PHYSICS

Tapping of the Atom's Energy Achieved in New Experiment

Cosmic Rays Produced Artificially for First Time as Beryllium Core Engulfs Helium Without Disintegrating

COSMIC RAYS, most piercing radiation known to man, have been produced artificially for the first time at the Physical Institute of the University of Giessen by Prof. W. Bothe and Dr. H. Becker. The process gains energy at the expense of the matter in the atom nucleus and thus realizes the old hope of tapping the energy of the atom.

Beryllium metal, bombarded with alpha particles from the radioactive element polonium, was in these experiments made to emit rays as penetrating as 14 million-volt X-rays so far unattained by man. The new rays are so penetrating that after passing through nearly three inches of iron they have lost only a third of their intensity.

Artificial Transmutation

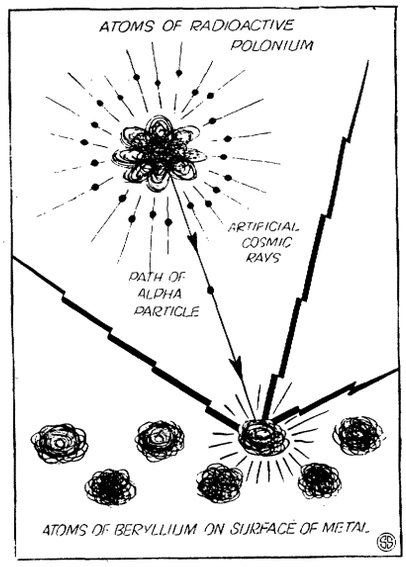
Previous experiments on the bombarding of atoms with alpha particles, which are helium atom nuclei moving at high speed, have resulted in the production of proton rays, the speeding hearts of hydrogen atoms. Artificial transmutation of the target atom nucleus into another chemically different element, had thus been attained by the loss of the hydrogen nucleus.

Drs. Bothe and Becker found, however, that beryllium gave off no protons when bombarded by alpha particles. The alpha particle entered the nucleus of the beryllium atom which at the same time emitted cosmic rays holding much more energy than the impinging alpha-particle projectiles.

Hitherto unknown carbon atoms of atomic weight 13 were thus formed from each of the beryllium atoms hit. This achievement constitutes a new type of transmutation of a chemical element. The process can be represented by an equation similar to those used to picture chemical reactions.

Six of the light chemical elements, Drs. Bothe and Becker found, gave the artificial cosmic or hard gamma rays under the action of the polonium alpha particles. These elements were: lithium, beryllium, boron, fluorine, magnesium and aluminum. Of these, beryllium gave by far the most intense secondary rays and therefore was most suitable for experiments. Some of these elements also emitted proton rays.

Science News Letter, March 12, 1932



POWERFUL BOMBARDMENT

This diagram shows how radioactive polonium sends out showers of speeding alpha particles, of which only one in a great number scores a hit on a beryllium atom and thus sets up a cosmic radiation.

ARCHAEOLOGY

Unearth New Portrait Of King Tut's Girl-Wife

See Front Cover

A NEW portrait of the girl-wife of that well-known Egyptian pharaoh, Tutankhamon, has been unearthed from the ruins of Tel-el-Amarna, where the Egypt Exploration Society has been excavating. The portrait is a beautiful little head, with exquisitely modeled features. It is less than two inches long.

Identity of the portrait has been settled with reasonable certainty by J. D. S. Pendlebury, who directed the excavations. Without hesitation, Mr. Pendlebury pronounced the face to be so closely like that of a woman on the back of a chair in Tutankhamon's tomb, that both must be the same character. The portrait on the chair is that of Tutankhamon's wife.

The little sculptured head bears a startling likeness to the famous beauty Queen Nefertiti, it was also pointed out. This is added proof of the identity of the portrait, for Nefertiti was the mother of the princess who became Tutankhamon's queen.

Science News Letter, March 12, 1932

PHYSICS

German Physicist Interprets Experiments With Cosmic Rays

By Prof. Dr. W. Bothe, of the Physical Institute of the University of Giessen

OUR EXPERIMENTS show that energy is gained if any alpha particle is shot into the beryllium nucleus. That is to say, by addition of an alpha particle to the beryllium nucleus, a carbon nucleus of atomic weight 13 is produced which contains less energy than the two original nuclei together.

These experiments give a hint as to the way in which the building up of the atom nuclei actually takes place in the universe: The heavier nuclei are produced by steps from the lighter. The hypothesis which Dr. Robert A. Millikan has made to explain the "ultra-rays" (cosmic rays), that the heavy nuclei are formed direct by the sudden combination of a great number of protons and electrons is accordingly very improbable.

In still another connection the gamma radiation from beryllium is of interest in connection with the problem of the cosmic rays. The new rays are much harder than the known radioactive gamma rays, their penetrating power approaches close to that of the softest components of the cosmic rays. Thus in the beryllium rays one can study the properties of a gamma radiation which has approximately the