PHYSICS-CHEMISTRY

Name Three Nobelists

Two American physicists and one Czechoslovakian chemist, first scientist to receive a Nobel Prize in his country, named to receive Nobel Prize in Physics and Chemistry, 1959.

THE 1959 Nobel Prize in Physics was awarded to two scientists who deal with the strange world of the atomic nucleus.

Drs. Emilio Segre and Owen Chamberlain of the University of California led the Radiation Laboratory team that discovered the anti-proton in 1955 using the bevatron, a powerful atom smasher. Dr. Chamberlain is now a visiting professor at Harvard University.

The anti-proton, or negative proton, is one of a group of subatomic particles having properties opposite to those of ordinary matter. One outstanding property of anti-matter particles is that when they come close to ordinary protons or neutrons, the two annihilate each other, releasing a large amount of energy.

The energy released in annihilation is several hundred times that in the corresponding reaction in hydrogen thermonuclear fusion.

Anti-protons are born and "live" only outside the nucleus following some high energy nuclear event similar to the collision resulting from bevatron bombardment, when the anti-matter particle is created from energy.

Two astronomers have suggested that clashes of matter with anti-matter, destroying both, could cause the broadcasting of radio waves from space picked up on earth by the giant antennas called radio telescopes. They calculated that the most anti-matter that could be present in the Milky Way galaxy in which the sun and its planets, including earth, are found is one part in 10,000,000.

Physicists have for several years known about the anti-particles of pi mesons, the glue that keeps atomic cores from flying apart. However, for the very rare hyperons, only one anti-particle has so far been found, the negative lambda.

Hyperons are unstable particles from the atomic nucleus, heavier than the proton or neutron. They live for only billionths of a second, but during that fleeting lifetime their existence is just as real as that of a neutron, which lasts for about 12 minutes before decaying into a proton.

One question puzzling physicists, therefore, is exactly what are fundamental particles. Neutrons and protons, both found in the nuclei of atoms, are fundamental, physicists agree. They are still debating where to draw the line, however, since the number of strange fragments found in the debris of smash-ups between atoms is bewildering. Some 30 particles are now known or expected to be found.

The anti-particles of hyperons still to be discovered include one each for the three kinds of sigmas known and one for the negative xi.

THE INVENTION and development of one of the foremost methods of chemical analysis by instruments won the 1959 Nobel Prize in Chemistry for Prof. Jaroslav Heyrovsky of Charles University, Prague, Czechoslovakia.

The polarographic method of analysis depends on the different speeds with which ions travel in solution under the influence of an electric field, and the ease with which atoms part with their electrons to form ions.

It is used extensively in chemical laboratories around the world both in industry and for research. The method is particularly valuable in the field of metallurgy.

Its advantages include easily reproducible results and ability to show the presence of chemicals present only in very small amounts. Other outstanding features of the method are its rapidity of operation, the possibility of analyzing solutions the size of a drop, the fact that in most cases the solution remains unaltered during the analysis and can later be used for other purposes, and the recording of results automatically on a graph to provide a permanent record of the analysis.

The method . . . also gives simultaneous quantitative and qualitative analysis of several components of a solution.

The first polarograph was constructed in 1925, and resulted from Prof. Heyrovsky's studies of electrolyses with a dropping mercury cathode. Electrolysis is the passage of an electric current through a solution, resulting in the movement of ions to positive and negative electrodes.

A technical definition of the polarographic method of analysis as given by Dr. Otto H. Muller, associate professor of physiology, State University of New York Medical Center at Syracuse, N. Y., is:

The polarographic method may be defined as a method of analysis based on the electrolysis of a minute fraction of a solution in a cell consisting of one small, easily polarizable, and one large, non-polarizable electrode.

(In electrolysis, polarization is the increase of the resistance of a solution due to gas accumulation at the electrode or chemical depletion in part of the solution.)

The voltage necessary for the electrolysis indicates the nature of the reacting substance, while the current observed indicates its concentration.

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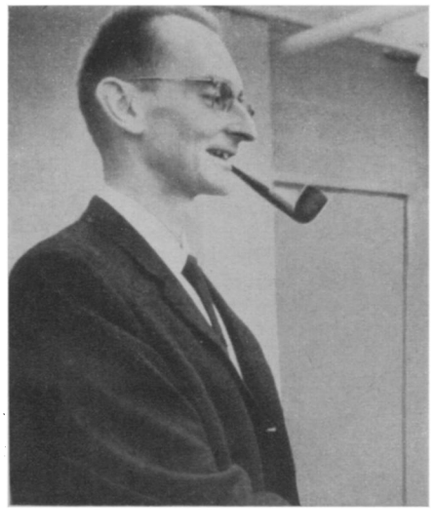

PRIZE WINNERS—American scientists Drs. Emilio Segre, Owen Chamberlain and Czechoslovakian Prof. Jaroslav Heyrovsky, Nobel Prize winners for 1959, are shown left to right.