CHEMISTRY

Lightest Water Made, and New Record for Heaviest Set

Concentrations of Light and Heavy Hydrogen Isotopes Account for Liquids Slightly Unlike Ordinary Water

THE WORLD'S lightest weight water, containing the lightest sort of hydrogen and the lightest variety of oxygen, has been manufactured in the chemical laboratories of the U. S. Bureau of Standards at Washington.

Last year Dr. E. W. Washburn, chief of the chemistry division of Uncle Sam's great scientific establishment, the Bureau of Standards, made what was then the world's heaviest water. Prof. Harold C. Urey of Columbia University checked the heavy water's composition with the spectrograph. They reported their achievement in the Proceedings of the National Academy of Sciences and exhibited the water at the American Association for the Advancement of Science meeting at Atlantic City last Christmas week. Now Dr. Washburn has made the lightest water known.

The Bureau of Standards heavy water contains increased amounts of hydrogen isotope two and oxygen isotope eighteen. The lightest water contains increased amounts of hydrogen isotope one and oxygen isotope sixteen. Both, of course, consist of one atom of oxygen and two atoms of hydrogen.

Until a few years ago it was not known that there are two kinds of hydrogen, one with just twice the atomic weight of the other. In 1931, Prof. Urey and Dr. G. M. Murphy of Columbia University and Dr. F. G. Brickwedde of the U. S. Bureau of Standards discovered the heavy weight hydrogen. It is also known that there are three weights or isotopes of oxygen atoms, 16, 17 and 18.

Dr. Washburn has just determined several physical constants of his heavy water. The heavy water freezes even when surrounded by ordinary melting ice. Its freezing point is five-hundredths of a degree Centigrade higher than that of ordinary water. Its boiling point is higher and its refractive index is lower.

The new lightest water must have physical constants differing from ordinary water in the opposite direction, but since ordinary water consists almost entirely of light-weight hydrogen and oxygen the difference between ordinary and light water is much smaller.

Drs. E. R. Smith and Mikkel Frandsen of the Bureau of Standards staff have worked with Dr. Washburn in his current tests on the light and heavy waters.

Ordinary water was the starting point in making both the heaviest and lightest waters. It was discovered that water in the electrolytic cells of oxygen and hydrogen gas plants had larger concentrations of the heavy hydrogen and oxygen. The light hydrogen and oxygen atoms go off as gas first when the electric current breaks down the water. Thus heavier water is left in the electrolytic cells. Dr. Washburn and his associates therefore decomposed water electrically over a long period and thus obtained heavy water. They burned the light hydrogen and oxygen gases to obtain the champion light (*Turn to Page* 158)

DEIFYING A SCOTSMAN

These two canes are adorned with features of Dr. William Patterson, who is god of medicine to Tule Indians of Panama. The Scottish doctor spent two years in Panama in a seventeenth century colonial venture. Now, the Indians think of him as a god who once lived in their midst and worked great wonders of healing. Dr. Walter Hough, of the U. S. National Museum is holding the canes.

MEDICINE

Successful Treatment For Strychnine Poisoning Found

STRYCHNINE poisoning may be cured by two modern sleeping potions, it appears from a report to the American Medical Association in Chicago, Ill. Successful use of these two medicines in eleven cases is described by Drs. G. F. Kempf, J. T. C. McCallum and L. G. Zerfas of the Lilly Laboratory for Clinical Research, the Indianapolis City Hospital and the Indiana University School of Medicine.

The two modern medicines are isoamylethylbarbiturate, sometimes called sodium amytal for short, and sodium pentobarbitol. They are known to induce sleep in restless, suffering patients. Directions for their use in strychnine poisoning are given by the Indianapolis doctors in *The Journal of the American Medical Association.*

Ordinarily, poisoning of any kind is treated by emptying the stomach and preventing the absorption of the poison into the system. Because strychnine is very quickly absorbed, these measures are usually unsuccessful, and treatment must be directed at counteracting the effects of the poison on the system.

Many drugs have been used for this purpose, but have not been satisfactory. Doctors have been searching for an antidote that would control the convulsions, get the poison out of the body, and supply oxygen so that the patient does not suffocate. Death in strychnine poisoning is due either to exhaustion or to suffocation, the Indianapolis physicians explained. The difficulty with most of the older antidotes for strychnine is that if much strychnine has been

taken, the amount of the antidote necessary to counteract its effects would be fatal in itself.

The two drugs used by the Indianapolis doctors seem to avoid this difficulty, as they may be given in large doses without bad effect. They stopped the convulsions promptly and generally put the patient to sleep but without interfering with his breathing. The drugs were usually injected into a vein, but are also effective when given by mouth, it was found.

Science News Letter, March 11, 1933

PHYSIOLOGY

Teaspoonful of Alcohol Detected in Drivers

CONSUMPTION of about one teaspoonful of alcohol can now be detected in an adult as a result of improvement in technic in tests for alcohol in the blood, Dr. Klaus Hansen, professor of pharmacology at the University of Oslo, in Norway, recently stated in discussing application of the new technic to tests for drunkenness in drivers.

The University of Oslo Pharmacological Institute provides free of charge, to physicians making requests, boxes containing tiny glass tubes, fitted with rubber caps, to hold the blood of motor drivers whose sobriety has been questioned by the police.

Although this arrangement has existed only about 18 months, as many as 52 doctors in different parts of Norway have taken advantage of it, and have sent in 373 blood samples for test.

When the concentration of alcohol in the blood was from 2.61 to 5 per thousand, the clinical report of the examining doctor invariably indicated drunkenness on the part of the driver. In such cases the analysis would seem to be superfluous.

On the other hand, it was invaluable when it showed that the concentration of alcohol was so low that the driver could not possibly be under its influence, however excited and unreasonable his behavior. Dr. Hansen refers to a driver whose concentration was as low as 0.03 per thousand, a concentration found even when a person has not drunk any alcohol. Yet, this man was so nervous that he was assumed to be under the influence of alcohol. The analysis saved him from a compromising situation.

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PHYSICS-ASTRONOMY

Optician's Window Novelty Measures Heat From Stars

THE RADIOMETER — the little whirligig device inside a glass bulb that is often seen spinning around in an optician's window—has now been used to study the spectrum photographs of stars, which show their composition. This application has been made by Dr. Sinclair Smith and Olin C. Wilson, Jr., of the Mt. Wilson Observatory, Pasadena, Calif.

The common form of radiometer, which was the invention of the great English physicist, Sir William Crookes, consists of four small vanes balanced on a pivot in a partially evacuated bulb. One side of each vane is polished, the other blackened, and the black side of one faces the polished side of the next. When heat radiation, either from the sun or an artificial source, falls on the vanes, they start moving, in the direction of the polished sides. The reason for this is that the black side absorbs more of the radiation than the other, and is heated more. The molecules of the small amount of gas remaining in the bulb are constantly in motion. When they hit the warmer side, they bounce off with a greater kick than those hitting the polished side, and so they push the vanes around.

In the arrangement developed by the Mt. Wilson scientists, two tiny vanes are used, suspended from a fiber of quartz. Thus they cannot turn completely around, as they twist the fiber. To the upper part of the fiber is attached a small mirror. A beam of light falls on this mirror and is reflected to a moving photographic film. As a greater or less amount of radiation falls on the vanes, the fiber twists more or less, and the reflected spot of light moves back and forth, leaving a trace on the film.

The spectrum photographs to be studied are negatives, and show a series of parallel clear lines, of which the relative brightness and widths are significant, as well as their positions. To study them, a strong light is focused to a narrow line on the plate, which is then steadily moved by an electric motor. The light that passes through, and the heat that accompanies it, varies with the intensity of that part of the spectrum plate. This heat falls on the radiometer, and thus the moving spot of light reflected from the mirror traces on the film a record of the intensities of the spectral lines.

Such a device is called a registering spectrophotometer, and previous ones have used either thermocouples or photoelectric cells to detect the light changes. The former converts the heat into electric energy, while the latter makes a similar conversion of light. Dr. Smith states that the new device avoids the electrical difficulties accompanying each of these, and that it is more sensitive than the thermocouple. He also says that it is much simpler, and that many institutions might build one, though unable to afford the other and more expensive instruments.

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PSYCHOLOGY

Mathematical Formula Describes Legislator's Vote

THE COMPLEX factors leading to the vote of a legislator, including such items as party affiliation, lobbying, campaign pledges, bargaining, and so on, can all be taken account of in a single mathematical formula which will indicate his vote on a particular measure, Dr. L. L. Thurstone, psychologist of The University of Chicago, indicated in the *Journal of Social Psychology.*

In his equation, the first part represents the individual member's attitude toward a proposal. In the second part, the loading of one factor, say party affiliation, in this proposal is multiplied by the strength of the member's affiliation with that factor and added to a similar product for other factors.

Other more complicated equations were proposed by Dr. Thurstone to express mathematically the total of all the attitudes of a single member and the total of all the attitudes of the whole legislative body. Working from these equations, it is possible to list and name the various factors which "load" a particular measure, as well as to discover any individual member's identification with these factors, he showed.

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