

remunerative rates. We have also heard the work severely criticised on the ground that it is far too difficult, and many of the terms and expressions used too technical, for those for whom it is intended. The force of this objection depends, of course, entirely upon the answer to the question, "For what classes of pupils is the work intended?" The Preface states that it "is primarily intended for teachers, and for pupils in attendance at the Normal and other schools of the higher grade." When we remember the immaturity of many even of these pupils, it cannot be denied that there is much force in the objection, even as it relates to them. The size of the book, the abstruseness of many of the topics discussed, and much of the language used, will render it impossible for the great majority of these pupils to attain anything like such a mastery of the subject as will enable them to bring it down to the comprehension of the Public School children. And this, be it observed, must be the use that teacher-students are expected to make of it, and is the only one which could justify their being forced to purchase and study it at the Normal Schools.

But when we turn to the Title Page, we find that the book is "authorized by the Minister of Education, for use in all schools under the control of the Education Department." This caps the climax of the absurdity. The idea of putting such a book into the hands of the average Public School boy, or girl, is simply preposterous. No teacher of common judgment, or sense, would think of such a thing, save in obedience to a Departmental mandate. But on the other hand this is precisely the use for which a text-book on Hygiene is most needed. The interests to be served demand that the whole mass of the school population, and not simply the small per centage which goes through the High Schools and Collegiate Institutes, should be instructed in regard to the laws of health. Those who know anything of the way in which the majority of the common schools are conducted, the crowded state of the programme, and the demands upon the teachers for routine work, will understand how little is to be expected from any informal instruction, on subjects outside of the text-books.

Hence, it is clear that the new text-book, expensive though it is, does not suit the public want. A suitable, simple manual for the Public School is still needed. Another experiment has been tried and another great blunder perpetrated by the Department.

Special.

ELEMENTARY CHEMISTRY.

ATMOSPHERIC AIR.—Continued.

221. Carbon Dioxide.

Exp. 7.—Pour some lime-water into a saucer, leave it exposed to the atmosphere for twenty-four hours, when a thin scum will be found on its surface. Put this scum into a test-tube, add a little hydrochloric acid, and a brisk effervescence will take place, carbon dioxide being given off, which may be collected and its presence indicated in the usual way.

Carbon dioxide is, therefore, a constituent of the atmosphere. The average amount of this gas in free open country air is between 3 and 4 volumes in 10,000 volumes of air, whilst in towns where much coal is burnt the amount may rise as high as 6 or 7 volumes in 10,000. When present in certain quantities it acts most prejudicially on the higher forms of life, nor is the amount which becomes hurtful far removed from the amount at present existing in the air. According to Dr. Parkes, an eminent authority on this subject, air is unhealthy when the carbon dioxide exceeds .06 per cent. or 6 volumes in 10,000. Hence in a sanitary point of view it is exceedingly important to ascertain when this amount is exceeded. For this purpose Dr Angus Smith gives the following method:—

Exp. 8.—Take a bottle of clear white glass having a well-fitted stopper, and when quite full containing as nearly as possible ten and a-half fluid ounces of water. Fill the bottle with the air to be tested by putting a glass tube to the bottom and sucking out the air. Now pour into it half a fluid ounce of clear lime-water, insert the stopper, and shake vigorously for a short time. Let the bottle stand so that the air bubbles may rise, and observe whether or not turbidity or opalescence is produced. If the liquid does not remain bright and clear the air examined contains more than 6 volumes of carbon dioxide in 10,000 volumes of air, but if no turbidity is produced the sample tested may be considered wholesome, the carbon dioxide being in this case taken as the measure of its general purity. Dr. Smith proposes the following rule as a practical application of this method:—"Let us keep our rooms so that the air gives no precipitate when $10\frac{1}{2}$ oz. bottle is shaken up with half an ounce of clear lime water." In order that the air in an occupied room may not contain more than .06 per cent. of carbon dioxide, 3,000 feet of fresh air must be introduced per hour for each person, and about twice this volume for every gas burner that consumes three cubic feet per hour. Fortunately this renewal of air takes place to a considerable extent in most rooms, even when the doors and windows are shut, by the chimney, by cracks and crevices in the doors and windows, and especially through walls. Most building materials are porous when dry but become nearly air-tight when wet. Compact wall linings, such as ordinary wall-papers, tend to keep walls damp and therefore render rooms much more unhealthy than the old-fashioned whitewash.

222. Ammonia.

Exp. 9.—Fill a bottle with fresh rain water, add to it a small quantity of Nessler's solution, and let it stand for a short time; the water will become of a pale yellow color, indicating the presence of ammonia.

The ammonia present in the atmosphere rarely exceeds one part in a million, but this portion, when carried to the soil by means of rain, amounts to between five and six pounds per acre annually. It is from this source that unmanured crops derive the greater part of the nitrogen which they require for the formation of seed and other portions of their structure, plants being unable to assimilate free nitrogen.

223. Nitric Acid.

This substance is always present in the atmosphere in small