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Nobel Prize in Chemistry 1912

Victor Grignard

Paul Sabatier

The Nobel Prize in Chemistry 1912 was divided equally between Victor Grignard *"for the discovery of the so-called Grignard reagent, which in recent years has greatly advanced the progress of organic chemistry"* and Paul Sabatier *"for his method of hydrogenating organic compounds in the presence of finely disintegrated metals whereby the progress of organic chemistry has been greatly advanced in recent years"*.

RESEARCH INFORMATION:

The aim of the scientist is, or should be, to extend the limits of human knowledge. However, the roads open to him are many and he can render service in his chosen field in various ways. By developing fertile theories or hypotheses he may blaze new trails for human thought; by discovering unknown facts he may enrich our knowledge, and by inventing new technical devices and new methods he may forge new weapons for the arsenal of Science. This last way is not the least important.

It is true that a Scheele in his time and with astonishingly poor resources at his disposal succeeded in obtaining results which astounded the world and covered him with immortal glory. But this is now part of the history of Science and belongs to an age long

since vanished; such a thing cannot happen again, any more than a people can relive its youth or an individual his childhood.

The natural sciences are advancing rapidly and we are constantly up against new and ever more complicated problems, where the old technical resources cease to be of any avail and where the invention of other means is indispensable to progress.

It was against this background that the Royal Academy of Sciences decided to award the Nobel Prize for Chemistry in 1912 to the inventors of two new working methods, each excellent in its own field. Half of the prize goes to Victor Grignard, Professor at the University of Nancy, for his invention of the reagent named after him, and half to Paul Sabatier, Dean of the Faculty of Sciences at Toulouse University, for his method of hydrogenating organic compounds in the presence of finely divided metals.

The methods in respect of which the awards were made both belong to the field of organic chemical synthesis, the purpose of which is the artificial production of organic compounds, i.e. derivatives with carbon as basic element, whether or not such derivatives are found in that exact form in the animal or vegetable kingdom. This branch of chemistry is fairly young; it is usually considered to date from a discovery made in 1828 by Friedrich Wöhler, a disciple of Berzelius. From this humble beginning, from one isolated observation, organic synthesis has developed, especially during the last half century, into something of undreamed-of importance not only for the science of chemistry itself but also for the application of chemistry to everyday life. It is certainly no exaggeration to say that those branches of industry which are based on the use of synthetic methods in organic chemistry have provided a livelihood for millions of men and have created wealth to the value of thousands of millions of pounds.

For this reason discoveries opening the way to new developments in this sphere can be said to "have conferred the greatest benefit on mankind", irrespective of whether these words are taken in a wider sense or in a limited, not to say literal, sense.

Professor Grignard's method is the culmination of a series of investigations, carried out with remarkable technical skill, which revealed that metallic *magnesium* in the

presence of ether reacts on organic derivatives of chlorine, bromine and iodine by forming ether-soluble organic compounds of magnesium. These latter compounds in turn react extremely readily with a large number of other organic substances, so that carbon combines with carbon, i.e. forming a true organic synthesis.

The importance of Grignard's method to organic chemistry lies in the number of essential virtues that it possesses, namely simplicity of procedure, and therefore saving of time; low cost of materials employed; satisfactory yield and, most important of all, a very wide application. From this last point of view no method of organic synthesis superior to that of Grignard's is known, and indeed there is scarcely any sphere of organic chemistry outside its scope.

The services which this method has rendered to Science are great, but no less great are those which it can be expected to render in future. Shall we, for instance, ever learn how to produce artificially alkaloids or vegetable organic bases, which are so important in medicine but which are still so diffilcult to prepare and therefore so costly? If we do there is little doubt that this will only be with the aid of Grignard's reagent.

Professor Grignard. Anyone who has been concerned with organic chemistry during recent years knows how greatly you have contributed to the advancement of this branch of science. The number of remarkable and important investigations which have been made possible by the reagent invented by and named after you is already most imposing, and it continues to increase every day. Your method has thus pushed back appreciably the frontiers of our knowledge, of our ability to observe; and not only that, it is also opening up prospects of new conquests for our science.

It is therefore with genuine satisfaction and in the certainty of acting in full accordance with the wishes of the scientific world that the Royal Swedish Academy of Sciences has awarded you the Nobel Prize for Chemistry for this year, and I have the honour to ask you to accept it from the hands of His Majesty the King, who has graciously agreed to present it to you.

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The new method, which has been named after its inventor Professor Sabatier, consists of the reduction of organic compounds under the action of finely powdered metals - nickel, cobalt, copper, iron or platinum. This method is as follows: An oxide of one of these metals is heated to 300°C in a current of hydrogen gas. After the metal has been reduced in this way the heat is decreased and vapour of the organic substance which has to be reduced is mixed with the hydrogen gas.

The method is very simple and convenient and its yield is high. In addition to these advantages it is completely safe, which happily distinguishes it from the reaction method hitherto most widely used, which all too often gave rise to explosions, some of them very serious.

Sabatier's reduction method has been very extensively employed not only by its inventor and his disciples, and it has opened up new fields of scientific research; it has also rendered service to many scientists in various countries and has enabled them to obtain important results which would have been impossible with the old methods. Moreover, several chemists have introduced various modifications for different purposes, and this has considerably increased the range of its uses.

Among the most interesting results obtained with Sabatier's method I will confine myself to recalling how Professor Sabatier, by applying under various experimental conditions his reagent to the hydrogen carbide, acetylene, succeeded in producing higher homologues of hydrocarbons identical with those contained in natural petroleum of different origins, for instance American, Russian or Galician, upon which phenomenon he based a general theory for explaining the origin of different mineral oils

Professor Sabatier. In one of your works, with which I have been very familiar for several years, you say that "in the study of the phenomena of the physical world, no matter what these phenomena may be, the basis of any system must be observation, precise, strict, and free from all preconceptions". These are memorable words, which to many may seem a truism, though the message they contain frequently goes unheeded; they cannot therefore be repeated too often.

You, Sir, have not merely professed this doctrine in your books - you have applied it throughout your scientific career. Thanks to this constant application of your principles you have achieved results whose value - and this we can say with certainty - will always remain.

For me it is a most gratifying duty to congratulate you on behalf of the Royal Swedish Academy of Sciences upon your brilliant scientific achievements, and in particular your general method of hydrogenating organic compounds in the presence of reduced metals and catalysts, a method which in the sphere of organic chemistry has during the past few years made possible much progress and the opening-up of so many new fields to science.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1912/press.html