The Nobel Prize

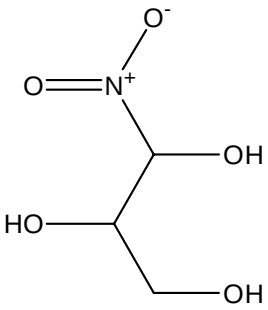
Topics

Chemists

Nobel Prizes have been awarded annually since 1901 for achievements in physics, chemistry, medicine (strictly physiology or medicine), literature and for peace. To win a Nobel Prize is considered the highest honour for people working in these fields. As well as the honour comes the not inconsiderable financial reward of some 10 000 000 Swedish Krone (worth around £800 000) at current exchange rates.

The prizes are funded by money left in the will of the Swedish chemist Alfred Nobel (1833-96).

Alfred Bernhard Nobel was born in Stockholm and developed an interest in chemistry from an early age. He was self-taught and never took any college or university exams. In 1863 he began work as a chemist for his father, investigating the liquid explosive nitroglycerine. This explosive is extremely unstable and can be detonated by the merest impact, making it difficult to transport safely. In 1864, Nobel's brother Emil and four others were killed by an accidental explosion of nitroglycerine.



nitroglycerine

Despite this, Nobel continued to work with explosives and eventually developed a safe way to handle nitroglycerine, by absorbing it into a type of clay called keiselguhr. This product was called dynamite and was much harder to ignite accidentally than nitroglycerine. It was used for blasting in quarries, road building, *etc*, although the Nobel Company also made military explosives.

Dynamite, and other new explosives made Nobel's fortune. When he died in 1895 he left almost all his money to a foundation that would award prizes every year to those 'who, during the preceding year, shall have conferred the greatest benefit on mankind' in the categories mentioned above. The Nobel foundation invests the capital left by Nobel and the interest is used to fund the annual prizes. The Royal Swedish Academy of Sciences is responsible for awarding the prizes in Chemistry and Physics.

A great deal of care and effort goes into selecting the winners, which is why the prizes are so prestigious – more than 6000 people are asked to nominate candidates. Nominators include previous Nobel laureates; members of the prize-awarding institutions themselves; scholars active in the relevant fields and officials and members of various universities and learned academies. Several thousand people are involved in the committees' efforts to determine the originality and importance of each nominee's contributions, with outside experts frequently being called in during the process. Prizes may be shared by up to three people but they are not awarded posthumously. This is probably why Maurice Wilkins rather than Rosalind Franklin shared the 1962 Physiology or Medicine Prize for the discovering the structure of DNA with James Watson and Francis Crick. In fact Nobel Prizes are usually awarded several years after the work they relate to was done. This is largely

to allow time for the impact and importance to be assessed. For example, Crick and Watson published their work in 1953 but were not awarded the prize until nine years later.

The first Nobel Prize for Chemistry was awarded in 1901 to Jacobus van't Hoff of Holland for work on osmosis while the latest (2005) was shared by Yves Chauvin**,** Robert H Grubbs, and Richard R Schrock for work on organic synthesis. A full list of prize winners with brief summaries of their work can be found at http://www.almaz.com/nobel/ .

Many of the earlier Nobel Physics prizes have some bearing on chemistry, for example J J Thomson's 1906 prize was for discovery of the electron and Niels Bohr won the 1922 prize for his model of atomic structure. Ernest Rutherford, however, was reputedly chagrined to find that his 1908 prize for work on radioactivity was for *chemistry* when he considered himself to be a *physicist*.

Keeping it in the family

Perhaps surprisingly there are three father-and-son science Nobel Prize-winning pairs and one mother-and-daughter one. Joseph James ('J J') Thomson and his son George Paget both won Physics Prizes (1906 and 1937) for work on the electron. William Henry Bragg (father) and William Lawrence Bragg (son) shared the 1915 Physics Prize for their discovery of X-ray diffraction. Niels Bohr took the 1922 Physics Prize for his model of the structure of the *atom* and his son Aage the 1975 prize for work on the structure of the *nucleus*. Marie Curie won two Nobel Prizes (1903 Physics and 1911 Chemistry) and her daughter Irène Joliot–Curie won the 1935 Physics prize. The Curies were a remarkable family for scientific honours – Marie shared her first prize with husband Pierre and Irène shared hers with her husband Frédéric. All the Curies' prizes were for work on radioactivity.

Multiple prize winners

Marie Curie is the only person to win prizes in both physics and chemistry. Frederick Sanger won two chemistry prizes - in 1958 for finding the structure of the protein insulin and 1980 for work on the base sequence of DNA. Linus Pauling won a Chemistry Prize in 1954 for research into chemical bonding and also won the 1962 Peace Prize for his attempts to bring about a nuclear test ban. John Bardeen won two Physics Prizes (in 1956 for discovering the transistor and 1972 for the theory of superconductivity). No individual has won three prizes in any categories although the Red Cross organisation has won three Peace Prizes.

Battle of the sexes

Overwhelmingly, the science Nobel Prizes have gone to men (although the third ever Physics Prize was shared by Marie Curie).Only three Chemistry and two Physics prizes have gone to women (two to Marie Curie and one to her daughter!). This is probably a reflection of the fact that science was largely a male pursuit during the 20th century. A list of female Nobel laureates can be found at http://www.almaz.com/nobel/. This site has lots of other Nobel Prize information including chronological and alphabetical listings of winners in all categories. The official Nobel site is at www.nobel.se.

Did you know?

The University with the most Nobel Prize Winners is Cambridge with 80, closely followed by the University of Chicago (77). Oxford lags behind in fifth place with a mere 47.

Element number 102, Nobelium, is named in honour of Alfred Nobel.

Further suggestions

Students may be interested to look at lists of Nobel Prize winners and their discoveries to find how many they recognise and to see how the work of many of the early prize winners in now commonplace in school textbooks, for example Thomson's discovery of the electron, Bohr's model of the atom, Rutherford's work on radioactivity.