ISSN:2249-5347

IJSID

International Journal of Science Innovations and Discoveries

An International peer Review Journal for Science

Nobel Prize in Chemistry 1906

Henri Moissan

The Nobel Prize in Chemistry 1906 was awarded to Henri Moissan *"in recognition of the great services rendered by him in his investigation and isolation of the element fluorine, and for the adoption in the service of science of the electric furnace called after him"*.

RESEARCH INFORMATION:

The Academy of Sciences has this year awarded the Nobel Prize for Chemistry to Professor Henri Moissan of the University of Paris for isolating and investigating the chemical element fluorine and for introducing the electric furnace into the service of science - exploits whereby he has opened up new fields for scientific research and industrial activity.

When Lavoisier presented his antiphlogistic system, this system proved in principle so perfect that one could confidently predict that many well-known substances, such as alkalis and alkaline earths, were not elements but oxides of hitherto unknown metals - a theory which Davy, by means of electrolysis, soon after proved to be correct. However, Lavoisier's system was not perfect in every respect. The very prototype of all salts, "common salt" had no place in it. When once the negative principle, chlorine, which is one

ISSN:2249-5347

IJSID

International Journal of Science Innovations and Discoveries

An International peer Review Journal for Science

of its constituents, was thoroughly understood, and - more important - when iodine, a substance analogous to chlorine, had been discovered, it became clear that in these substances a new class of elements, the halogens, had been found. This led to the conclusion that hydrofluoric acid, which had been discovered by Scheele and studied more fully by Berzelius must be assumed to contain a negative element, fluorine, which was completely analogous to the other halogens and which, in anticipation, was given its place beside oxygen, at the head of the halogens. But all efforts to isolate it failed until in 1886 Moissan found the way to an ultimate solution of the problem. The difficulty lay partly in the enormous energy possessed by this element, thanks to which it would decompose water in the cold, and partly in the fact that anhydrous hydrofluoric acid, which seemed to be the substance most capable of yielding fluorine upon hydrolysis, was a non-conductor of electricity. However, by means of a series of ingenious arrangements Moissan succeeded in overcoming all these difficulties to such a degree that this element could now be obtained in a continuous flow of gas for hours on end. This result enabled Moissan to carry out a very thorough methodical study of it. So far the most important outcome of this research is that fluorine has now been proved to possess all the qualities previously attributed to it by virtue of its position in the system as a reinforced oxygen. Thus, at ordinary temperature it combines with carbon and silicon, forming gases; it combines with hydrogen at temperatures as low as approximately -230° C. When hydrogen unites with this element, also, more heat is released than when hydrogen unites with oxygen. Some of its compounds - for instance, those with sulphur - are of great importance for determination of the valence of the elements.

However, Moissan's ultimate goal in his work on fluorine was to complete the brilliant series of mineral syntheses, which had brought great renown to several of his compatriots, by producing artificially the most remarkable and at the same time most precious mineral - the diamond. This meant employing a hitherto little practised method. The possibility of using an electric arc as a means of heating was already evident. Moissan had the very simple, but brilliant, idea of using it to produce heat, while at the same time

ISSN:2249-5347
IJSID
International Journal of Science Innovations and Discoveries
An International peer Review Journal for Science

excluding all side effects. In his celebrated electric furnace he succeeded in liquefying substances such as lime and magnesium oxide; in this way he produced calcium carbide and a whole series of other carbides, in pure and crystallized form, from which it was found that carbides were the most heat resistant of all chemical compounds. It was now possible, by decomposition of their carbides, to prepare in pure ingots metals such as tungsten, molybdenum and titanium, which had hitherto been obtainable only in powder form.

Again with his furnace he produced microscopic diamonds by suddenly cooling from a very high temperature a molten pig of iron containing carbon. This experiment is very instructive; the carbon gave transparent drop shaped diamonds which were in every way similar to the microscopic specimens found, for instance, in the diamond-bearing strata of the Cape, and this apparently explains how diamonds are formed in nature. Moissan also made a methodical study of graphite, and he showed - a fact of great interest - that graphite becomes what is known as "swelling" when it is extracted from a metal solution prepared in an electric furnace, since a certain number of native irons, among them the iron found by Nordenskjöld at Ovifak in Greenland, as well as the diamond-bearing strata of the Cape contain graphite in the swelling form.

The work done by Moissan with the electric furnace gave to the world of technology an impetus which will be felt for a long time, and it is still impossible to measure the extent and significance of the effects which this invention will have.

Professor Moissan. The whole world has admired the great experimental skill with which you have isolated and studied fluorine - that savage beast among the elements. With the aid of your electric furnace you have solved the riddle of how diamonds are formed in nature. You have unleashed a mighty wave into the world of technology, a wave which has not yet attained its full height. And it is in recognition of these services that our Academy of Sciences has awarded you the Nobel Prize, and in the name of this Academy I congratulate you on your work, which will be of lasting value.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1906/press.html