

chemical scholars and knew what to lay stress upon. The text book chemist who works merely in imagination or sometimes memorizes merely, has very little idea of the tales his examination papers tell of his chemical conceptions. When the teacher blames the examiner for the lack of his success, even the pupils are apt to think that the master had better be silent.

As Chemistry is one of the difficult subjects to master without apparatus and experiment, and a teacher who understands what he is doing the following report of the examiner in Chemistry this year is published.

Professor John Waddell, B. A., (Dal.), B. Sc. (Lond.) Ph. D., (Heidelberg), D. Sc. (Edin.) has always shown great interest in the improvement of chemical training in Nova Scotia; and as an examiner he excels in giving due consideration to the immature conceptions of beginners such as abound in Grade X. He writes as follows:

The chemistry taught in the school should be, on the one hand, the kind to form an introduction to the subject suitable to those going to the University, and on the other hand, sufficiently complete to be of value to the larger number, whose formal education ends with the school. To a great extent the two objects can be attained at the same time. A clear definite knowledge of a limited number of facts is necessary, and an understanding of the more simple underlying principles.

The best way to get the greater number of the facts is by experiment, though some additional facts may advantageously be learned from the textbook. The latter may very well be used to draw the attention of the pupil to what is specially to be observed, and to ensure, as far as possible, that his observation shall be accurate. Theory should be subordinate to fact, but should not be entirely neglected; and should be presented in the simplest form, and as the application of common sense to chemical phenomena. Application of common sense is not infallible. It leads people astray sometimes in ordinary life and may do so in chemistry; but it is much more reliable than fantastic speculation which is by most of the pupils in schools, considered to be the foundation of the Science.

The pupil can scarcely be considered familiar with the facts, till he understands them from various points of view. For instance, if he knows that chlorine is produced by the action of hydrochloric acid on manganese dioxide, he should know that the action of hydrochloric acid on manganese dioxide produces chlorine. Many pupils can, however, answer the question as to how chlorine is made, who would be nonplussed if asked the action of hydrochloric acid on manganese dioxide.

If the pupils know thoroughly the phenomena connected with the preparation of, and experimenting with, a dozen or fifteen of the most common gases and other substances usually prepared, his knowledge of chemistry would be greater than that of ninety-five percent of the candidates in Grade X.

I should recommend that the subject be taught as indicated by the examination in Grade X in 1909. In each case the phenomena should be kept distinct from the inference regarding them, as suggested in the first question. The examination in general, shows the character of the work which is thought most beneficial, and next year the examination will be, as far as possible, along the same lines, with such variation that the cramming of a few facts will not suffice. For instance, the first question will not be asked in the same way; but it is probable that a question involving observation will be asked, as well as another on chemical principles.

I think it is well for pupils to learn a number of equations. If they can be led to construct the equations from the reactions, so much the better; but pupils of that grade will find it easier to learn the equations as a help in remembering the facts, than to retrace the process. In this case, equations are exercises of memory; but it is important that the pupils obtain all the information possible from the equations, and that they should understand the information given about quantities.