

Exploring a Particle Now Possible

Chemistry—Physics

Photo-Electric Device Reveals Minute Composition

A NEW discovery, of value to scientific research and to industry—the chemical analysis of particles so small that hitherto they defied all attempts to determine their composition—has been explained by Dr. W. C. MacTavish, professor of chemistry at New York University. The analyses were made by two young Austrian chemists now connected with New York University—Dr. Anton Benedetti-Pichler and Dr. Joseph Niederl, both of them former students of Prof. Fritz Pregl, who received the Nobel Prize for his work in microanalysis. Both come from the Chemical Institute of the Technical High School at Graz, Austria.

Dr. Niederl demonstrated a method of analysis discovered by one of his pupils at New York University, William Saschek. He termed it the "micro-vaporimetric molecular weight method of analysis," by which he determined the composition of a frac-

tion of a drop of liquid.

Then Dr. Niederl explained that there are as yet only three other laboratories equipped to do microanalysis—that of the Rockefeller Institute, where he helped install the apparatus, and the laboratories of Columbia and Johns Hopkins Universities.

Illustrating the value of the method, Dr. Niederl explained that he recently had determined for one of the leading New York laboratories the chemical constituents of a small drop of substance produced in an effort to find a rubber substitute and that upon another occasion Dr. Pichler had determined microscopic impurities in iron that was being galvanized. The method may be used in determining the genuineness of old paintings and coins, he said.

In demonstrating the micro-vaporimetric molecular weight method, Dr. Niederl analyzed about a third

of a drop of liquid contained in a capillary tube. The tube was placed in mercury and then broken, releasing the liquid. The mercury was then heated until the liquid from the tube became gas. As the gas expanded it forced off an amount of mercury equal to its volume. By taking into consideration the temperature at which the gas was vaporized, together with its volume, its molecular weight was determined. Dr. Niederl said a method of analyzing mixed substances was now being developed.

Dr. MacTavish also demonstrated an automatic chemist that uses an electric eye to keep the analysis under control. The device is fairly simple. A beam of light is cast through the liquid being analyzed so that it falls upon a photo-electric cell. Above the beaker containing the liquid under investigation is a tube which passes an acid drop by drop into the beaker. A small amount of chemical indicator added to the liquid in the beaker makes the liquid red, so that the beam of light passing through it is not powerful enough to operate the relays connected with the photo-electric cell.

When a sufficient amount of acid has dropped into the beaker the red color disappears, indicating complete neutralization. This allows enough light to pass through the liquid to operate the relays and give the chemist a signal that his test has been completed.

"Using a robot of this kind around a chemical laboratory will save a great deal of the chemist's time," Dr. MacTavish said. "Its electric eye is ten times as sensitive as the human eye and will distinguish shades of color impossible to the chemist."

A colleague of Dr. MacTavish, Dr. H. M. Partridge, has perfected a method of producing lithium in such quantity as to make it commercially available at low cost. Although it formerly cost \$20 an ounce, it now was produced for \$20 a pound, he said. He has prepared one piece about the size and shape of a baker's jelly roll, which is probably one of the largest pieces ever made. The metal weighs one-fifteenth as much as iron. It is so light it floats in kerosene, having only one-half the specific gravity of water.

Finds House 5,000 Years Old at Ur

Archaeology

DIGGING down into the soil of Ur of the Chaldees and digging back at the same time farther into ancient history, the joint expedition of the University of Pennsylvania Museum and the British Museum has found ruins of a house inhabited 5,000 years ago. The expedition, which is now started on its eighth season of excavations at the home town of Abraham, is concentrating this year on learning more about the town of Ur before the flood spread its thick layer of barren mud over the region.

A report just received from C. Leonard Woolley, director of the expedition, states:

"We have now dug some 15 feet over the whole area and already have the ground-plans of five totally distinct buildings superimposed one upon another. Each of these buildings enjoyed a reasonably long life, judging by the repairs to the walls and by the way in which floors have been relaid, and the levels we have now reached must take us back into the early part of the fourth millennium before Christ."

Even the oldest of these houses is not of the pre-flood city, Mr. Woolley reports. That lies deeper.

"But it is the work of a civiliza-

tion almost as old," he adds, "and these walls, built of small mud bricks laid herring-bone fashion, are the monuments of an era new to Mesopotamian archaeology."

The oldest royal graves at Ur which the expedition has unearthed in previous seasons have been estimated by Mr. Woolley to belong to the time 3200 to 3500 B. C., which is older than the First Dynasty of Ur. Some scientists have been reluctant to accept so early a date. Mr. Woolley reports that he has now, unexpectedly, obtained definite proof of age. The graves were dug into the great rubbish mounds which had risen outside the walls of the prehistoric city. Where he is now working the rubbish is laid in well-defined strata and the mound's growth can be traced in bands of varying color. In one of the highest, most recent layers have been found fragments of clay jar-stoppers stamped with seals, and among these the seals of the first king of the first dynasty of Ur, Nesanni-padda and his wife, Nin-tur-Nin. This stratum of rubbish formed about 3000 B. C. stretches unbroken over the royal graves, and thus demonstrates their greater antiquity, Mr. Woolley points out.

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