

form of the wood but the bulk has been much reduced, and its weight does not exceed one-fourth the weight of the wood.

97. From Vegetable Substances.

Exp. 2.—Take a small piece of writing paper crush it into a lump, and put it into a narrow test-tube. Take a slip of blue and a slip of reddened litmus paper slightly moisten them and ignite the paper by holding the end of the tube in the lamp. As soon as a white smoke appears in the tube, dip into it the blue test-paper. After a moment take out the blue paper and put in the red one. Observe (1) that the white paper heated in the tube is converted into a black substance, preserving the same size and shape; (2) that a brown oily liquid is deposited on the sides of the tube; (3) that the blue test-paper turns red, and the red test-paper remains unchanged in the volatile matter given off during the ignition; (4) that the black substance in the tube, when placed on platinum foil and strongly heated, burns away without flame, leaving nothing but a very small quantity of incombustible white ash. The black substance is charcoal.

From these experiments we infer (1) *That vegetable substances contain charcoal.* (2) *That they contain the elements of a volatile acid, which acid they produce when subjected to a red heat in close vessels.*

98. From Animal Substances.

Exp. 3.—Take a bit of woollen cloth, put it into a small test-tube. Prepare moistened slips of test-papers as in the preceding experiments. Hold the tube in the flame of the spirit-lamp, and put into it first the blue paper and then the red one. Observe (1) that the woollen cloth is converted into a black substance like charcoal; (2) that a brown oily liquid is deposited on the sides of the tube; (3) that the blue paper remains unaltered, and the red paper turns blue; (4) that the black substance taken from the tube, placed on platinum foil, and held in the flame of the spirit-lamp, burns away without flame, leaving only a very small quantity of white ash.

From these experiments we infer, (1) *That animal bodies contain charcoal.* (2) *That they contain the elements of a volatile alkali, which alkali they produce when subjected to a red heat in a close vessel.*

PROPERTIES OF CHARCOAL.

99. Absorptive power.

Exp. 4.—Take a narrow-necked bottle and fit it with a good sound cork, previously steeped in paraffine. Fill the bottle with ammonia gas. This may be done either by putting a few drops of ammonia into the bottle and shaking it well, or by placing it, mouth downwards for a few minutes, over the mouth of a bottle containing strong ammonia. Place in it a few pieces of newly-burned charcoal and cork it up. After a few hours withdraw the cork, and it will be found that there is no odor remaining; the whole of the ammonia has been absorbed.

This power of absorbing gases depends upon the fact that all gases condense in greater or less degree on the surface of solid bodies with which they come in contact, and as charcoal is very porous, or possesses a large surface to a given mass, its absorbent power is proportionately great.

100. Decolorizing Power.

Exp. 5.—Take three tumblers and place in each a table-spoonful of bone-black. Into the first tumbler put some blue or reddened litmus solution, into the second a solution of log-wood or any other vegetable coloring matter, into the third a solution of potassium permanganate. Stir the solutions well with a glass rod. Fold three pieces of filtering or white blotting paper, so as to fit into a funnel. Pour the contents of each tumbler on a filter; observe that the filtrate is in each instance colorless or nearly so. In case the first portions of the filtrate happens to come through colored, they may be poured back upon the filter and allowed to pass again through the charcoal.

In the purification of brown sugar the coloring matters are removed in a manner similar to the foregoing, the colored syrup being filtered through layers of bone-black.

Beer or ale, thus treated, lose not only their color but their bitter taste. A solution of quinine sulphate filtered thus through bone black, is deprived of its bitter taste.

101. Dedorizing Power.

Exp. 6.—Put a few drops of a sulphuretted hydrogen solution into a test-tube, add a little animal charcoal and shake the mixture thoroughly for half a minute; the liquid has now lost all the offensive smell of the gas which has been absorbed by the charcoal.

Charcoal not only absorbs unpleasant effluvia evolved in the process of decay and putrefaction, but has the power, especially in contact with air, of oxidizing and destroying them. This property is retained by charcoal for a long time, and when lost, it may be renewed by ignition. Hence charcoal filters are largely used for preventing foul sewer gases from polluting the air of houses, and charcoal respirators have been used to prevent the ingress of deleterious gases into the lungs. Trays filled with heated wood charcoal, placed in infected apartments have proved very effective in absorbing noxious emanations. Charcoal filters are also largely employed for filtering water for drinking purposes. In its passage through the charcoal the water has not only the organic and soluble coloring matters removed but also undergoes aeration.

(To be Continued.)

ENTRANCE LITERATURE.

PREPARED SPECIALLY FOR THE SCHOOL JOURNAL.

BOADICEA.

Page 85—4th Book, Ontario Readers.

I.—GENERAL NOTES.—A short account of the author of this ode is given in the Reader. For a fuller account see some work on English Literature. It will be sufficient to add here that Cowper was educated at Westminster School. At eighteen he entered an attorney's office, and was called to the bar in 1754. He did not practise his profession, but spent his time, when in possession of his faculties, in sauntering with his dog along the reedy banks of the placid Ouse, or in writing a little for the serials of the day. He was, during middle life, much troubled with a mental disease, a sort of religious melancholy, and it was not till he was fifty years of age that he sat down seriously to write a book of poems. The first