

judicious teacher towards correcting the defects in tone and in accent, and the tendency to flattening of vowel sounds, which are so characteristic of us provincials. Many wrong voice inflections need only to be pointed out to make their absurdity manifest. Should the teacher, undertaking this work, find it in any case necessary to apply the proverb, "Physician, heal thyself," he will share the profit with his pupils. We have on the whole the noblest, most capacious and flexible language the world has ever produced, and the members of the teaching profession owe it to themselves, their employers and their country to do what they can to preserve it in its purity. As members of a learned profession and one closely allied with the study of literature and language, they may fairly be expected to be themselves exemplars in the use of good English.

Special.

ELEMENTARY CHEMISTRY.

WATER.

Symbol, H₂O. Molecular Weight, 18.

COMPOSITION—(A) SYNTHETICALLY.

By uniting two volumes of Hydrogen and one of Oxygen.

It has already been shown (Art. 20) that water is composed of two volumes of hydrogen and one volume of oxygen.

Exp. 1.—The above experiment can be varied by admitting hydrogen into the eudiometer and noting the volume; taking care not to more than about half-fill the tube with the gases. Press down the mouth of the tube on a piece of india-rubber or pad of blotting paper, and explode the gases. When the tube has cooled admit the water, and note the volume of the residual gas. If 100 volumes of hydrogen and 75 volumes of oxygen be admitted, the gas which remains will be found to occupy 25 volumes. Hence 100 volumes of hydrogen have combined with 50 volumes of oxygen.

By the reduction of Copper Oxide by Hydrogen.

The method of performing the experiment has already been described (Art. 79).

(B) ANALYTICALLY.

By Electrolysis.

This has been fully described (Art. 19).

By decomposing Water by red-hot Iron.

That water is made up of hydrogen and oxygen in the proportion of 2 parts by weight of hydrogen to 16 parts by weight of oxygen, may be shown by passing steam over a weighed quantity of red-hot iron. The water is decomposed, the hydrogen passing over in a free state, and an oxide of iron is formed. The hydrogen may be measured and its weight estimated, whilst the weight of the oxygen in combination with the iron may also be determined (Art. 82).

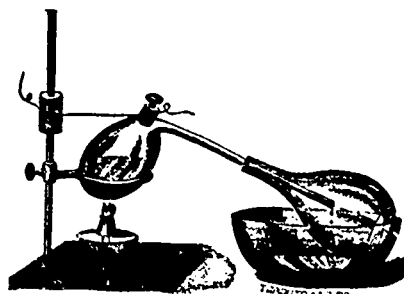
Pure Water.

The preceding experiments have shown that pure water is composed of hydrogen and oxygen. But the water which occurs

in nature is never absolutely pure. It may be obtained in a pure state by the following methods:—

Purification of Water.

Exp. 2.—(1) *Distillation.*—Half-fill a moderately large sized retort with water, place its neck in a large flask, and place the flask in a pan of cold water. Cover the flask with a cloth or with blotting paper, and pour cold water from time to time upon it. Place the retort upon wire-gauze on a ring of the retort-stand, and boil the water. As fast as the



water in the retort is converted into steam, the vapor will pass over into the cold receiver, and will there be condensed again to the liquid state. Reject the first portion of the water that comes over, as it contains carbon dioxide, ammonia, and many volatile substances which the water may have held in solution.

Observe that the *pure water* obtained by distillation in the preceding experiment is colorless, inodorless, and insipid. As regards color, however, when a layer of it, about six feet in thickness, is examined by transmitted light, it appears of a bluish green tint.

(2) *Filtration.*—The separation of suspended matter is effected on the small scale for laboratory purposes by filtration through porous paper placed on a glass funnel; and on the large scale by employing filtering beds of sand and gravel. In order to separate suspended matter from water used for drinking purposes filter through a layer of charcoal; animal charcoal in coarse grains is the best, but if that cannot be obtained common wood charcoal will do very well. A common garden flower-pot, having the hole covered with a bit of clean-washed flannel, which should be changed from time to time, will make a good filter. Into this put some small gravel, then some white sand, and press down the charcoal on the top of this, and the filter is ready for use. When the charcoal gets clogged take off the top, boil well, dry and it will be as good as ever.

(3) *Freezing.*—Under ordinary circumstances, pure water freezes at 0°C. or 32°F. It becomes more difficult to freeze when certain substances are dissolved in it; thus, sea water freezes at about 3½ degrees lower than fresh water. Dissolved matters are to a great extent, although not completely, separated from ice, and retained in the unfrozen water. Water obtained by melting the ice of sea water is used for drinking in the Arctic regions.

To make others true, you must be true yourself; to make others wise, you must be wise.

Remember that one book thoroughly digested, is better than twenty quickly hurried through.

The pupil thoroughly knows only that which he knows how to tell reasonably well.

Unless you are willing to do much extra work out of regular school hours, you can hardly hope to win.

The earnest, progressive teacher will be successful, even if the surroundings are not what they should be.