WAY TO TRANSMUTE ELEMENTS IS FOUND

Dream of Scientists for a Thousand Years Achieved by Dr. Rutherford.

NEW AGE, SAYS RICHARDSON

Remarkable Result of Bombarding Nitrogen Gas With the Alpha Rays of Radium.

The transmutation of elements, the dream of both charlatans and scientists for nearly a thousand years, has actually been accomplished by the recent work of Sir Ernest Rutherford, and his results are generally accepted by scientists and physicists, according to Dr. James Kendall, Associate Professor of Chemistry at Columbia, who said, on the other hand, that there was not the slightest reason to believe that the Germans had accomplished their reported feat of making synthetic gold.

Nitrogen, sodium, aluminum, chlorine, oxygen and carbon have been transmuted, or broken up by Rutherford into hydrogen and helium, according to Dr. Kendall.

This was first accomplished, accordcording to the claims of Rutherford, by bombarding nitrogen gas with the alpha rays of radium. These so-called rays are helium atoms which are flung out of the exploding radium atom with an energy incomparably greater than any projectile produced artificially. The velocity of this atom would take it around the world in slightly less than a second, and the power of the exploding atom, in proportion to size, is something like a million times greater than that of trinitrotoluol.

Result of a Chemical Collision.

The radium was placed so as to drive the alpha particles into nitrogen gas. When the alpha particle had a head-on collision with a nitrogen atom it tore it to pieces, so it is asserted. The atom supposedly has a structure somewhat resembling the solar system. Its centre is a nucleus of positive elevtricity, resembling the sun of the solar system, and this is surrounded by electrons, or charges of negative electricity, presumably whirling about the nucleus, as the planets whirl about the sun.

The alpha particle is believed to produce such a disruption in the atom as might occur, for instance, if another star of the dimensions of the sun tore through our system, hit the sun directly and drove it off into space, causing the planets to shoot off in all directions.

This occurs on a scale in the neighborhood of the billionth part of a billionth of an inch, but it can be partly measured. The alpha particles thrown off by radium produce scintillations when they strike a screen of zinc sulphide within a certain distance. When they were used to bombard nitrogen scintillations took place at greater distances from the radium than the alpha particle could alone produce.

By his study of these scintillations Dr. Rutherford was able to prove to the satisfaction of men of science generally that new products were developed by the shattering of the nitrogen atoms and that these products were hydrogen and helium atoms. His experiments have all been in the way of disorganizing the more complex atoms into simpler ones. The transmutation of atoms with simple structures into those with more complex ones has not been achieved.

Dr. Kendall on Rutherford.

"Rutherford has reduced nitrogen, aluminum, chlorine and sodium to hydrogen and helium," said Dr. Kendall. "He has also produced helium atoms by tearing oxygen and carbon to pieces, but hydrogen has not resulted, I believe, from the disruption of these atoms.

"This is certainly the transmutation of elements, but it is done on an infinitely small scale, and is important at present only to the scientific man. It does not promise that elements can be changed from one type to another, except on the smallest laboratory scale. It does not suggest that the transmutation of metals may be developed from it.

"As to the reports from Germany that gold has been produced by the transmutation of elements, there is nothing to it at all. It is all nonsense."

This report was based on the statement of Dr. Irving Fisher, the noted American economist, who recently stated in England that he had been informed by "a highly educated professional man" who had the information direct from the discoverer, that the process of making gold by transmutation was known in Germany. Dr. Fisher said that he knew nothing of the alleged method by which this was accomplished and that he was interested in it only as an economist, not as a chemist or physicist.

Results of the Discovery.

The possible far-reaching results of Rutherford's discovery were discussed as follows by Professor O. W. Richardson in his recent presidential address to the Section of Mathematics and Physics of the British Association:

"Rutherford has taken the direct method of bombarding the nuclei of the different atoms with the equally minute high-velocity helium nuclei (alpha particles) given off by radioactive substances, and examining the tracks of any other particles which may be generated as a result of the impact.

"A careful and critical examination of the results shows that the hydrogen nuclei are thus expelled from the nuclei of a number of atoms, such as nitrogen and phosphorus. On the other hand, oxygen and carbon do not eject hydrogen under these circumstances, although there is evidence in the case of oxygen and nitrogen of the expulsion of other sub-nuclei whose precise structure is a matter for further inquiry.

"The artificial transmutation of the chemical elements is thus an established fact. The natural transmutation has, of course, been familiar for some years to students of radioactivity. The philosopher's stone, one of the alleged chimeras of the medieval alchemists, is thus within our reach.

"But this is only part of the story. It appears that in some cases the kinetic energy of the ejected fragments is greater than that of the bombarding particles. This means that these bombardments are able to release the energy which is stored up in the nuclei of atoms.

Energy of High Power.

"Now we know from the amount of heat liberated in radioactive disintegration that the amount of energy stored in the nuclei is of a higher order of magnitude, some millions of times greater, in fact, than that generated by any chemical reaction such as the combustion of coal.

"In this comparison, of course, it is the amount of energy per mass unit of reacting or disintegrating matter which is under consideration. The amounts of energy which have been thus far released by artificial disintegration of the nuclei are themselves small, but they are enormous in comparison with the minute amount of matter affected.

"If these effects can be sufficiently intensified there appear to be two possibilities. Either they will prove uncontrollable, which would presumably spell the end of all things, or they will not. If they can be both intensified and controlled, then we shall have at our disposal an almost illimitable supply of power which will entirely transcend anything hitherto known. It is too early yet to say whether the necessary conditions are capable of being realized in practice, but I see no elements in the problem which would justify us in denying the possibility of this. It may be that we are at the beginning of a new age, which will be referred to as the age of subatomic power. We cannot say; time alone will tell."

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