

## 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**

**H**YDROGEN 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 H<sub>2</sub> 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 H<sub>2</sub> 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 H<sub>2</sub> 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.

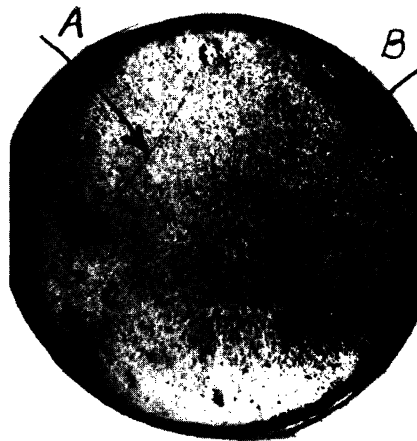
A new still will be made at the Bureau of Standards, which Dr. Brickwedde will use to attempt a more complete separation of the hydrogen twins. As the one is twice as heavy as the other he believes that this should be quite possible.

*Science News Letter, December 19, 1931*

## 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.

The most important application of this discovery lies in the treatment of cancer. It is being tested in several London hospitals with very encouraging results. Sir Arthur Keith has further suggested that it may be of value in the treatment of acromegaly or gigantism, which is due to abnormal functioning of the pituitary gland.

The effect of the extract was first observed on rats and rabbits, then on

water cress. At the suggestion of Prof. Julian S. Huxley it was tried on the axolotl, a form of salamander. In all these cases the growth-retarding effect has been very marked. Treated rabbits have remained at about half the size of their untreated brothers and sisters. The germination of water cress seeds is entirely stopped by a 20 per cent. solution of the extract.

*Science News Letter, December 19, 1931*

#### BOTANY

## Cheesecloth Saving Rare Plant On Rim of Hawaiian Volcano

ONE OF THE MOST interesting plants in the world, the Haleakala Silversword, once abundant in its limited area, has now become so scarce that botanists of the U. S. National Park Service cover every specimen of it that comes into bloom with cheesecloth to protect it from insect enemies that would otherwise destroy its seeds.

The Haleakala Silversword, as its name implies, grows only on the rim and in the crater of Haleakala, a great dormant volcano in that portion of the Hawaii National Park located on the island of Maui, one of the Hawaiian Islands. It belongs to the great Composite family of plants.

### Beautiful Silvery Sphere

When young the plant, known to Hawaiians as "pohinahina" or "ahinahina" from their word for "gray," is a beautiful silvery sphere of incurved linear leaves. The silvery coloring is caused by the dense covering of hair which repels some of the penetrating rays of the sun and also guards the plants from too rapid loss of moisture. When it attains a diameter of about two feet, the great silvery ball shoots up a magnificent cluster of flowering heads to a height of from three to six feet.

Probably the very abundance of the silversword not so many years ago is the main cause of its scarcity now. Before the area was made a national park no effort was made to conserve a plant which grew in such profusion. So the silver balls were pulled and sent rolling down the rim to present a spectacle something resembling the rolling of giant snowballs, or they were ruthlessly gathered for shipment to the Orient for use as ornaments.

According to Otto Degener, botanist of the Hawaii National Park, in one place where a garden of silversword ten acres in extent grew in the nineties of the last century, not one plant could be found 30 years later.

The silversword generally flowers but once, dying after the maturing of its fruit. It is therefore important that the blossoms be protected, to give the seeds a chance to mature. Perhaps the worst enemy the plants have, now that the National Park Service is protecting them from the vandalism of man, is the tyrpetid fly, which lays its eggs in the seed pods. The larvae, maturing, feed upon the seeds.

So the Park Service is extending its care of the plants, now wrapping their blooms in cheesecloth to give them a chance to mature.

The silversword chose a fitting habitat when it selected Haleakala, one of the largest dormant volcanoes in the world and known to have erupted less than two hundred years ago. In its great crater, with an area of nineteen square miles, could be placed an entire city.

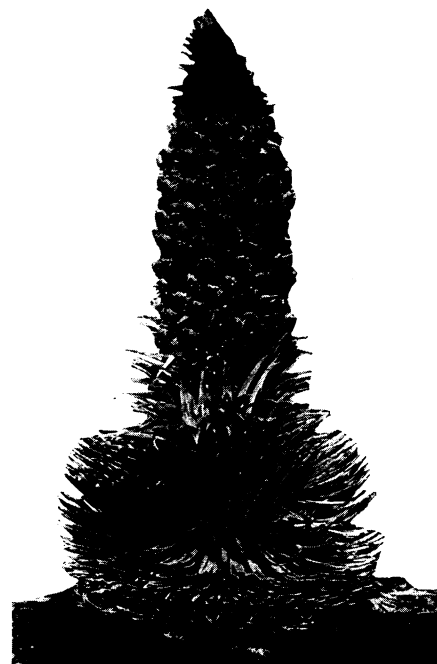
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#### ENGINEERING

## Test Auto Measures Power Output While in Motion

A UNIQUE gasoline-electric automobile for measuring whether one kind of highway requires more power of a vehicle than another is being tested at the Iowa Engineering Experiment Station at Ames, Raymond G. Paustian, Jr., engineer, has reported to the Highway Research Board of the National Research Council.

The vehicle is a remodeled automo-



HALEAKALA'S SILVERSWORD

bile of a standard make. The transmission was stripped out and in its place an electric generator and a motor were installed, Mr. Paustian said. The gasoline motor drives the generator, which drives the motor, which in turn runs the car. Since power to the wheels comes directly from the electric motor, it can be measured by metering the electrical input to the motor. Losses in the motor and in the transmission of power through the differential to the rear wheels are accounted for by a laboratory calibration on a drum dynamometer.

Power measurements are now being made on level concrete roads, Mr. Paustian explained, in order to perfect the operation of the car. Instruments are read not by making notations with pencil and pad but by taking photographs of the faces of the meters. With a motion picture camera readings can be taken exactly at ten-foot intervals even though the car is traveling sixty miles an hour.

"During the coming year a series of extensive investigations with this equipment will be undertaken," Mr. Paustian said. "Measurement of the resistance of concrete, brick, gravel, earth and other roadway surfaces at low and high vehicle speeds is the problem of primary interest. A measurement of the power requirements of highway grades will also be undertaken and will be correlated with a study of gasoline consumption when the car travels over different grades on various types of roadway surfaces."

*Science News Letter, December 19, 1931*