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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE STORY OF THE CHEMICAL ELEMENTS¹

TO-NIGHT I am to present to you a few sketches from the story of the chemical elements during the last three decades—a period during which that story has developed into an exciting drama.

Let me begin by briefly reviewing the state of our knowledge of the elements at the beginning of the century. Of the 89 elements now known about a dozen, including all the radioactive elements and several of the rare-earth elements, were still undiscovered. The chemical world had, only a few years previously, been excited by the discovery of two inert elementary gases—argon by Lord Rayleigh and Sir William Ramsay in 1894, and helium by the latter in 1895—two elements utterly different in their properties from any then known; and there had just been announced (in 1898) by Ramsay and Travers the isolation from the air of three more of these gases, neon, krypton and xenon, forming with argon a new very distinct group of the periodic system. The discoveries of argon and helium were especially striking; for argon had existed unknown through the centuries, though present to an extent of nearly one per cent. in the atmosphere; and helium had been detected in the sun by its spectrum long before it was found on the earth. Some of you will recall that Professor Ramsay exhibited in this country a few years later a minute bubble of helium and showed its spectrum—a substance that is now prepared in quantity large enough to fill huge dirigibles. And it is interesting to note that two other of these then rare gases, argon and neon, are now used for filling each year thousands of electric lamps. But of far greater importance was the bearing of the discovery of helium on the development of subatomic physics and chemistry, as we shall soon see.

Thirty years ago the periodic relations of the elements were commonly represented [in the way shown in Figure 1] by arranging the elements in the order of their atomic weights in periods of eight. This arrangement was fairly satisfactory for practical use; but it had many familiar defects—some of which suggested real theoretical difficulties.

¹ Address delivered at the New York meeting of the American Association for the Advancement of Science by its retiring president.

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