

## HOME EXPERIMENTS WITH HYDROGEN

by VERNON TRACEY

HYDROGEN, the lightest of chemical elements forms a very interesting field of experiment for the home chemist. It can be produced easily in several ways for experimental purposes; one of the most common of which consists of the action of sulphuric acid on zinc.

A flask into which is dropped a few grams of zinc scraps is fitted with a rubber stopper, thistle-tube and delivery-tube as shown in the photo. The thistle-tube is fitted into the stopper so the end will be about  $\frac{1}{8}$  from the bottom of the flask. The end of the delivery-tube is near the top of the flask. Dilute sulphuric acid is poured down the thistle-funnel and hydrogen is produced when it comes in contact with the zinc. The top of the thistle-funnel is covered with a piece of glass to prevent the hydrogen from escaping. The hydrogen flows out through the delivery-tube and is collected in a bottle over the pneumatic trough.

If, after some hydrogen has been collected the action slows down, remove the glass from the thistle-tube and add more dilute acid. In diluting the acid, use equal volumes of acid and water and pour the acid slowly into the water while it is being stirred with a glass stirring-rod, for if the water is poured into the acid, steam will be generated and the acid spattered in all directions.

Another even more interesting way of producing hydrogen is by the electrolysis of water—that is using electricity to break water up into its elements—hydrogen and oxygen. Hydrogen and oxygen are both produced by this experiment and are collected separately.

Fit up a glass vessel on a metal stand as shown in the drawing, fill vessel and test-tubes with acidulated water and support the test-tubes in an inverted position so their open ends will be under water and over the electrodes. Connect the battery and the hydrogen will collect at the cathode, rise up and displace the water in the test-tube. Oxygen will collect in a similar manner over the anode. Because water is composed of two parts of hydrogen to two parts of oxygen, there will be twice as much hydrogen in one tube as there is oxygen in the other. After the hydrogen tube is full, remove it and place it upright in a test-tube rack with a piece of glass over its mouth to keep the gas from escaping. Collect another tube of hydrogen, and by this time the other test-tube will be full of oxygen.

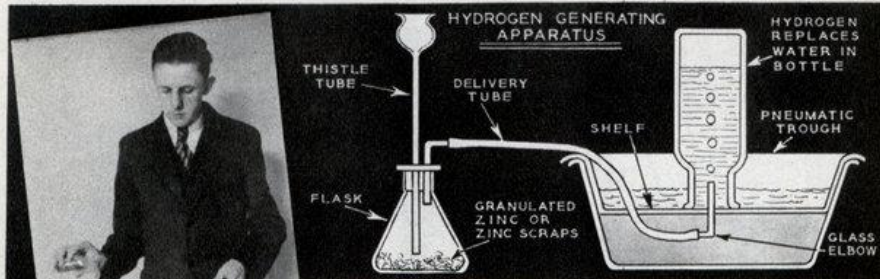
Wrap a towel around a test-tube of hydrogen and holding it mouth down, bring a lighted match up to it. The hydrogen will burn with a pale-blue flame as it leaves the test-tube. Thrust the match up into the test-tube and it will appear to go out, but as soon as it is removed it will flame up again.

Hydrogen burns to form water. This can be demonstrated by burning a jet of hydrogen and collecting the water-vapor given off. To do this— make a right-angle bend in a piece of copper tubing and mount it on a ringstand.

Loosely pack the top end of the tube with steel-wool to prevent the flame from following the tube back to the generator. Connect the rubber tube from the generator onto the bottom end of the copper pipe and light the hydrogen issuing from the top. If a cold dry glass is supported over the flame, the vapor will condense forming water droplets on the inside of the glass.

Hydrogen and oxygen combine in the proportion of two parts of the former to one part of the latter to form water. They combine however in equal proportions to form hydrogen peroxide—a well known disinfectant. Oxygen is responsible for the disinfecting properties of this compound. Hydrogen peroxide being a very unstable compound breaks down into water and oxygen when applied to a wound, or even exposed to bright light; thus the necessity for keeping it in dark colored bottles. One oxygen atom remains in combination with the two hydrogens (water), the liberated oxygen atom is very active and destroys bacteria. The amateur can have fair results in preparing hydrogen peroxide by treating barium dioxide with dilute sulphuric acid. A dilute acid composed of three parts of water to one part of acid is added to the manganese dioxide. The milky liquid is then filtered and collected in a flask as shown in the photo.

# HOME EXPERIMENTS



This simple generating apparatus is all the equipment you need to produce Hydrogen gas. Scraps of zinc are placed in flask containing dilute sulphuric acid. Rubber stopper, thistle tube and tubing to pneumatic trough are connected as shown.

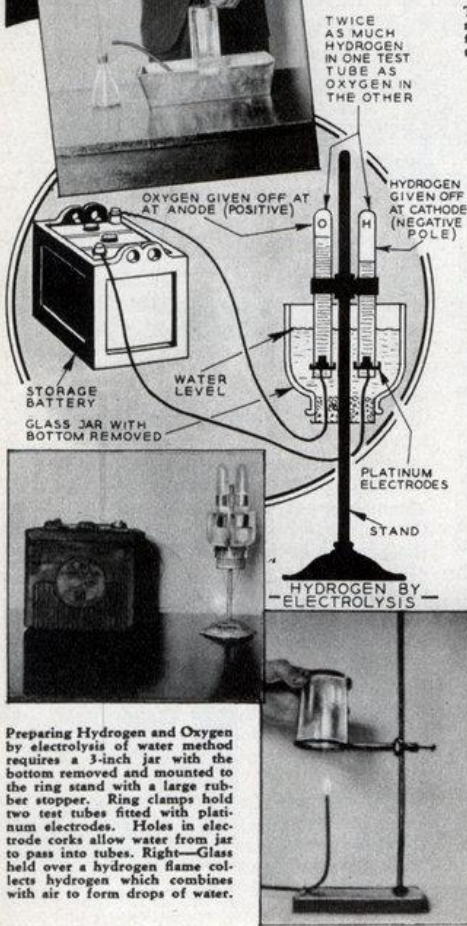
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Another even more interesting way of



Preparing Hydrogen and Oxygen by electrolysis of water method requires a 3-inch jar with the bottom removed and mounted to the ring stand with a large rubber stopper. Ring clamps hold two test tubes fitted with platinum electrodes. Holes in electrode corks allow water from jar to pass into tubes. Right—Glass held over a hydrogen flame collects hydrogen which combines with air to form drops of water.

# WITH HYDROGEN



Hydrogen Peroxide, a common household antiseptic, can be prepared by mixing dilute sulphuric acid with barium dioxide. The resulting milky liquid is cleared by filtering. Before using test the solution to determine whether or not it will successfully bleach cloth.

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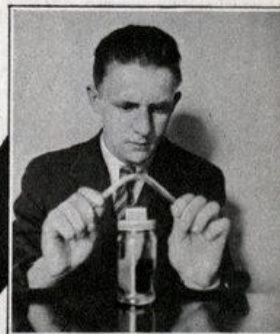
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Many experiments can be performed with the Hydrogen gas generator described on opposite page. Above is shown model airship constructed of light rubber being inflated with the gas. Pipe connected to generator will blow floating soap bubbles.



A screw cap jet provided with wick and filled with alcohol provides a handy lamp for bending glass tubing into the various shapes required for performing these and other experiments.

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## American Youth Goes Hostel

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time they have been at work may be seen by the results. Beginning at Northfield, Mass., a loop of 35 hostels in the New England states has already been set up. Like their European prototypes, they are simple and inexpensive, the cost of stopping overnight being 25 cents. Food and fuel must be purchased, and meals cooked by the A. Y. H. visitors. With a sleeping sack, knapsack and bicycle as the main requisites, a hosteler needs only the simplest essentials in the way of equipment for his outdoor adventure.

To enjoy the privileges of the hostels, one must have a membership pass, available at \$1.00 to anyone under 25 years of age, \$2.00 to adults over that age, and \$3.00 to entire families. Members always leave the hostels as neat and clean as they find them. Boys and girls, chaperoned by house fathers and mothers, sleep in separate quarters. Most of the New England hostels are simple farmhouses, though a few colleges have opened dormitories for the purpose. Bicycling, mountain-climbing and outdoor life generally, send young vacationists to the hostels tired from healthy exercise, but not too fatigued to enjoy a happy

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[Continued from page 113]

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