THE AMERICAN CHEMICAL SOCIETY

DIVISION OF CHEMICAL EDUCATION

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Educating the public in the use of the metric system: HARVEY A. NEVILLE. All countries except Great Britain and the United States have adopted the metric system of measurement. When this step is taken here, it will be the duty of the educational system of the country to familiarize the public with the usage and advantages of metric units. For this purpose methods of visual instruction are suggested. The convenience of decimal relations and the interrelation of the fundamental units are emphasized. The metric equivalents of common quantities are graphically shown. Some practical conveniences of metric units are pointed out, and the economy of time and effort now dissipated in teaching several different systems of measurement is discussed.

Ethylene: F. B. ARENTZ. Ethylene gas, discovered in 1795 by four Dutch chemists, did not come into prominence until the World War. Its first use was in the manufacture of mustard gas, but now its use for cutting and welding, coloring of citrus fruits, as an anesthetic and in chemical synthesis is becoming more general. Ethylene is made by passing ethyl alcohol vapor over a heated catalyst, condensing out the water formed, and compressing the pure gas into steel cylinders.

Some angles in the articulation of high school and college chemistry: CHARLES E. COATES. A discussion of the attitude of the college teacher and the nature of college requirements relative to this problem. The different purposes of various first-year courses in college chemistry and how these purposes can best be accomplished. The time in the high school course in which chemistry is given. Difference in qualifications of high school teachers of chemistry with regard to scholarship and teaching ability. The difference in qualifications of first-year teachers in college chemistry in regard to scholarship and teaching ability. The degree of maturity of high school students. The equipment of high school laboratories. Is high school chemistry a real help to the college student in chemistry, and if so, to what degree and why?

A tested method of teaching the history of chemistry: LYMAN C. NEWELL. Instruction in the history of chemistry is handicapped by the student's lack of historical background and his incomplete knowledge of chemistry. Attempts to give a consecutive or detailed course are doomed to failure. An experience of twenty-five years has convinced me that the only method suitable for a mixed class of beginners must possess certain features: (1) It must be built around the personality and specific contributions of prominent chemists, (2) it must be illustrated by portraits, books and memorabilia, (3) it should be supplemented by two kinds of papers prepared by students, *viz.*, short papers at frequent intervals and one or more longer papers requiring special reading.

Systematic treatment of first-year chemistry: P. M. GLASOE. Approach the subject through familiar channels. Do not swamp the student with new definitions and new vocabulary from the start. Have student name a list of all the metals and non-metals he knows from everyday life. Carry the process forward by having him arrange the elements as found in a table of atomic weights in the order of their weights. Fifteen or twenty metals with half a dozen non-metals constitute a year's work. Arrange first two series, Li–Ne and Na–A, so as to show grouping. Study, by means of these series, the change of properties from metallic to non-metallic, positive to negative basis to acid. On the same basis take up chemical affinity, valence, structural formulas; acids, their derivation and structural formulas, bases, their derivation and structure; salts, their structural formulas and relative stability; the derivation and properties of the anhydrides of both bases and acids. Amphoterism is a natural deduction. Elements are studied in the order of their occurrence in the groups of the Periodic System.

The art of lecture table demonstrating: HERBERT F. DAVIDSON. Lecture table demonstrations are worth while because they make the subject concrete. Chemistry as usually taught is, to many students, a very abstract thing, but well-chosen, deftly performed experiments can make the subject very real to such students. Demonstrations should not be performed simply because they are spectacular, but because they teach a chemical lesson. The building of apparatus which above all should be simple and capable of expeditious exhibition, gives the teacher himself the kind of mental stimulation needed by those who teach the general chemistry. It is better to show no experiments on the lecture table than to have any appreciable percentage of failures. A number of experiments will be performed to illustrate the principles discussed.

Correlation of high school and college chemistry: LEROY L. SUTHERLAND. A discussion of the true function of a high school chemistry course as to purpose and scope. A plea that colleges and universities exercise greater caution in accrediting the science work of secondary schools. An exposition of the harm done to both chemistry and the individual student, when on entering freshman chemistry, he is given no recognition whatsoever for work done in his high school course, but told to "Forget all you have learned—we will now teach you correctly." A claim that the study and teaching of chemistry should be a progressive growth, and not a planting of seed which as they begin to sprout are ruthlessly torn up and cast aside on the dump-pile to be replaced by more seed. This represents lost motion. We must see to it that the secondary schools plant the right kind of seed, and then build to but not destroy their work.

Teaching the growth of chemistry in industry by the

use of maps: LOUIS W. MATTERN. From reports compiled by Professor Charles E. Munroe, expert agent in charge of "Chemicals and Allied Products" at the U. S. censuses 1900–1905–1910, several charts were prepared which he used during the course of an address, published in the January, 1925, issue of the *Journal of Chemical Education*, to show the growth of several chemical industries and the need of their extension into unoccupied fields. These charts are very instructive, so it has been suggested that the large body of important census statistics of chemical industries since 1900 could be used in producing a system of charts, by means of suitable characters on maps of the United States, which would clearly visualize the growth of chemistry in industry and the vast areas of latent resources which challenge chemistry to greater service. Such maps would prove most useful to teachers. Acting on the belief of the importance of this work, the author has conferred with Mr. William W. Stuart, director of the census, on the feasibility of this matter and who expressed his desire to furnish maps of intervening censuses.

The problem of high school chemistry: GUY CLINTON. The three principal factors recognized are matter, arrangement and method. The paper is restricted to the discussion of the latter two. One fundamental principle which determines arrangement is that matter should be presented in a progressive order, so that that which follows may not presume knowledge beyond what the preceding exercises give opportunity to learn. It is considered preferable to build a course around laboratory experiments rather than to take it from a text-book. Experiments should be grouped about principles rather than principles about experiments. The language of chemistry should receive the particular attention of teachers.

Museum experiments: R. A. BAKER. Any reaction which requires considerable time for completion, or which is of such a nature that its course is automatically recorded, may be utilized as a "museum experiment." The set-ups may be displayed long enough to attract general attention, and when properly placarded, stimulate interest and profitable discussion among students. A number of appropriate experiments are described.

The present status of the ionization theory: JAMES KENDALL. The original ionization theory, as formulated by Arrhenius, is unable to account for the most important type of all conducting solutions—strong electrolytes in water. These do not follow Ostwald's dilution law, but do conform approximately, nevertheless, to the solubility product principle. It may be deduced from this that the stumbling-block is connected in some way with the undissociated molecule in solution. Recent research, indeed, demonstrates that the Arrhenius conception of kinetic equilibrium between undissociated and ionized solute is incorrect. The extension of the ideas of the Braggs on crystal structure and of Lewis and Langmuir on atomic structure to solution leads to the conclusion that the undissociated molecule is practically non-existent, and that at high dilutions electrostatic forces between oppositely charged ions are the prime factors to be considered. At greater concentrations, interactions between solvent and solute must be taken into account, and rules regarding such interactions have been qualitatively established. The collapse of the theory of Ghosh discredited "complete ionization" temporarily, but the more rigorous equations of Debye and Huckel are fully in accord with experimental data. Some points of difficulty still remain, but the rapid advances made in the last few years inspire the hope that the field will be entirely cleared up in the near future.

Use of charts, motion pictures and other aids in the teaching of elementary organic chemistry: ALEXANDER LOWY. A number of charts, diagrams, such as "Products from a barrel of oil," "Products from a hundred tons of coal," "Organic type formulas," "Organic chemical transformations," "Petroleum refining," etc., will be shown. The use of motion pictures entitled "The story of petroleum" (4 reels, distributed by the Bureau of Mines) and "By-product coking" (2 reels, distributed by the Koppers Company, Pittsburgh) will be emphasized. Saving time at lectures by using colored crayons will be illustrated.

Minimum essentials: "Teach—test—reteach": RACHEL E. ANDERSON. The determination of a definite course of study to fit the existing needs of a high school where college and non-college preparatory students are taught in the same class. The adoption of definite minimum essentials to be mastered by all students; the effective and rapid measurement of them to determine whether reteaching is necessary for the individual or the class collectively. The experiment has proved the effectiveness of teaching for mastery, rather than for distribution along a normal curve. In fact the application of the method of "Teach—test—reteach" has developed a mastery of fundamental principles that has made the curve of distribution top-heavy on the positive side. The plan breeds a closer correlation between laboratory and text-book assignment and the use of reference books. Furthermore, the plan is not complete until chemistry is built into everyday processes. Slosson's "Creative Chemistry" is read and the rather pleasant game of one hundred "false and true" questions measure the results. Chemistry has increased in popularity and there has been a marked decrease in the number of failures.

Teaching principles of electrodeposition: W. BLUM. The importance of potential relations, and especially of single potentials during deposition, is emphasized. Potential changes involved in polarization can be most simply explained in terms of the changes in "effective metal ion concentration." From polarization curves it is often possible to predict the direction of the effect of different variables upon the distribution and crystalline structure of the deposited metals.