

CHEMISTRY

Double Weight Hydrogen Found in Water Electrolysis

Commercial Hydrogen-Oxygen Plants Yield Water Containing Abundance of Hydrogen Isotope Two

A PLENTIFUL supply of newly discovered double-weight hydrogen atoms exists in the apparatus used commercially to break down water into oxygen and hydrogen gases by passing electricity through it.

This has been determined through joint research by Dr. E. W. Washburn of the National Bureau of Standards in Washington and Dr. Harold G. Urey of the chemistry department of Columbia University, New York.

The existence of a hydrogen isotope of atomic weight two, twice the ordinary hydrogen atom of mass one, was discovered last year by joint research between the same two institutions. This was hailed as an important development bearing upon the constitution of matter and the way in which elements are distributed in nature.

The scientists set about to find ways of separating the heavier atoms of hydrogen, which are relatively rare, from the light atoms of hydrogen, which are plentiful. It was recognized that when hydrogen gas is formed by electrolysis of water, the two kinds of hydrogen atoms or ions do not have an equal chance to get into the hydrogen gas that is formed. The heavy, or double-weight, hydrogen atoms would be likely to be held back in the water, while the lighter isotope one hydrogen would be most likely to pass off.

To test this theory of the concentration of isotope two hydrogen, a water electrolysis experiment was begun at the Bureau of Standards. This test is not yet complete.

But it was possible to take advantage of water electrolysis processes operated commercially over a period of a year by plants producing oxygen and hydrogen gas for industrial use. As every school boy knows, water consists of two parts hydrogen and one part oxygen, and electricity breaks it up into the two gases. Residual water from two such plants was broken down into hydrogen and oxygen gases at Columbia University and examined with the spectroscope. As was expected, larger amounts of the isotope

two hydrogen were found than of the isotope one variety.

Plans are underway for the concentration of large quantities of the double-weight hydrogen from the old water of electrolysis plants in order that this unusual kind of hydrogen may be thoroughly investigated.

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BOTANY

Russian "Velvet Tree" May Compete With Cork Oak

COMPETITION with the cork oak, classic cork-producing tree of southwestern Europe, may be offered by the "velvet tree," native to wastelands in Japan, China and Russian Asia. Prof. E. E. Kern of the Institute of Plant Industry has been investigating its possibilities, and finds that though the cork it produces will not do for bottle stoppers, it is quite satisfactory for insulation and other purposes.

The tree belongs to the same botanical family as the citrus fruits. It is known as *Phelodendron*, which is Greek for "cork tree." It reaches a height of about fifty feet, and attains an extreme age of 300 years. Cultivation, Prof. Kern states, improves the quality of its corky bark.

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CHRONOLOGY

Millions of American Clocks Have Only Five-Second Error

ARE Americans living on time?

Many of them regulate their activities within a maximum error of five seconds, is the answer of Henry E. Warren, president of the Warren Telechron Co., in a paper presented before the International Electrical Congress in Paris. Mr. Warren described the development and increasing use of electric clocks that maintain their accuracy from the frequency of the power supply.

He said that in order to determine the accuracy of time pieces of this kind a study was made of one of the largest

power systems in the country for 16 weeks. During this period there was never a deviation of more than five seconds faster or slower than the correct time. Mr. Warren believes that the time service on many other large systems is as good as this.

In order to keep the tiny home clock accurate, it is necessary that huge turbines and generators run exactly at the right speed, the paper brought out. Operators observe a master clock and occasionally manually change governor settings to maintain the split-hair regulation.

Mr. Warren estimates that there are more than 4,000,000 of these little clocks in the United States. Although each is very small and consumes little energy, he thinks that the 4,000,000 clocks must bring power companies more than as many dollars in revenue each year. The power output of each ranges from less than one-millionth to more than one ten-thousandth of a horsepower. The power output of a spring clock, however, was said to be even smaller, easily amounting to less than one twenty-millionth of a horsepower.

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ICHTHYOLOGY

Michigan Fish Often Have More Than One Head

"SIAMESE TWINS" among fish are a common occurrence in Michigan. The State Fish Division reports that probably no other group of living



NOT UNUSUAL

Some become adults and occasionally a fisherman catches one.

creatures produces more abnormalities.

In the state hatcheries two-headed fish are not unusual, and instances have been noted of five perfect heads to a single body and tail. While these fish do not generally live past the stage when artificial feeding becomes necessary, they occasionally do live to the adult stage.

A few years ago a legal-sized perch having two heads was caught in a lake near Cadillac.

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PHYSIOLOGY

Diabetic Burns Fat Instead Of Sugar During Exercise

EXPERIMENTS showing that sufferers from diabetes probably burn fat instead of sugar when they exercise or do muscular work were reported by Dr. William H. Chambers of Cornell University Medical College to the American Association for the Advancement of Science meeting in Syracuse.

When the pancreas fails to produce enough insulin, diabetes follows. Scientists differ as to whether the diabetic condition is caused by an overproduction of sugar from fat or is due to a loss of the ability to burn sugar, Dr. Chambers pointed out. Recent studies of diabetics during exercise have seemed to show that they burn some sugar during exercise and that therefore the overproduction idea was correct. Dr. Chambers' studies, on the contrary, indicate that this theory is probably not correct and that even during exercise the diabetic is burning fat and not sugar.

The method of determining whether the body is burning fat or sugar consists of measuring the ratio of the carbon dioxide output to the oxygen intake. When fat is burned the quotient of carbon dioxide divided by oxygen is 0.71, and any rise in this figure shows that sugar is being burned, he explained.

His investigations showed that there was a rise in this figure during exercise in diabetic animals, but he also made measurements during the rest or recovery period following the exercise and studied the blood composition during this time. From these findings he concluded that the rise in the figure for the diabetic during exercise is due to change in the acid-base balance of the body and not to the burning of sugar, and that consequently the diabetic burns fat for fuel during exercise as well as when at rest.

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PHYSICS

Cosmic Ray Intensity Varies With Change in Latitude

Dr. Compton's Findings From World-Wide Observations Question Theory Proposed by Dr. Millikan

COSMIC RAYS do not bombard the earth with equal intensity from all directions, but their strength increases with the distance north and south of the earth's equator, Dr. A. H. Compton, Nobel prize physicist of the University of Chicago, reports in the *Physical Review*.

This is the first report from an extensive world-wide survey during which many physicists are making observations in remote localities. Dr. Compton transmitted this initial report from the Tasman Sea, during travel to new observing stations after research at Hawaii, New Zealand and Australia.

Birth Cries?

The definite differences in the intensity of the cosmic rays at different latitudes shown by Dr. Compton's report are likely to upset present ideas of the origin and nature of the cosmic radiation. Dr. Robert A. Millikan, of the California Institute of Technology, like Dr. Compton a Nobel prizeman, has consistently found that the intensity of the cosmic radiation is independent of the latitude at which the observations are made. Dr. Compton's report does not confirm Dr. Millikan's findings.

Dr. Millikan has suggested that the cosmic rays may be the birth cries of the synthesis of heavy elements out of hydrogen and helium in the depths of the universe. This theory is based upon his findings from wide-flung researches that cosmic radiation bombards the earth equally from all directions. With Dr. Compton's report this theory is likely to lose support.

Strongest at Equator

Dr. Compton reports that so far as the measurements have gone they indicate "uniform variation with latitude, showing a minimum at or near the equator and increasing intensity toward the north and south poles."

At sea level, the difference between intensity at latitude 45 degrees and zero degrees is roughly 16 per cent. whereas at an elevation of 9,000 feet the differ-

ence is about 23 per cent. This would indicate, Dr. Compton says, that it is the least penetrating part of the cosmic rays which varies most rapidly with latitude. No significant variations with longitude have been noted.

Observations recorded in Dr. Compton's report include those made from Mt. Evans in this country, from the Jungfrauoch in Switzerland, as well as the measurements made by Dr. Compton and associates during this present extensive trip.

Prof. R. D. Bennett of the Massachusetts Institute of Technology has planned with Dr. Compton the world-wide survey which is being supported by the Carnegie Institution of Washington.

The cosmic ray research has claimed one life. Allen Carpe lost his life while climbing Mt. McKinley in Alaska in May on his way to Muldrow Glacier to make cosmic ray measurements. Prof. Bennett will take up the work that was thus interrupted.

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ENTOMOLOGY

Male Butterfly Carries Perfume for His Mate

DIFFERENT butterfly species seem to have their own individual taste in perfume. The perfume exuded by the scent scales of common American species of butterflies covers a wide variety of delightful odors resembling some of the more fragrant flowers, a report of Austin H. Clark issued by the Smithsonian Institution reveals.

Sandalwood, red clover, milkweed, crushed violet stems, dried sweet grass, violets, musk, mignonette, and sweet briar are among the flower fragrances imitated by the butterflies. Unlike fashions in the human world, it is the male who wears the perfume. Females of the same species whose males exude the delicate pleasant odors give off a powerful nauseating smell.

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