EVOLUTION OF COLLEGIATE CHEMISTRY CURRICULA

BY

BRUCE W. MERWIN

Southern Illinois State Normal University, Carbondale, Illinois

During the past half century the offerings of the various college departments of science have changed greatly, resulting at present in some uncertainty as to what new courses should be added as these different departments expand. It is the purpose of this paper to study the shifts in collegiate courses offered in chemistry, to try to show possible causes of these changes, and to see what the present tendencies are.

Three periods may be distinguished in the history of chemistry within the time studied: (1) an early period ending about 1880; (2) a middle division extending to 1910; and, (3) a recent one lasting until the present time.

During the first period, when the practical and the utilitarian dominated, the ideas of classification and philosophy and little experimentation were associated.

The second period, from 1880 to 1910, was characterized by the development of the laboratory, an expression of the growing scientific spirit, and the tendency to stress the study of laws and theories, all having as an aim the development and discipline of the mind, accompanied by a rapidly increasing tendency toward the utilitarian. The changes in subject matter and content indicate that the practical or utilitarian aim in college education had become widely adopted by the end of the century. The transition from the classical to the modern, from the theoretical and speculative to the practical point of view, evoked certain movements which in turn contributed toward the change in aim. The desertion of the disciplinary aim was responsible for the transition from required to optional work, for the shifts in the amounts of time allotted to the various subjects, for the introduction of new subjects and the repression of some of the old, and even for new methods of instruction and increase in enrollment.

Many of the recommendations of the Committee of Ten, 1893, are still reflected in the college offerings in chemistry. The more important recommendations were as follows: chemistry for those going to college or scientific schools and for those going to neither should be treated in the same manner and include the same content; chemistry should be taught by a "combination of laboratory work, textbook, and through didactic instruction carried on conjointly, and at least one-half of the time devoted to these subjects be given to laboratory work;" an entire year should be devoted to the subject; one-fourth of the time of the high school course should be devoted to nature studies, and this amount of preparation should be required for entrance to college.

The third period, extending from 1910, or perhaps a little earlier, to the present day, has witnessed a strong shift to the practical, the useful, in all school subjects, and an attempt to offer those things that will best fit the student for life in his community. These things are difficult to determine, and during the present decade numerous studies are being made to determine objectively just what subject matter should be included. A study of the table shows the efforts being made to enrich and make practical the work in the collegiate chemistry departments.

Distribution of Listed Courses in Chemistry by Percentages of Kansas Colleges Offering

Year	1870	1880	1890	1900	1910	1920	1925	1930
No. of Colleges	6	9	18	22	23	20	20	17
Subject	%	%	%	%	%	%	%	%
General Chemistry	83	78	83	82	70	75	65	94
Inorganic Chemistry	17	0	17	27	43	60	50	65
Qualitative	0	11	11	45	74	85	80	94
Organic Chemistry	0	33	17	46	74	100	100	100
Quantitative	0	11	17	36	52	85	95	100
Advanced Quantitative	0	11	6	9	9	20	25	71
Physical Chemistry	0	11	6	18	17	45	55	82
History of Chemistry	0	0	6	5	22	20	30	41
Industrial Chemistry	0	0	0	4	13	35	45	35
Glass Blowing	0	0	0	0	5	0	15	6
Teachers Course	0	0	6	0	0	0	5	29
Philosophy of Chemistry	0	0	0	5	0	0	10	0
Water Analysis	0	0	0	0	0	0	5	24
Assaying	0	11	6	9	17	20	15	24
Agricultural Chemistry	0	11	6	5	13	25	25	29
Physiological Chemistry	0	0	6	9	22	20	35	24
Household Chemistry	0	0	11	5	22	45	50	29
Experimental Chemistry	0	0	0	14	0	5	5	6
Photography	0	0	6	0	9	5	10	0
Fuel Analysis[a]	0	0	0	0	0	0	0	41[a]
Food Analysis	0	0	0	0	0	0	0	53
Oil Analysis	0	0	0	0	0	0	0	24
Metallurgy	0	0	0	0	0	0	0	35
Advanced Organic	0	0	0	0	0	0	0	71
Organic Preparations	0	0	0	0	0	0	0	65
Organic Problems	0	0	0	0	0	0	0	29
Advanced Physical Chemistry	0	0	0	0	0	0	0	24
Survey of Chemistry	0	0	0	0	0	0	0	6
Chemistry of Rare Elements	0	0	0	0	0	0	0	12
Chemistry of Cement	0	0	0	0	0	0	0	6
Sanitary Chemistry	0	0	0	0	0	0	0	12
Inorganic Preparations	0	0	0	0	0	0	0	18
Chemistry of Explosives	0	0	0	0	0	0	0	6
Chemistry Problems	0	0	0	0	0	0	0	12

[a] Note: Some of the courses that seem to appear for the first time in 1930 actually appeared earlier and were then included under more general titles, such as Industrial Chemistry, which developed rapidly after 1900 into a number of specialized courses such as those dealing with fuel, foods, oil, explosives, cement, etc. These are listed in this expanded form to show the wide variety of courses listed in 1930.

According to this Table 83 per cent of the 6 colleges listed in 1870 offered a course in General Chemistry; 78 per cent of the 9 colleges in 1880; and so on.

The same forces that brought about the appointment and the final report of the Committee on Sciences of the Commission on the Reorganization of Secondary Education, 1920, caused the college authorities to shift their offerings to meet the new demands. This committee endorsed the general science course and regarding chemistry recommended general chemistry and specialized chemistry for various curricula such as household chemistry, industrial chemistry, etc. A parallel movement is also revealed in the accompanying table, for instance, household chemistry came to be supplemented by such courses as food analysis and sanitary chemistry, and

industrial chemistry came to include many practical phases. This shows the response to the demand for training for the differentiated branches taught in secondary schools.

Another force that hastened these changes was Dr. Frederick J. Kelly's study of the liberal arts colleges. He called attention to the need for definite aims and made some suggestions which, in some cases at least, appear to have stimulated and served as guides in the selection of additional courses.

It is also to be noted that since 1910 a lessening amount of time is devoted to the laboratory and more to demonstration work, while the disciplinary aim is rapidly giving place to a practical aim based on the demands of the individual student and the community in which he lives. Courses dealing with foods, cement, or explosives are good examples of this.

The historic trends in the treatment of chemistry as a school subject indicate that the present decade will witness an expansion in the college chemistry curricula along three lines; first, by the introduction of those higher courses designed specifically for those who are to become technical and research chemists; second, by the introduction of those utilitarian and vocational courses essential to the welfare of particular vocational groups; and third, by the introduction of general cultural courses in chemistry designed primarily for those neither continuing work in chemistry nor employing it in their vocations but to whom a knowledge of chemistry may furnish a means of avocational enjoyment.