But, apart from the work and the necessary recreation, there will still be left a few hours of every day for reading and writing. How many men and women of literary tastes and hungry minds would give almost anything to secure a couple of hours every day for study and thought. Two hours a day for 300 days in the year: 600 hours, or 100 six hour days. In ten years 1,000 days of six hours each, or about three working years, all to one's self. How much should be accomplished in that time! And what is to prevent almost every teacher from securing at least so much? Are we not then speaking within bounds when we say the teacher ought to be among the foremost in every department of social and literary culture?

But there are lions in the path. Yes, we know it; many and formidable they often are. The want of books in rural districts and, with the pittances received as salaries, the want of means to buy them. The claims, lawful and right within certain limits, but to be resisted when ruinously excessive, of pleasant companions and social gatherings. Most to be dreaded in these days of "cram," the preparation of examination questions, the reading of reams of foolscap in the shape of answers, and the getting ready each evening for the everlasting drill of the morrow. The first of these obstacles is serious, often insurmountable. Where schools are sufficiently near each other the formation of teachers' reading clubs will materially help by dividing the difficulty. But why confine such clubs to teachers? Are there not in almost every district a few like-minded persons intelligent enough to take part in carrying on the work of such a club? The temptations to fritter away precious hours in nonsense and gossip can be conquered only by moral strength and courteous firmness on the part of the teacher. For the third difficulty we know no remedy save the good sense of public educators, which is already tending to reaction from the absurd and killing extremes to which the examination craze has swung. But, after all, the proof of the strength is to be found and often the highest benefit reaped, not in the removal, but in the overcoming of obstacles. The teacher who will may eventually take his place amongst the wisest and best in any land. The true man and woman will cherish no lower ambition.

Special.

ELEMENTARY CHEMISTRY.

CHAPTER IV.

SECTION II.

CARBON.—(*Concluded.*)

Symbol C. Atomic Weight, 12 (11.97) Molecular Unknown.

102 Reducing power.

Exp. 7.—Heat a glass tube in the spirit-lamp and draw it out to a point. Drop into the point of the tube a very small quantity of arsenious oxide, As_2O_3, and above it place a splint of wood charcoal. Heat the charcoal red-hot in the flame of the lamp, and gently raise the hand so as to bring the oxide into the flame without taking the charcoal out of it. The arsenious oxide will volatilize, giving up its oxygen to the carbon, and deposit metallic arsenic on the cold part of the tube.

The affinity of carbon for oxygen at a high temperature is very great. It deprives most metallic oxides of their oxygen and thus brings them into the metallic state. It might almost be said that the art of metallurgy, as it now exists, is based upon the affinity of carbon for oxygen at a high temperature.

103. Indestructibility.—Charcoal, and carbon in most of its forms, is extremely indestructible unless exposed to an elevated temperature. Hence stakes and fence posts, if charred before they are put into the ground, last very much longer than when this treatment is neglected. For the same reason it is a common practice to char the interior of tubs and casks destined to hold liquids.

104. Lampblack. This form of charcoal is obtained by burning turpentine, resin, or other vegetable matters rich in carbon, with a limited supply of air. It is not pure carbon. It always retains a portion of incompletely burned compounds of carbon and hydrogen. It furnishes the most indestructible of black pigments, and has long been employed on this account as the basis of printing ink.

105. Animal Charcoal.—Charcoal manufactured from animal substances, is called *animal charcoal.* When bones are strongly heated out of contact with the air the variety of charcoal thus produced is called **Bone-Black,** and is much used by sugar refiners.

106. Graphite.—This is a crystalline form of carbon occurring in massive or hexagonal plates. It is also called plumbago, and is more familiarly known as black-lead. It is obtained from the earth in large quantities, and is used for the manufacture of lead pencils, and for giving a black polish to iron articles, such as stoves, &c., and for protecting them from rust.

107. The Diamond.—The Diamond is another form of crystalline carbon, occurring in well-defined crystals belonging to the regular system. It is the hardest substance known. Besides its extraordinary value as a gem it is used for cutting glass. Very small diamonds are said to have been lately prepared artificially by a Glasgow chemist. If the diamond be suspended in a cage of platinum wire, heated to bright redness, and then plunged in oxygen gas, it will burn with a steady red light, and with the production of pure carbon dioxide.

108. Allotropic Forms.—Charcoal, graphite, and the diamond are but different forms of the element carbon. They differ in hardness, in color, in specific gravity, and in many other physical properties. They are alike infusible, alike able to resist the action of substances which attack most other bodies, alike in being combustible, and alike in the same weight of each yielding the same quantity of carbon dioxide when burned. Such phenomena as these afford strong grounds for believing that our present elementary substances may have a composite structure.

QUESTIONS ON CARBON.

1. Give an account of the different methods employed for preparing charcoal from wood. How would you demonstrate the preparation of charcoal on the small scale?