

PHYSICS

Mysterious Nucleus of Atom Yields Secrets to Bombardment

Cambridge Investigators Learn From Rays of Polonium That Core of Atom is Probably Built Like Its Outer Shell

THE MYSTERIOUS inner core of the atom is probably built on the same lines as the outer shells, that is, like an uneven staircase.

Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard, of the University of Cambridge, England, have bombarded a variety of atomic nuclei with fast moving alpha rays from polonium, a radioactive element. They found that energy is done up in packets or quantised in the nucleus as elsewhere in the atom.

"What is happening in the inner core of the atom?" is the question that is being asked now in many laboratories of physics. The nature of the electron layers that form the bulky outer coat of the atom is well known but the very small nucleus which gives matter its weight is still a problem.

Protons, electrons and alpha particles are the constituents of the nucleus, say these Cambridge scientists. The protons are themselves nuclei of the smallest atoms, that is of hydrogen, while the alpha particles are helium nuclei.

Protons have been ejected from certain atoms by Dr. Chadwick by bombarding them with the rapidly moving alpha particles from polonium, an element very like radium.

Two things may happen. The destructive alpha particle may be swallowed up by the second nucleus or it may escape again. In both cases Dr. Chadwick found proton rays were produced.

If the alpha particle penetrates the target nucleus, protons of only two or three definite speeds are produced. Thus only limited and fixed amounts of energy can come from the nucleus at these times and fresh evidence is found for the quantum theory which has been so powerful in probing the structure of the atom.

Non-penetrating collisions, however, lead to protons whose speed depends on the speed of the guilty alpha particle. As might be expected more of such protons are found moving along the line

of motion of the hitting alpha particle than in other directions.

The proton speed groups have given the Cambridge scientists proof of the existence of energy levels in the nucleus, at least so far as the protons are concerned.

Nothing is yet known about the behavior of the electrons in the nucleus.

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SAFETY

Speeding Autos Slow Flow of Traffic.

IF YOU drive through city traffic at 45 miles per hour you slow up traffic as much as though you drive at less than 10 miles per hour. This is shown in data presented by the traffic committee of the City Officials' Division of the American Road Builders' Association.

They have found that a speed limit of 23½ miles per hour will allow the

MEDICINE

Not Enough Oxygen Causes Condition Resembling Insanity

AN EMOTIONAL and mental condition resembling the effects of alcohol or temporary insanity results from a lack of oxygen such as that experienced by high-flying aviators.

Marked effects on the personality and on mental processes are caused by oxygen deprivation, it was brought out by experiments reported last week before the New York Branch of the American Psychological Association by Dr. Ross A. McFarland of Columbia University. The results of these experiments may lead to the development of new methods of studying the physiological and psychological causes of mental breakdown, Dr. McFarland believes.

Loss of memory results from the lack of oxygen at altitudes of 20,000 feet or

more, and even below that height persons become unable, after a period of an hour, to keep their attention fixed or to perform tasks requiring judgment, patience or persistence. These effects occur in an insidious manner.

If cars, with an average length of 14 feet, travel at five miles per hour, they need keep only 5 feet apart, and 1,380 can pass a given point in an hour. If they run at 10 miles per hour, the distance between must be increased to 11 feet, but the number of cars per hour is 2,100.

The number of cars per hour on the street increases with the speed, but the distance between the automobiles required for safe driving increases also. At first the necessary space between modern cars equipped with four-wheel brakes increases only slightly with their speed, but at about 23½ miles per hour the effect of the factor of safety of space between begins to affect the number of cars which the street can handle. At that speed, 2,600 cars per hour is the capacity of the traffic lane.

At speeds higher than 23½ miles per hour, the safe distance between cars cuts down very sharply the number of cars per hour, and at 45 miles per hour the street can accommodate only 1,760, just about the number that can be managed at the almost impossible velocity of seven miles per hour.

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Emotional outbursts are characteristic, but individuals differ widely in their reactions, Dr. McFarland said. "Some reacted by marked irascibility of temper or by trying to break the apparatus to pieces; others by uncontrollable laughter, silliness, or flirting with the experimenter. There seemed to be some consistency in these reactions suggesting that the basic and uninhibited temperament of the individual had been exposed. . ."

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