

## THE NEED OF A MORE GENERAL KNOWLEDGE OF AND TRAINING IN CHEMISTRY

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Before we can discuss properly the place of chemistry or of any other science in a scheme of education we must have a basis in some true philosophy of education and back of that must be a sane philosophy of life. Very many of the present tendencies in High School education seem to imply that its primary purpose is to develop men and women who are money making and money spending machines and that life consists chiefly of the externals, food and drink, and clothing and recreation and material resources. The poet Tagore gives a quite different view—to him the ideal of life is not acquisition, but *realization* and our greatest teacher has said, "The Kingdom of God is within you." For three and a half years of terrible war, Germany has been fighting because the masses of her people have believed that she is surrounded by hostile nations which threatened to destroy her civilization and because her leaders believe, with some show of justification, that their civilization is the best in the world and that it is their duty to impose it on others. Our allies have been fighting that the principles of justice and humanity may not perish from the earth and they are slowly coming to see that international cooperation and mutual helpfulness are better than selfish national aggrandizement. On both sides the nations of the world are demonstrating that they are willing to sacrifice a million lives and the material accumulations of a generation for ideals which are of greater value than life itself.

The dominant purpose of our education should be, therefore, to prepare our pupils for a rich and varied intellectual and spiritual experience in life. To secure such an end we should not have a series of disconnected science courses filled with interesting information which the pupil can safely forget as soon as he has passed the semester examination, but a graded course in science running through four years arranged in such a manner that each part rests upon that which precedes. The natural sequence might be physiology, botany, zoology, physics, chemistry. I place chemistry at the end because it is better adapted than any other science to bring, with its own special contribution, a correlation of all the scientific knowledge which precedes it. It would be well to give an examination at the end which should cover in a comprehensive manner the work of the four years. The older education secured such a consecutive, graded course by the study of Latin. Scientific studies will never satisfactorily replace Latin in genuine educational value until we secure some such graded work as I have outlined. I think that some of our smaller schools, with a limited program, follow a better pedagogical model than the large, strong schools with their hodge-podge of electives, often administered without demanding a proper sequence of subjects.

In the presentation of chemistry or of any other scientific subject the attempt should not be made to give merely interesting information about a series of disconnected facts but rather to develop scientific habits of thought and the ability to understand clearly those simple, fundamental principles which are our most valuable heritage from the past. Above all the pupil should learn that these principles are not to be taken on authority but are logically connected with facts easily understood, some of which he can reproduce for himself. While the laboratory work should doubtless begin with experiments which illustrate the facts of general inorganic chemistry, qualitative analysis, if properly taught is better adapted than any other subject with which I am acquainted for the development of accurate, scientific methods of thinking.

The opinion is all too common that no study is "practical" which does not directly minister to the student's ability as a money-getter. If we accept the ideal which I have put before

you—that our purpose should be to prepare the student for a rich and varied experience in life by suitable intellectual training in habits of accurate thought—courses which give some real knowledge of the science are certainly more practical than courses which give a great variety of interesting but disconnected information.

In vocational courses, however, the information important for the vocation which the student is preparing to follow finds its proper place. The ideal, as it seems to me, would be that each pupil before leaving school should have some vocational training. If he is to leave at the close of the eighth grade, at least a part of his work should have a direct bearing on his future vocation. If he is to go out into life from the high school he should be trained in school for some definite vocation. The same is true of the University if his education is to close there. But the amount of time given to training for a vocation should never be so great as to crowd out the more important training for life and for citizenship.

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