

They have discarded the atomic theory. The "atom" of Dalton is no longer considered the ultimate particle of matter, but is composed of a definite number of infinitely smaller identical units, each in constant motion in its intra-atomic sphere. These units are called "corpuscles" or "ions," and the chemical and physical properties of an element are functions of the number of "ions" in each atom. It has been estimated that the atom of hydrogen, the lightest of all known substances, contains 700 "ions"; that of oxygen, 11,200; of gold, 137,200; and of radium itself, 120,000 "ions." The intra-atomic motion of the "ions" of radium is more rapid than that of any other known substance. It is so violent that the force which holds the "ions" together in an atom is overcome, and the "ions" are set free into the ether, similarly as meteors leave the solar system. This atomic disintegration of radium is the cause of its radio-activity. Naturally, it should be expected that the substance would lose in weight. This is believed to be the case, but as the disintegration of the atom of radium takes place so very slowly, the loss is inappreciable to the balance. It is estimated that in ten thousand million years, the loss in weight from one square inch of surface would only be about one grain.

This theory of the constitution of matter offers an explanation not only of the phenomena of radium, but also of many other facts which have been recently observed and could not readily be explained by means of the theory of Dalton. For example, it affords an explanation for the effect of X-rays on the conductivity of gases. Again, with this theory it is an easy matter to explain the existence of natural families of elements, and that in these groups of analogous elements the atomic weights frequently increase in the same ratio. In fact, the existence of Mendeleeff's law of periodicity is a natural deduction.

Some physicists have advanced the theory that the "ions" of all the elements are identical. If this is true, and atoms in general can be disintegrated, as is believed to be the case with radium, then the transmutation of one element into another, of the base into the noble metals, should be within the reach of scientists.