of a gas. Almost certainly a somewhat similar question will be asked next year. The action of a gas upon different substances is one of the best ways of showing its chemical properties, and there are many examples given in the textbook beginning with the experiment of passing hydrogen over heated hematite. Most of the actions asked for this year, should have been familiar because zinc acted on by hydrochloric acid would naturally give hydrogen just as zinc acted on by sulphuric acid does, while the action of hydrochloric acid on calcuim carbonate and on manganese dioxide are the usual methods for making carbon dioxide and chlorine. Very many of the candidates in making up the equations did not even make them balance, apparently not realizing that the symbols given on the one side must be found on the other, for the symbols stand for definite weights of the different elements; and a fundamental principle in chemistry is that no matter can be lost or created; that the elements may be rearranged; and that is what takes place in chemical action. But the quantities, and therefore the symbols, must be unchanged. For example: the equation $MnO_2+2HCl = MnCl_2+2H_2O+Cl_2$ is evidently wrong because on the left side there are only two H's and two Cl's while on the right hand there are four of each. The equation $MnO_2+2HCl = MnCl_2+H_2O_2$ is also wrong but not *evidently* so. It is wrong because hydrochloric acid acting on manganese dioxide does not give hydrogen peroxide; but one would need to know the *chemical facts* to know that the equation is wrong, because exactly the same quantities of the elements are given on each side. As a matter of fact the apparently similar equation $Ba\ O_2+2HCl = BaCl_2 + H_2O_2$ is right because barium peroxide does yield hydrogen peroxide tho manganese dioxide does not.

## Question 8.

In answer to the eighth question a good many indicated that experiments were not done in their schools, tho I found that there were quite as many schools as I had expected where experiments were carried out. It seemed, however, that a few of the candidates did not quite realize the meaning of the phrase "done by myself" or "done by the teacher." At one station a candidate described as an experiment done by himself the smelting of iron in a furnace one hundred feet high; and at the same station another examinee gave the credit of the same industrial operation to his teacher. At another station a candidate described some experiments that "we tried with liquid air," tho probably no liquid air could be found nearer than Boston.