

CHEMISTRY

Hydrogen Atoms of Twice Usual Weight are Discovered

New Building Block of Matter, Separated by Evaporating Liquid Hydrogen, May Clear Up Mystery of Atom Core

HYDROGEN atoms twice as heavy as usual, forming probably a new unit in the building of all other chemical atoms and throwing new light on the mystery of the atom core, have been detected for a first time through the collaboration of Prof. Harold C. Urey and Dr. G. M. Murphy of Columbia University with Dr. F. G. Brickwedde of the U. S. Bureau of Standards.

The low temperature laboratory of the Bureau, in which liquid helium was made for the first time in the United States some months ago by Dr. Brickwedde and others, assisted in the discovery of this new hydrogen isotope, which differs from ordinary hydrogen only in the weight of its atoms. By evaporating liquid hydrogen under a reduced pressure, and at the excessively low temperature of freezing hydrogen 434 degrees below zero Fahrenheit, a partial separation of the heavier atoms was achieved. Prof. Urey and Dr. Murphy then examined the heavier distillate in their spectroscope in New York and found a new series of "Balmer" lines that could only be attributed to hydrogen atoms of atomic weight two. Only one atom out of four thousand in ordinary hydrogen gas, however, he finds, is of the new H₂ kind.

Isotope Predicted

Prof. Urey himself had predicted May last that this hydrogen isotope of weight two would be found. His conclusion was drawn from a consideration of the relations between the numbers of electrons and protons in the known atomic nuclei. Independently Prof. Herrick L. Johnson of Ohio State University and Prof. Raymond T. Birge and D. H. Menzel of the University of California had made the same prediction. Dr. Johnson followed practically the same reasoning as Prof. Urey, while Prof. Birge reached his conclusion by comparing chemical atomic weights and isotopic weights obtained direct by Dr. F. W. Aston in Cambridge, England.

Faintness of the spectrum or rainbow of the light emitted by the heavier hydrogen prevented previous seekers from

observing the tell-tale lines, Prof. Urey believes. Prof. Urey did indeed observe these lines in the spectrum of ordinary hydrogen gas but they were so faint that he could not be sure they were not "ghost" lines caused by irregularities in the apparatus used for detecting them. When in the low temperature experiments the proportion of the rare isotope was raised to 1 in 800, however, the H₂ lines became visible near the regular lines of the "Balmer" spectrum. The nucleus of the new atom lies in weight between ordinary hydrogen, weight one, and helium, weight four, both of them regarded as the units of which the cores of all other atoms are made. The new H₂ provides a new building block for atom nuclei, believes Dr. Brickwedde, and will be investigated with great eagerness by both chemists and physicists for the light it will throw on the structure of the nucleus.

The outside coatings of the new hydrogen atoms are identical in all re-

spects, including chemical properties, with ordinary hydrogens. Only the mass of the nucleus is different. These two forms are not to be confused, however, with the symmetric para and unsymmetric ortho hydrogen atoms discovered in 1929 by Drs. K. F. Bonhoeffer, and P. Harteck at the Kaiser Wilhelm Institute for Physical Chemistry in Berlin. These forms of hydrogen were of equal weight but different magnetic properties.

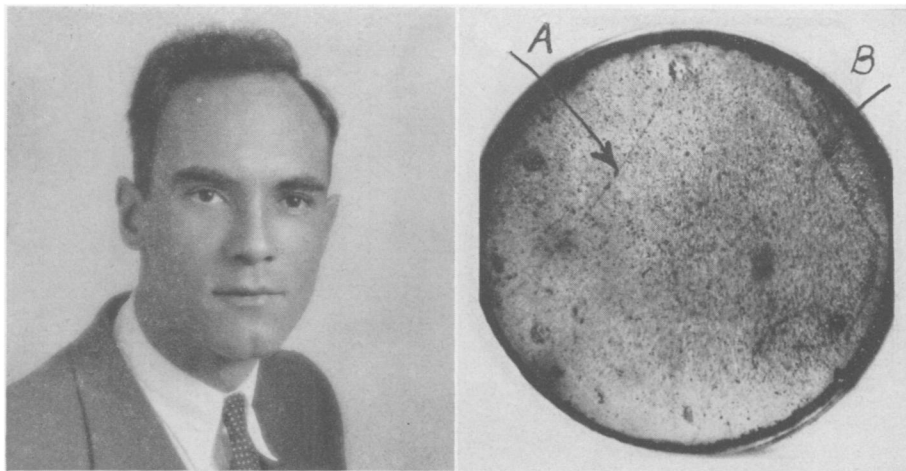
A new still will be made at the Bureau of Standards, which Dr. Brickwedde will use to attempt a more complete separation of the hydrogen twins. As the one is twice as heavy as the other he believes that this should be quite possible.

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MEDICINE

Growth-Checking Extract Used in Cancer Treatment

A SUBSTANCE having remarkable powers of controlling the growth of living beings and of possible value in the treatment of cancer is being investigated in the laboratories of the Royal College of Surgeons of England and at King's College. The discovery is due to a young biochemist, J. H. Thompson, who has found that an extract of the parathyroid gland of cattle will restrict or prevent growth without endangering the health of the organism.



COSMIC RAYS DISRUPT ATOMIC HEARTS

When atomic hearts are broken by cosmic rays from interstellar space, there are formed high speed particles of electricity and matter that have been photographed by Dr. Carl D. Anderson, above, of the California Institute of Technology at Pasadena. (S. N. L., Dec. 12, 1931.) The curving track "a" is an electron of 140,000,000 volts energy. Track "b" is a positively charged particle, probably a proton, of about 70,000,000 volts energy. The curve in the tracks is produced by the influence of a powerful magnetic field of 17,000 gauss, and the tracks can be seen because they are trains of water droplets condensed in an artificial cloud by the passage of the rays from the smashed atoms. Dr. Anderson discovered the disrupting effect of cosmic rays upon atomic nuclei during research in collaboration with Dr. Robert A. Millikan.