

CONTINUATION COURSE IN CHEMISTRY.

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A better name for my topic perhaps would be "Observations on the Teaching of Chemistry to College Students", for that more nearly describes what I purpose to say here.

For some time past there has been criticism of science teaching in our colleges, criticism which is in part justified and certainly is in part unjust. Be that as it may, it has in one science at least aroused those responsible for the instruction to attempt a careful consideration of the spirit and purport of their teaching, together with an evaluation of its results. Through the Division of Chemical Education of the American Chemical Society a committee has been appointed to conduct such study and to make recommendations both as to the topics required in a standard high school course in chemistry, and also for a first year college course in the same.

This committee has published through the medium of the *Journal of Chemical Education* (Vol. 1, No. 5, May 1924) a preliminary suggested outline for such college course, which is now under discussion and criticism before being put in final form.

I think we are all of us agreed that there should be a proper correlation between high school and college chemistry courses to avoid duplication and uneconomical use of time; the difficulty is to work these out to the best advantage taking in consideration educational, cultural, industrial and local interests and needs.

In planning the college course, which is the one to which we shall direct these remarks, the definite objectives to be attained by such a course should be thoroughly understood by those responsible for the course and then the work planned in such manner as will best lead to the attainment of these objectives. These objectives are necessarily somewhat diversified and are influenced in part by the amount of previous instruction which the students have had, the maturity of the students, and to some degree by the locality of the college.

There was a time, not long ago, when practically all students entering college came without even an elementary knowledge of chemistry. Necessarily their college training was that of beginners. Now-a-days many of the high schools are well equipped for instruction in this field of knowledge and consequently a considerable proportion of those entering college have had some training in chemistry. Unfortunately not all have had this training and so far as my experience goes it tends to show that there is a great diversity as to the quality of such training and how much of it the student remembers. In many of the high schools the chemistry course consist largely of an accumulation of information, most of which has been forgotten by the time the boy enters college, but upon which the student prides himself as having "had

chemistry" and on the basis of which he sometimes resents being put in classes with beginners. Of course this has nothing to do with the training which he should receive in college except that it makes it somewhat more difficult to reawaken his interest, unless perchance he plans to take up advanced chemistry. One way of dealing with students of different degrees of preliminary training is of course to arrange them in sections and give them work on the basis of such training and that is being done at some of the colleges; but in some it is impossible and it is not always necessary. It is or should be possible to plan a course that will not discourage or overpower the beginner—unless too immature—and which at the same time will interest and stimulate the better informed. This is perhaps not the ideal solution, nor do I put it forward as such, but I do maintain that it need not be discouraging to the teacher. It will call upon him for more thought in planning his course, greater resourcefulness in its presentation, will require rather more time given to the needs of individual students and will above all call for a better acquaintance with the student as an individual.

As to the objectives to be sought for in the teaching of first year college chemistry, obviously this is a matter of opinion and may be influenced by various local conditions to some degree, but the writer holds, in common with a number of others with whom he has discussed the subject, that, taking into account the fact that the usual freshman course in chemistry is for a large per cent of the class the only formal presentation of the subject that they will get, we should endeavor to accomplish the following things:

First, To use the course as an educative influence, and for an explanation of this I am willing to abide by the statement made by President Hopkins of Dartmouth when he says: "The purpose of a college education is to give a man complete command of his faculties and the ability to think clearly and independently". There are few subjects that, rightly used, are better adapted to this sort of logical training in habits of thought and of reason than chemistry.

Second, To use it as a means of cultivating the scientific spirit, or method, which is to approach any subject with an open mind, to state the problem clearly, then bring to bear upon it all known facts, from these to plan experiments designed to test or prove their applicability, and finally to draw, by a process of logical reasoning, the proper and justified conclusion. Chemistry lends itself to all this most admirably.

Third, To connect the known facts of chemistry, and the fundamental principles upon which they are based, with the applications which can be and are made of them in the service of mankind. This includes its service to the home, to agriculture, to health, to medicine and to industry, with the maximum number of applications to local industries, or to things with which the student is familiar. Chemistry is a practical science and this fact should not be lost sight of.

Other objectives of course will naturally suggest themselves to you, but I think a little study will show that most of them are included under those mentioned. After all, the chief objective of all education is to give intellectual training. If our students can learn to think,

if they can be trained to use what they know and to develop judgment, we shall have attained the chief end of all education. For those who plan to take up the systematic study of chemistry this is the best foundation as well.

I have purposely not attempted to state what topics shall be included in such a continuation course, perhaps those which have been or are to be indicated by the committee before mentioned will do as well as any. What is of importance is that whatever is used shall be properly used and with the objectives in mind which have just been given.

The writer would plead for a little better and more universal preliminary training of high school students in chemistry, particularly in Indiana. This would materially aid me and others in increasing the content and perhaps in improving the quality of the continuation course in chemistry as given in the colleges of the state. Chemistry is a subject far-reaching in importance, concerning which a large percentage of our so-called leaders in industry, in society and in public affairs are ignorant, to the very great detriment of our country, but concerning which the leaders of the future need not and should not be ignorant. It is incumbent upon us who have the training of the future generations entrusted to our care to see to it that such is the case.

