATPase. He is the oldest living Nobel laureate at age 99.

John E. Walker



United Kingdom

Born: 7 January 1941 (age 76), Halifax, United Kingdom

Sir John Ernest Walker FRS, FMedSci is a British chemist who won the Nobel Prize in Chemistry in 1997.

Jens C. Skou



Denmark

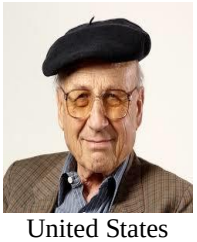
Born: 8 October 1918 (age 98), Lemvig, Denmark

Jens Christian Skou (is a Danish medical doctor and Nobel laureate in 1997 in Chemistry for the first discovery of an ion-transporting enzyme, Na+, K+ - ATPase.

****

1998 (Two persons)

Walter Kohn



United States

Born: 9 March 1923, Vienna, Austria
Died: 19 April 2016, Santa Barbara, California, United States

Walter Kohn was an Austrian-born American theoretical physicist and theoretical chemist. He was awarded, with John Pople, the Nobel Prize in chemistry in 1998 for his development of the density-functional theory.

John A. Pople



United Kingdom

Born: 31 October 1925, Burnham-on-Sea, United Kingdom

Sir John Anthony Pople, KBE, FRS, was a theoretical chemist who was awarded the Nobel Prize in Chemistry with Walter Kohn in 1998 for his development of computational methods in quantum chemistry.

****

1999 (One person)

Ahmed Zewail



Egypt

Born: 26 February 1946, Damanhur, Egypt

Ahmed Hassan Zewail was an Egyptian-American scientist, known as the father of femtochemistry. He was awarded the 1999 Nobel Prize in Chemistry for his work on femtochemistry and became the first Egyptian to win a Nobel Prize in a scientific field. His work is on studies of the transition states of chemical reactions using femtosecond spectroscopy.

****

2000 (Three persons)

Alan J. Heeger

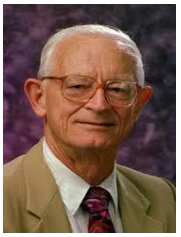


United States

Born: 22 January 1936 (age 81), Sioux City, Iowa, United States

Alan Jay Heeger is an American physicist, academic and Nobel Prize laureate in chemistry for the discovery and development of conductive polymers.

Alan G. MacDiarmid



United States, New Zealand

Born: 14 April 1927, Masterton, New Zealand

Died: 7 February 2007, Drexel Hill, Pennsylvania, United States

Alan Graham MacDiarmid, ONZ, FRS, was a New Zealand-born American chemist, and one of three recipients of the Nobel Prize for Chemistry in 2000.

Hideki Shirakawa



Japan

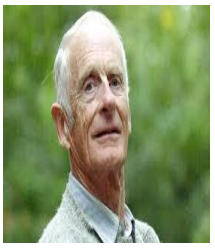
Born: 20 August 1936 (age 81), Tokyo Prefecture

Hideki Shirakawa is a Japanese chemist and winner of the 2000 Nobel Prize in Chemistry for his discovery of conductive polymers together with physics professor Alan J. Heeger and chemistry professor Alan G. MacDiarmid at the University of Pennsylvania.

****

2001 (Three persons)

William S. Knowles



United States

Born: 1 June 1917, Taunton, Massachusetts, United States

Died: 13 June 2012, Chesterfield, Missouri, United States

William Standish Knowles was an American chemist. He was born in Taunton, Massachusetts. Knowles was one of the recipients of the 2001 Nobel Prize in Chemistry. He shared half the prize with Ryōji Noyori for their work in asymmetric synthesis, specifically for his work in hydrogenation reactions. The other half was awarded to K. Barry Sharpless for his work in oxidation reactions

for their work on chirally catalyzed hydrogenation reactions.

Ryōji Noyori



Japan

Born: 3 September 1938 (age 78), Ashiya, Hyōgo Prefecture, Japan

Ryōji Noyori is a Japanese chemist. He won the Nobel Prize in Chemistry in 2001. Noyori shared half of the prize with William S. Knowles for the study of chirally catalyzed hydrogenations; the second half of the prize went to K. Barry Sharpless for his study in chirally catalyzed oxidation reactions (Sharpless epoxidation).

K. Barry Sharpless



United States

Born: 28 April 1941 (age 76), Philadelphia, Pennsylvania, United States

Karl Barry Sharpless is an American chemist known for his work on stereoselective reactions. He is a recipient of the 2001 Nobel Prize in Chemistry.

****

2002 (Three persons)

John B. Fenn



United States

Born: 15 June 1917, New York City, New York, United States

Died: 10 December 2010, Richmond, Virginia, United States

John Bennett Fenn was an American research professor of analytical chemistry who was awarded a share of the Nobel Prize in Chemistry in 2002. Fenn shared half of the award with Koichi Tanaka for their work in mass spectrometry.

Koichi Tanaka



Japan

Born: 3 August 1959 (age 58), Toyama, Toyama Prefecture, Japan

Koichi Tanaka is a Japanese engineer who shared the Nobel Prize in Chemistry in 2002 for developing a novel method for mass spectrometric analyses of biological macromolecules with John Bennett Fenn and Kurt Wüthrich (the latter for work in NMR spectroscopy) for the development of methods for identification and structure analyses of biological macromolecules for their development of soft desorption ionisation methods for mass spectrometric analyses of biological macromolecules.

Kurt Wüthrich



Switzerland

Born: 4 October 1938 (age 78), Aarberg, Switzerland

Kurt Wüthrich is a Swiss chemist/biophysicist and Nobel Chemistry laureate, known for developing nuclear magnetic resonance (NMR) methods for studying biological macromolecules. He won Nobel Prize in Chemistry in 2002 for the development of methods for identification and structure analyses of biological macromolecules for his development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution.

****

2003 (Two persons)

Peter Agre



United States

Born: 30 January 1949 (age 68), Northfield, Minnesota, United States

Peter Agre is an American physician and molecular biologist, Bloomberg Distinguished Professor at the Johns Hopkins Bloomberg School of Public Health and Johns Hopkins School of Medicine, and director of the Johns Hopkins Malaria Research Institute. In 2003, Agre and Roderick MacKinnon shared the 2003 Nobel Prize in Chemistry for discoveries concerning channels in cell membranes and for the discovery of water channels.

Roderick MacKinnon



United States

Born: 19 February 1956 (age 61), Burlington, Massachusetts, United States

Roderick MacKinnon is a professor of Molecular Neurobiology and Biophysics at Rockefeller University who won the Nobel Prize in Chemistry together with Peter Agre in 2003 for his work on the structure and operation of ion channels.

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2004 (Three persons)

Aaron Ciechanover



Israel

Born: 1 October 1947 (age 69), Haifa, Israel

Aaron Ciechanover is an Israeli biologist, who won the Nobel prize in Chemistry in 2004 for characterizing the method that cells use to degrade and recycle proteins using ubiquitin mediated protein degradation.

Avram Hershko



Israel

Born: 31 December 1937 (age 79), Karcag, Hungary

Avram Hershko is a Hungarian-born Israeli biochemist and Nobel laureate in Chemistry in 2004.

Irwin Rose



United States

Born: 16 July 1926, Brooklyn, New York City, New York, United States

Died: 2 June 2015, Deerfield, Massachusetts, United States

Irwin Allan Rose was an American biologist. Along with Aaron Ciechanover and Avram Hershko, he was awarded the 2004 Nobel Prize in Chemistry for the discovery of ubiquitin-mediated protein degradation.

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2005 (Three persons)

Yves Chauvin



France

Born: 10 October 1930, Menen, Belgium

Died: 27 January 2015, Tours, France

Yves Chauvin was a French chemist and Nobel Prize laureate in 2005 in Chemistry. He was known for his work for deciphering the process of metathesis for which he was awarded the 2005 Nobel Prize in Chemistry along with Robert H. Grubbs and Richard R. Schrock for the

development of the metathesis method in organic synthesis.

Robert H. Grubbs



United States

Born: 27 February 1942 (age 75), Marshall County, Kentucky, United States

Robert Howard Grubbs is an American chemist and the Victor and Elizabeth Atkins Professor of Chemistry at the California Institute of Technology in Southern California. He was a co-recipient of the 2005 Nobel Prize in Chemistry for his work on olefin metathesis.

Richard R. Schrock



United States

Born: 4 January 1945 (age 72), Berne, Indiana, United States

Richard Royce Schrock is an American chemist and Nobel laureate recognized for his contributions to the olefin metathesis reaction used in organic chemistry.

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2006 (One person)

Roger D. Kornberg



United States

Born: 24 April 1947 (age 70), St. Louis, Missouri, United States

Roger David Kornberg is an American biochemist and professor of structural biology at Stanford University School of Medicine. Kornberg was awarded the Nobel Prize in Chemistry in 2006 for his studies of the process by which genetic information from DNA is copied to RNA, the molecular basis of eukaryotic transcription.

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2007 (One person)

Gerhard Ertl



Germany

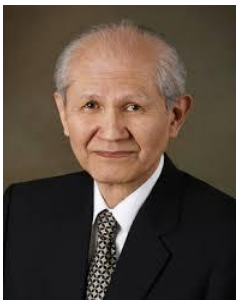
Born: 10 October 1936 (age 80), Bad Cannstatt, Stuttgart, Germany

Gerhard Ertl is a German physicist and a Professor emeritus at the Department of Physical Chemistry, Fritz-Haber-Institut der Max-Planck-Gesellschaft in Berlin, Germany. Ertl's research laid the foundation of modern surface chemistry, which has helped explain how fuel cells produce energy without pollution, how catalytic converters clean up car exhausts and even why iron rusts, the Royal Swedish Academy of Sciences said. He was awarded the 2007 Nobel Prize in Chemistry for his studies of chemical processes on solid surfaces. The Nobel academy said Ertl provided a detailed description of how chemical reactions take place on surfaces.

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2008 (Three persons)

Osamu Shimomura

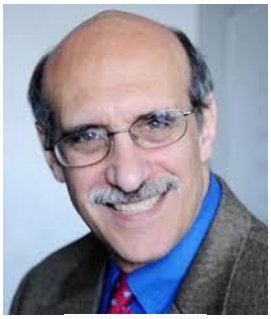


Japan

Born: 27 August 1928 (age 88), Fukuchiyama, Kyoto Prefecture, Japan

Osamu Shimomura is a Japanese organic chemist and marine biologist, and Professor Emeritus at Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts and Boston University School of Medicine. He was awarded the Nobel Prize in Chemistry in 2008 for the discovery and development of green fluorescent protein (GFP) with two American scientists: Martin Chalfie of Columbia University and Roger Tsien of the University of California-San Diego.

Martin Chalfie



United States

Born: 15 January 1947 (age 70), Chicago, Illinois, United States

Martin Lee Chalfie is an American scientist. He is University Professor at Columbia University. He shared the 2008 Nobel Prize in Chemistry along with Osamu Shimomura and Roger Y. Tsien for the discovery and development of the green fluorescent protein, GFP.

Roger Y. Tsien



United States

Born: 1 February 1952, New York City, New York, United States

Roger Yonchien Tsien was an American biochemist. He was a professor of chemistry and biochemistry at the University of California, San Diego and was awarded the 2008 Nobel Prize in Chemistry for his discovery and development of the green fluorescent protein, in collaboration with organic chemist Osamu Shimomura and neurobiologist Martin Chalfie. Tsien was also a pioneer of calcium imaging.

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2009 (Three persons)

Venkatraman Ramakrishnan



United States, India, United Kingdom

Born: 1952, Chidambaram

Venkatraman Ramakrishnan is an Indian-American-British structural biologist of Indian origin. He is the current President of the Royal Society, having held the position since November 2015. In 2009 he shared the Nobel Prize in Chemistry with Thomas A. Steitz and Ada Yonath, for studies of the structure and function of the ribosome.

Thomas A. Steitz



United States

Born: 23 August 1940 (age 76), Milwaukee, Wisconsin, United States

Thomas Arthur Steitz is a biochemist, a Sterling Professor of Molecular Biophysics and Biochemistry at Yale University, and investigator at the Howard Hughes Medical Institute, best known for his pioneering work on the ribosome. Steitz was awarded the 2009 Nobel Prize in Chemistry along with Venkatraman Ramakrishnan and Ada Yonath for studies of the structure and function of the ribosome.

Ada E. Yonath



Israel

Born: 22 June 1939 (age 78), Geula, Jerusalem, Israel

Ada E. Yonath is an Israeli crystallographer best known for her pioneering work on the structure of the ribosome. In 2009, she received the Nobel Prize in Chemistry along with Venkatraman Ramakrishnan and Thomas A. Steitz for her studies on the structure and function of the ribosome, becoming the first Israeli woman to win the Nobel Prize out of ten Israeli Nobel laureates, the first woman from the Middle East to win a Nobel prize in the sciences, and the first woman in 45 years to win the Nobel Prize for Chemistry. However, she said herself that there was nothing special about a woman winning the Prize.

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2010 (Three persons)

Richard F. Heck



United States

Born: 15 August 1931, Springfield, Massachusetts, United States
Died: 10 October 2015, Manila, Philippines

Richard Frederick Heck was an American chemist noted for the discovery and development of the Heck reaction, which uses palladium to catalyze organic chemical reactions that couple aryl halides with alkenes. The analgesic naproxen is an example of a compound that is prepared industrially using the Heck reaction. For his work in palladium-catalyzed coupling reactions and organic synthesis, Heck was awarded the 2010 Nobel Prize in Chemistry, shared with the Japanese chemists Ei-ichi Negishi and Akira Suzuki.

Ei-ichi Negishi



Japan

Born: 14 July 1935 (age 82), Hsinking

Ei-ichi Negishi is a Manchuria-born American chemist of Japanese origin who has spent most of his career at Purdue University in the United States. He is best known for his discovery of the Negishi coupling. He was awarded the 2010 Nobel Prize in Chemistry for palladium catalyzed cross couplings in organic synthesis jointly with Richard F. Heck and Akira Suzuki.

Akira Suzuki



Japan

Born: 12 September 1930, Mukawa, Hokkaido Prefecture, Japan

Akira Suzuki is a Japanese chemist and Nobel Prize Laureate in 2010, who first published the Suzuki reaction, the organic reaction of an aryl- or vinyl-boronic acid with an aryl- or vinyl-halide catalyzed by a palladium(0) complex, in 1979.

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2011 (One person)

Dan Shechtman



Israel

Born: 24 January 1941, Tel Aviv, Israel

Dan Shechtman was awarded the 2011 Nobel Prize in Chemistry for the discovery of quasicrystals, making him one of six Israelis who have won the Nobel Prize in Chemistry.

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2012 (Two persons)

Robert Lefkowitz



United States

Born: 15 April 1943, New York City, New York, United States

Robert Joseph Lefkowitz is an American physician (internist and cardiologist) and biochemist. He is best known for his groundbreaking discoveries that reveal the inner workings of an important family G protein-coupled receptors, for which he was awarded the 2012 Nobel Prize for Chemistry with Brian Kobilka.

Brian Kobilka



United States

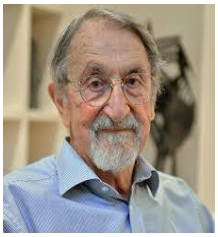
Born: 30 May 1955, Little Falls, Minnesota, United States

Brian Kent Kobilka is an American physiologist and a recipient of the 2012 Nobel Prize in Chemistry with Robert Lefkowitz for discoveries that reveal the inner workings of important family G protein-coupled receptors.

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2013 (Three persons)

Martin Karplus



United States, Austria

Born: 15 March 1930, Vienna, Austria

Martin Karplus is an Austrian-born American theoretical chemist. He is the Theodore William Richards Professor of Chemistry, emeritus at Harvard University. He is also Director of the Biophysical Chemistry Laboratory, a joint laboratory between the French National Center for Scientific Research and the University of Strasbourg, France. Karplus received the 2013 Nobel Prize in Chemistry, together with Michael Levitt and Arieh Warshel, for the development of multiscale models for complex chemical systems.

Michael Levitt



United States, United Kingdom, Israel

Born: 9 May 1947, Pretoria, South Africa

Michael Levitt, FRS is an American-British-Israeli biophysicist and a professor of structural biology at Stanford University, a position he has held since 1987. Levitt received the 2013 Nobel Prize in Chemistry, together with Martin Karplus and Arieh Warshel, for the development of multiscale models for complex chemical systems.

Arieh Warshel



United States, Israel

Born: 20 November 1940, Kibbutz

Arieh Warshel received the 2013 Nobel Prize in Chemistry, together with Michael Levitt and Martin Karplus for the development of multiscale models for complex chemical systems.

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2014 (Three persons)

Eric Betzig



United States

Born: 13 January 1960, Ann Arbor, Michigan, United States

Robert Eric Betzig has worked to develop the field of fluorescence microscopy and photoactivated localization microscopy and awarded the 2014 Nobel Prize in Chemistry for the development of super-resolved fluorescence microscopy along with Stefan Hell and fellow Cornell alumnus William E. Moerner.

Stefan W. Hell



Germany, Romania

Born: 23 December 1962, Arad, Romania

Stefan Walter Hell received the Nobel Prize in Chemistry in 2014 for the development of super-resolved fluorescence microscopy, together with Eric Betzig and William Moerner.

William E. Moerner



United States

Born: 24 June 1953, Pleasanton, California, United States

William Esco Moerner is credited with achieving the first optical detection and spectroscopy of a single molecule in condensed phases, along with his postdoc, Lothar Kador. Optical study of single molecules has subsequently become a widely used single-molecule experiment in chemistry, physics and biology. In 2014, he was awarded the Nobel Prize in Chemistry.

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2015 (Three persons)

Tomas Lindahl



Sweden, United Kingdom

Born: 28 January 1938, Kungsholmen, Stockholm, Sweden

Tomas Robert Lindahl FRS, FMedSci is a Swedish-born British scientist specializing in cancer research. In 2015, he was awarded the Nobel Prize in Chemistry jointly with American chemist Paul L. Modrich and Turkish chemist Aziz Sancar for mechanistic studies of DNA repair.

Paul L. Modrich



United States

Born: 13 June 1946, Raton, New Mexico, United States

Paul Lawrence Modrich is an American biochemist, James B. Duke Professor of Biochemistry at Duke University and Investigator at the Howard Hughes Medical Institute. He is known for his research on DNA mismatch repair. Modrich received the Nobel Prize in Chemistry 2015, jointly with Aziz Sancar and Tomas Lindahl.

Aziz Sancar



Turkey, United States

Born: 8 September 1946, Savur, Turkey

Aziz Sancar is a Turkish-American biochemist and molecular biologist specializing in DNA repair, cell cycle checkpoints, and circadian clock. In 2015, he was awarded the Nobel Prize in Chemistry along with Tomas Lindahl and Paul L. Modrich for their mechanistic studies of DNA repair.

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2016 (Three persons)

Fraser Stoddart



United Kingdom

Born: 24 May 1942, Edinburgh, United Kingdom

Sir James Fraser Stoddart FRS, FRSE, FRSC, works in the area of supramolecular chemistry and nanotechnology. Stoddart has developed highly efficient syntheses of mechanically-interlocked molecular architectures such as molecular Borromean rings, catenanes and rotaxanes utilizing molecular recognition and molecular self-assembly processes. He has demonstrated that these topologies can be employed as molecular switches. He shared the Nobel Prize in Chemistry together with Ben Feringa and Jean-Pierre Sauvage in 2016 for the design and synthesis of molecular machines.

Jean-Pierre Sauvage

Born: 21 October 1944, Paris, France

Jean-Pierre Sauvage is a French coordination chemist working at Strasbourg University. He has specialized in supramolecular chemistry for which he has been awarded the 2016 Nobel Prize in Chemistry along with Sir J. Fraser Stoddart and Bernard L. Feringa.

Ben Feringa



Netherlands

Born: 18 May 1951, Barger-Compascuum, Netherlands

Bernard Lucas is a Dutch synthetic organic chemist, specializing in molecular nanotechnology and homogenous catalysis. He is the Jacobus van 't Hoff Distinguished Professor of Molecular Sciences at the Stratingh Institute for Chemistry, University of Groningen, Netherlands, and an Academy Professor and Chair of Board of the Science Division of the Royal Netherlands Academy of Sciences. He was awarded the 2016 Nobel Prize in Chemistry, together with Sir J. Fraser Stoddart and Jean-Pierre Sauvage, for the design and synthesis of molecular machines.

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2017 (Three persons)

Joachim Frank



Born September 12, 1940); Columbia

Joachim Frank is a German-American biophysicist at Columbia University and a Nobel laureate. He is regarded as the founder of single-particle cryo-electron microscopy (cryo-EM), for which he shared the Nobel Prize in Chemistry in 2017 with Jacques Dubochet and Richard Henderson. He also made significant contributions to structure and function of the ribosome from bacteria and eukaryotes. He is a German-American biophysicist at Columbia University and a Nobel laureate. He is regarded as the founder of single-particle cryo-electron microscopy (cryo-EM), for which he shared the Nobel Prize in Chemistry in 2017 with Jacques Dubochet and Richard Henderson. He also made significant contributions to structure and function of the ribosome from bacteria and eukaryotes. Jacques Dubochet is a retired Swiss biophysicist. He is a former researcher at the European Molecular Biology Laboratory in Heidelberg, Germany, and an honorary professor of biophysics at the University of Lausanne in Switzerland. In 2017, he received the Nobel Prize in Chemistry together with Joachim Frank and Richard Henderson "for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution". He received the Royal Photographic Society Progress Medal, alongside his colleagues Professor Joachim Frank and Dr Richard Henderson, in 2018 for 'an important advance in the scientific or technological development of photography or imaging in the widest sense'.

Richard Henderson



Born: 19 July 1945; British

Richard Henderson is a British molecular biologist and biophysicist and pioneer in the field of electron microscopy of biological molecules. Henderson shared the Nobel Prize in Chemistry in 2017 with Jacques Dubochet and Joachim Frank. "Thanks to his work, we can look at individual atoms of living nature, thanks to cryo-electron microscopes we can see details without destroying samples, and for this he won the Nobel Prize in Chemistry."

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Three persons (2018)

George Pearson Smith



Born: 10 March 1941; USA

George Pearson Smith is an American biologist and Nobel laureate. He is a Curators' Distinguished Professor Emeritus of Biological Sciences at the University of Missouri in Columbia, Missouri, US. He is best known for phage display, a technique where a specific protein sequence is artificially inserted into the coat protein gene of a bacteriophage, causing the protein to be expressed on the outside of the bacteriophage. Smith first described the technique in 1985 when he displayed peptides on filamentous phage by fusing the peptide of interest onto gene III of filamentous phage. He was awarded the 2018 Nobel Prize in Chemistry for this work, sharing his prize with Greg Winter and Frances Arnold.

Sir Gregory Paul Winter



Born: 14 April 1951; UK

Sir Gregory Paul Winter CBE FRS FMedSci is a Nobel Prize–winning British molecular biologist best known for his work on the therapeutic use of monoclonal antibodies. His research career has been based almost entirely at the MRC Laboratory of Molecular Biology and the MRC Centre for Protein Engineering, in Cambridge, England. He is credited with the invention of techniques to both humanize (1986) and, later, to fully humanize using phage display, antibodies for therapeutic uses. Previously, antibodies had been derived from mice, which made them difficult to use in human therapeutics because the human immune system had anti-mouse reactions to them. For these developments Winter was awarded the 2018 Nobel Prize in Chemistry along with George Smith and Frances Arnold.

Frances Hamilton Arnold (born July 25, 1956)



Born: 25 July 1956; USA

She is an American chemical engineer and Nobel Laureate. She is the Linus Pauling Professor of Chemical Engineering, Bioengineering and Biochemistry at the California Institute of Technology (Caltech). In 2018, she was awarded the Nobel Prize in Chemistry for pioneering the use of directed evolution to engineer enzymes.

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Three Persons (2019)

Akira Yoshino



Born: 30 January 1948, Japan

Yoshino Akira is a Japanese chemist. He is a fellow of Asahi Kasei Corporation and a professor at Meijo University in Nagoya. He created the first safe, production-viable lithium-ion battery, which became used widely in cellular phones and notebook computers. Yoshino was awarded the Nobel Prize in Chemistry in 2019 alongside M. Stanley Whittingham and John B. Goodenough.

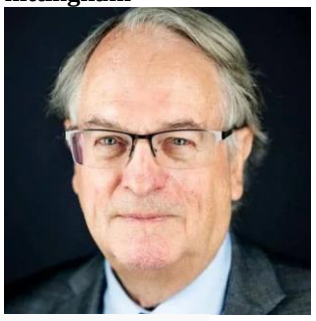
John Bannister Goodenough



Born: 25 July 1922; Died: 25 June 2023; USA

He was an American materials scientist, a solid-state physicist, and a Nobel laureate in chemistry. From 1986 he was a professor of Materials Science, Electrical Engineering and Mechanical Engineering, at the University of Texas at Austin. He is credited with identifying the Goodenough–Kanamori rules of the sign of the magnetic superexchange in materials, with developing materials for computer random-access magnetic memory and with inventing cathode materials for lithium-ion batteries. Goodenough was awarded the National Medal of Science, the Copley Medal, the Fermi Award, the Draper Prize, and the Japan Prize. The John B. Goodenough Award in materials science is named for him. In 2019, he was awarded the Nobel Prize in Chemistry alongside M. Stanley Whittingham and Akira Yoshino; at 97 years old, he became the oldest Nobel laureate in history. From August 27, 2021, until his death, he was the oldest living Nobel Prize laureate.

M. Stanley Whittingham



Born: 22 December 1941; British

Sir Michael Stanley Whittingham is a British-American chemist. He is a professor of chemistry and director of both the Institute for Materials Research and the Materials Science and Engineering program at

Binghamton University, State University of New York. He also serves as director of the Northeastern Center for Chemical Energy Storage (NECCES) of the U.S. Department of Energy at Binghamton. He was awarded the Nobel Prize in Chemistry in 2019 alongside Akira Yoshino and John B. Goodenough.

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Two persons (2020)

Jennifer Doudna



Born: 19 February 1964; USA

Jennifer Anne Doudna ForMemRS is an American biochemist who has pioneered work in CRISPR gene editing, and made other fundamental contributions in biochemistry and genetics. She received the 2020 Nobel Prize in Chemistry, with Emmanuelle Charpentier, "for the development of a method for genome editing." She is the Li Ka Shing Chancellor's Chair Professor in the department of chemistry and the department of molecular and cell biology at the University of California, Berkeley. She has been an investigator with the Howard Hughes Medical Institute since 1997.

Emmanuelle Charpentier



Born: 11 December 1968; France

Emmanuelle Marie Charpentier is a French professor and researcher in microbiology, genetics, and biochemistry. She has served as a director at the Max Planck Institute for Infection Biology in Berlin since 2015. Three years later, she founded an independent research institute, the Max Planck Unit for the Science of Pathogens. In 2020, Charpentier and American biochemist Jennifer Doudna of the University of California, Berkeley, were awarded the Nobel Prize in Chemistry "for the development of a method for genome editing" (through CRISPR). This was the first science Nobel Prize ever won by two women only.

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Two Persons (2021)

Benjamin List



Born: 11 January 1968; Germany

He is a German chemist who is one of the directors of the Max Planck Institute for Coal Research and professor of organic chemistry at the University of Cologne. He co-developed organocatalysis, a method of accelerating chemical reactions and making them more efficient. He shared the 2021 Nobel Prize in Chemistry with David MacMillan "for the development of asymmetric organocatalysis".

David MacMillan



Born: 16 March 1988; Scotland

Sir David William Cross MacMillan is a Scottish chemist and the James S. McDonnell Distinguished University Professor of Chemistry at Princeton University, where he was also the chair of the Department of Chemistry from 2010 to 2015. He shared the 2021 Nobel Prize in Chemistry with Benjamin List "for the development of asymmetric organocatalysis". MacMillan used his share of the $1.14 million prize to establish the May and Billy MacMillan Foundation.

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Three Persons (2022)
Carolyn R. Bertozzi



(*Born: October 10, 1966*; USA)

She is an American chemist and Nobel laureate, known for her wide-ranging work spanning both chemistry and biology. She coined the term "bioorthogonal chemistry" for chemical reactions compatible with living systems.

Morten P. Meldal



(Born: 16 January 1954; Denmark)

Morten Peter Meldal is a Danish chemist and Nobel laureate. He is a professor of chemistry at the University of Copenhagen in Copenhagen, Denmark. He is best known for developing the CuAAC-click reaction, concurrently with but independent of Valery V. Fokin and K. Barry Sharpless.

Karl Barry Sharpless

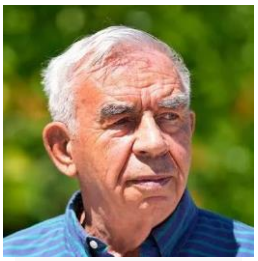


(Born: April 28, 1941; USA)

Karl Barry Sharpless is an American stereochemist. He is a two-time Nobel laureate in chemistry, known for his work on stereoselective reactions and click chemistry.

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Three Persons (2023)
Alexey Ekimov



(Born: 1945; Russia)

Alexey Ekimov solid state physicist and a pioneer in nanomaterials research. He discovered the semiconductor nanocrystals known as quantum dots in 1981, while working at the Vavilov State Optical Institute. In 2023, he was awarded the Nobel Prize in Chemistry for this discovery.

Moungi Bawendi



(Born: 15 March 1961: USA)

Moungi Gabriel Bawendi is an American chemist. He is currently the Lester Wolfe Professor at the Massachusetts Institute of Technology. Bawendi is known for his advances in the chemical production of high-quality quantum dots. For this work, he was awarded the Nobel Prize in Chemistry in 2023.

Louis E. Brus



(Born: August 10, 1943; Died: January 11, 2026); USA

Louis Eugene Brus was an American chemist, and the Samuel Latham Mitchell Professor of Chemistry at Columbia University. He was the co-discoverer of the colloidal semi-conductor nanocrystals known as quantum dots. In 2023, he was awarded the Nobel Prize in Chemistry.

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Three Persons (2024)

Demis Hassabis



(Born: 27 July 1976: UK)

Sir Demis Hassabis is a British artificial intelligence (AI) researcher and entrepreneur. He is the chief executive officer and co-founder of Google DeepMind and Isomorphic Labs, and a UK Government AI Adviser. In 2024, Hassabis and John M. Jumper were jointly awarded the Nobel Prize in Chemistry for their AI research contributions for protein structure prediction.

John Jumper



(Born: 1985; USA)

John Michael Jumper is an American chemist and computer scientist. Jumper and Demis Hassabis were awarded the 2024 Nobel Prize in Chemistry for protein structure prediction.

David Baker



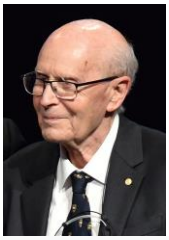
(Born: October 6, 1962; USA*)*

He is an American biochemist and computational biologist who has pioneered methods to design proteins and predict their three-dimensional structures. He is the Henrietta and Aubrey Davis Endowed Professor in Biochemistry, an investigator with the Howard Hughes Medical Institute, and an adjunct professor of genome sciences, bioengineering, chemical engineering, computer science, and physics at the University of Washington. He was awarded the shared 2024 Nobel Prize in Chemistry for his work on computational protein design.

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Three Persons (2025)

Richard Robson



Born: 4 June 1937; Australia)

Richard Robson FAA FRS is an English and Australian chemist and Professor of Chemistry at the University of Melbourne. Robson specialises in coordination polymers, particularly metal-organic frameworks. He has been described as "a pioneer in crystal engineering involving transition metals". In 2025, he was awarded the Nobel Prize in Chemistry jointly with Susumu Kitagawa and Omar M. Yaghi for the development of metal-organic frameworks.

Susumu Kitagawa



(Born: 4 July 1951; Japan)

Susumu Kitagawa FRS is a Japanese Nobel Prize-winning chemist specializing in coordination chemistry, with a focus on organic–inorganic hybrid compounds and the chemical and physical properties of porous coordination polymers, particularly metal-organic frameworks. He is Distinguished Professor at Kyoto University's Institute for Integrated Cell-Material Sciences (iCeMS), which he co-founded. In 2025, he was awarded the Nobel Prize in Chemistry jointly with Richard Robson and Omar M. Yaghi.

Omar M. Yaghi



(Born: February 9, 1965; Jordan)

Omar Mwannes Yaghi is a chemist best known for developing metal–organic frameworks (MOFs) and pioneering reticular chemistry. He was awarded the 2025 Nobel Prize in Chemistry, shared with Richard Robson and Susumu Kitagawa, for this work.

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Two Persons (2026)

Henri Boris Kagan



(Born: 15 December 1930; France)

He is widely recognized as a pioneer in the field of asymmetric catalysis. His discoveries have had far-reaching impacts on the pharmaceutical industry. In 2026, he was jointly awarded the Nobel Prize in Chemistry with Kensō Soai for the discovery of non-linear effects and autocatalysis in asymmetric organic synthesis.

Kenso Soai



(Born 1950; Japan)

In 2026, he was jointly awarded the Nobel Prize in Chemistry with Henri B. Kagan for the discovery of non-linear effects and autocatalysis in asymmetric organic synthesis.

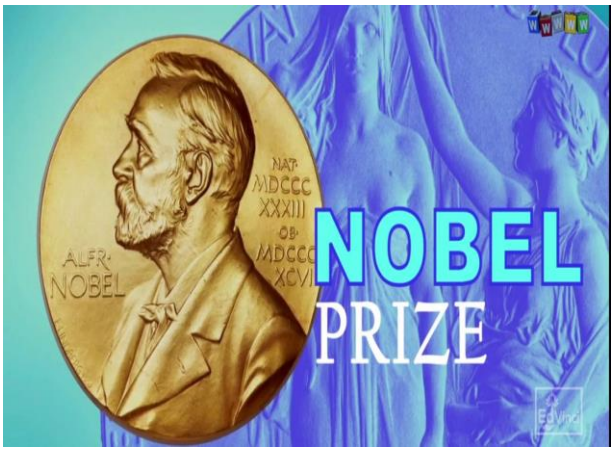
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The 2026 Nobel Prize in Chemistry was awarded to Henri Kagan and Kensō Soai for research that made it possible to control the formation of one of two mirror-image forms of molecules. The Royal Swedish Academy of Sciences announced the decision on 7 October.

CONCLUSION

Chemistry is no doubt a vast subject which focuses on various molecules either inorganic or organic. These molecules are classified into laboratory chemicals, biomolecules, pharmaceuticals, warfare agents, domestic chemicals, industrial chemicals, cosmetics, dyes and so many ingredients. All the molecules are structurally frameworked from Mendeleev's periodic table elements which are again sub-classified into metals and non metals which joins with each other by catenation property by either electrovalent bond, coordinate bond and covalent bond by hybridization rule of s, p, d & f atomic orbital theory.





Chemistry is a playground of functional groups.

Each and every element has its original chemical property which forms the compound having individual characteristics: Molecular Formula, Formula Weight, Composition (elemental percentage), Molar Refractivity, Molar Volume, Parachor, Index of Refraction, Surface Tension, Density, Dielectric Constant, Polarizability, Monoisotopic Mass, Nominal Mass and Average Mass. These individual chemicals react with other chemicals either *in-vivo* (inside the living system), *in-vitro* (outside the living system), *in-situ* (inside the reaction vessel) and *in-silico* (inside the computational software) to develop the new entity through the functional group attached with it which may of single step or multi step synthesis or biosynthesis. Playground means the domain where the chemicals react with each other which may be in-house (domestic sector) or out-house (overall sector). Functional group means the active part in the molecule which takes part in extracurricular activities to focus on the chemical reactivity. **The Nobel Prize in Chemistry; Awarded to Nobel Laureates since 1901** is 202 which focuses on this topic along with the Nobel Laureates who achieved the accolade of Nobel Prize in Chemistry

(1901-2026) by playing games with chemical molecules.[15]

At least 25 laureates have received the Nobel Prize for contributions in the field of organic chemistry, more than any other field of chemistry. Two Nobel Prize laureates in Chemistry, Germans Richard Kuhn (1938) and Adolf Butenandt (1939), were not allowed by their government to accept the prize. They would later receive a medal and diploma, but not the money. Frederick Sanger is one out of two laureates to be awarded the Nobel Prize twice in the same subject, in 1958 and 1980. John Bardeen is the other and was awarded the Nobel Prize in physics in 1956 and 1972. Two others have won Nobel Prizes twice, one in chemistry and one in another subject: Maria Skłodowska-Curie (physics in 1903, chemistry in 1911) and Linus Pauling (chemistry in 1954, peace in 1962). As of 2016, the prize has been awarded to 174 individuals, including four women: Maria Skłodowska-Curie, Irène Joliot-Curie (1935), Dorothy Hodgkin (1964), and Ada Yonath (2009). There have been eight years in which the Nobel Prize in Chemistry was not awarded.

Nobel Lectures is an English-language series of all the Nobel Lectures from 1901, along with related biographical notes, prize citations and presentation speeches. The official Nobel Lectures are given by the Nobel Laureates in the days leading to the Nobel Prize Award Ceremony held each December in Stockholm. Since 1901 the Nobel Foundation has annually published Les Prix Nobel, containing reports from the Nobel Prize Award Ceremonies in Stockholm and Oslo, as well as the biographies and Nobel Lectures of the Nobel Laureates. Up to 1988, the texts were published in the language in which they were presented. Since then the material in Les Prix Nobel has been mostly in English. In order to make the lectures available to people with special interests in the different prize fields, the Nobel Foundation granted Elsevier Publishing Company the right to publish in English the lectures for 1901-1970 as well as other material from Les Prix Nobel. The following volumes were published during the years 1964-1970.

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