WRITTEN SUMMARIES FROM DISCUSSION GROUPS

Group 1. INSTRUMENTATION
Leader: Dr. Stanley Watkins, Coe College

An attempt was made to analyze the question, "What is instrumental analysis in the undergraduate curriculum and where is it most effectively introduced?" Several general conclusions were stated. First, the topic should be presented to show the wide application of a particular instrument with emphasis on the theoretical basis, advantages (accuracy and sensitivity) and limitations. Second, the modern approach in chemistry should emphasize new and effective tools in solving complex chemical problems (structure determination, mechanisms of reactions, etc.) and should stress the evaluation and interpretation of data (IR, NMR, electrochemical, etc.). Third, in addition to practical applications, the topic should develop an understanding of the fundamentals of instrumentation so that the instrument is more than a "black box" to the student.

In discussing whether instrumental methods and principles should be taught in courses other than instrumental analysis courses, several views were expressed. In order to understand the modern organic chemist's approach to studying structures of compounds some mention must be made of IR spectroscopy. To postpone this important research method until an instrumental course would sacrifice some of its importance. Likewise, the inclusion of potentiometry in the beginning analytical chemistry, when the theory of oxidation-reduction titrations is introduced, would be ideal. The availability of relatively inexpensive potentiometers and grating spectrophotometers might encourage inclusion of these instruments in basic analytical courses. Some felt that distribution of topics of an instrumental nature within other courses would result in inadequate presentation of the principles of the method and a lowering of standards (exactness and statistical treatment) normally emphasized by the professional analytical chemist.

The general opinion was that a special course in instrumental analysis was desirable. Important topics would be absorption spectroscopy, electroanalytical measurements, chromatography and radio-chemical measurements. Additional topics that involve the use of expensive instruments such as IR, NMR, X-ray diffraction, mass spectroscopy, etc., could be introduced in any one of several advanced classes with emphasis on the interpretation of data.

In regard to instrumentation, several colleges build basic instruments to be used in the laboratory. Information about a set of instruments built for about $200 can be obtained from Dr. Fred Tabbutt, Reed College, Portland, Oregon. In a few colleges topics such as electrical measurement, optical methods, trouble shooting and electronics are stressed before the student makes use of the instruments.

Group 2. PROGRAMMED INSTRUCTION
Leader: Dr. Paul Carnell, Albion College

What is it? ...automated teaching...reinforced learning...auto-instruction with teaching machines. Lumsdaine, University of California, states, "The learner is called upon to respond frequently in interaction with an instructional program..." One of the most important differences between the programmed approach and the conventional manner, is much more latitude for differences in ability and background. In other presentations you set a fixed pace for the entire group. Methods of presentation often include programmed texts, teaching machines or programmed lectures. An experiment using these methods showed that students learned quickly from all programmed work. There were no differences between different types of presentation and students did significantly better than those taught by conventional lectures.

Several specific programs were considered. After considerable discussion it was stated: "We as scientists believe that we get answers better by experimentation, and I think if you do nothing else you should experiment with programmed instruction to see how you react. You will be the one who has to decide. In response to your devotion to science, (i.e., that experiments are necessary to get better answers) then you should look into it. Programmed

instruction may be over-rated, but I am inclined to think that it will succeed simply because it represents a more careful analysis of the material to be presented than we have had before. Secondly, in case you are interested in writing programs it would be very beneficial. You have to think through the problems much more carefully."

Group 3. WHAT MAKES A CHEMISTRY DEPARTMENT TICK?
Leader: Dr. Bill Deskin, Cornell College

The discussion of the administrative problems of the Chemistry Department was limited to a few topics. These included responsibility around the Department, purchasing, storeroom and library. This discussion proved to be extremely valuable to most of the participants. New ideas were presented and methods of solving problems were exchanged.

Considerable discussion evolved around the advantages of purchasing supplies and equipment in one large order. This order is usually submitted in the late spring or early summer for bids to several supply houses. Often an advantage is gained by including needs of other departments, i.e., Biology and Physics, on the bid lists.

Under storeroom problems ideas were exchanged on methods of maintaining inventory. Various systems were explained and discussed. Most of the colleges represented received approximately $20 to $30 per student per year for supplies, chemicals and equipment. In some cases additional funds are available for major items of equipment.

Some miscellaneous items: Of the 20 departments represented, about half have part-time storeroom help. Four or five schools have introduced standard taper glassware in organic laboratory. Most of the departments spent from $400 to $500 annually on reference books for the Chemistry Library. This amount is separate from journals and abstracts.

Group 4. PHYSICAL-INORGANIC: THE BALANCE BETWEEN CLASSICAL AND MODERN TOPICS
Leader: Dr. John Ricketts, DePauw University

The content of the physical chemistry course depended upon the content within the other courses which preceded and proceeded physical chemistry. Hence to effectively teach the physical chemistry course requires that the offerings within any particular chemistry department be thoroughly inspected to see what topics normally covered in physical chemistry had received adequate coverage in a previous course. As examples:

(a) If ionic equilibria and electrode potentials are adequately stressed in analytical chemistry, this topic can be deleted from the physical course.
(b) If a quantitative approach to reaction mechanisms is given in the beginning organic course, the integration of the various types of rate expressions becomes redundant and can be omitted in favor of a more sophistocated approach to chemical kinetics such as Absolute Rate Theory.

The content within the beginning physical chemistry course should emphasize classical thermodynamics and in addition devote some time to introducing both quantum mechanics and statistical thermodynamics.

There was some discussion concerning the need for a special course in physical chemistry for students of Biology and pre-medicine. It was agreed that such a course was valuable to them; however, no concrete solution could be agreed upon as to how the problem should be handled.

Group 5. WHAT SHOULD BE INCLUDED IN UNDERGRADUATE ORGANIC?
Leader: Dr. Quentin Petersen, Wabash College

Two texts were discussed: (a) Cram and Hammond and (b) Morrison and Boyd. Some use Cram and Hammond as a reference book. Functional groups as compared to an emphasis on mechanism was considered as an approach to organic chemistry.

A good deal was said about the mechanistic approach to organic chemistry. Some suggested that a better way to state the matter would be to call it the theoretical approach because

it is somewhat limiting to call it a mechanistic approach. All of this is symptomatic of the modern trend to minimize descriptive chemistry and put the courses on a more theoretical basis.

leglected topics. Many topics such as carbohydrates and proteins it is felt can be used to improve the theoretical understanding of organic and still retain some descriptive material on these important topics, especially in those courses which involve pre-meds, etc.

Laboratory. It was felt that a good deal of spade work can be left to students by reading on their own. Compounds are assigned to be synthesized which require a literature search either as a way of stimulating literature reading or actually planning a method of synthesis. Mention was made of the possible use of instruments in beginning organic chemistry. The purpose of a laboratory was defined as follows: (1) To make students aware of their own possibilities, and (2) To prepare the student to be able to repeat what is in the literature and extend this knowledge with the abilities they have acquired.

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CORNELL COLLEGE
Mount Vernon,Ia.

November 5, 1962

Dr. Arthur C. Cope, Chairman of the Board
American Chemical Society - Department of Chemistry
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dr. Cope:

The Midwestern Association of Chemistry Teachers in Liberal Arts Colleges recently held .ts annual meeting at Alma College, Alma, Michigan. The membership now includes some 250 members representing approximately 100 colleges and universities in a seven state area of the middle west. At this recent meeting we had a registered attendance of 120 members.

Throughout the meeting and in particular at the final business session of our meeting a great deal of concern was expressed over the extreme price increase of CHEMICAL ABSTRACTS for 1963. This group recognizes the absolute necessity of having CHEMICAL ABSTRACTS available if staff members and advanced undergraduate chemistry majors are to continue with their research programs. However necessary or desirable it is to have CHEMICAL ABSTRACTS available it was felt that the new price schedule would remove this journal from the libraries of a number of less wealthy colleges.

The American Chemical Society's own committee on Professional Training has stressed the importance of maintaining appropriate library holdings which includes CHEMICAL ABSTRACTS if an institution is to provide adequate training for their chemistry students. This, of course, will seriously affect a large number of students if many institutions find it necessaryto discontinue their subscriptions to this journal. Also the group did not feel that the alternate provision of obtaining sections at the reduced cost was a solution. These sections will not include annual indexes and thus literature searches would be impossible for students in the future.

As secretary of the Association I was directed to transmit to the Board of Directors of the American Chemical Society the concern of our membership. It was further suggested in the motion which was passed unanimously that, at least as a temporary measure, the American Chemical Society itself should accept the responsibility for quick relief from this problem and thus avoid the breaking of invaluable runs of CHEMICAL ABSTRACTS and the setting of precedents of non-subscriptions to CHEMICAL ABSTRACTS.

The following suggestion has been brought to my attention and I thought it might be a possible solution to the problem. Many of the abstracting services in other fields are priced according to the number of holdings the individual library has of the group which are abstracted.

Thus an institution which subscribes to a large number of journals would pay considerably more than a small institution which maintains only a small number of journals. Perhaps you have already considered such a plan and have rejected it for reasons not apparent to me. I am sure that arriving at a fair price for CHEMICAL ABSTRACTS is no small or easy task. The concern of our group is that we do not want to see too many smaller and many times less wealthy institutions drop this valuable journal.

Sincerely,

(Signed) William A. Deskin
Secretary-Treasurer

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AMERICAN CHEMICAL SOCIETY

November 30, 1962

Mr. William A. Deskin
Midwestern Association of Chemistry Teachers
in Liberal Arts Colleges
Cornell College
Mount Vernon, Iowa

Dear Mr. Deskin:

Your letter to Doctor Cope about CHEMICAL ABSTRACTS has been referred to me for reply.

You are concerned that the new price schedule for CA will put it out of reach for smaller and less wealthy academic institutions. I agree that the price rise was a steep one, but the Board had no choice if CA was to continue. Its costs are rising at a rate of $500,000 per year.

You make the suggestion that CA be priced according to the number of holdings a library has of the group being abstracted. The problem here is that CA can be priced to no organization at less than the member subscription price-which is $500 (and below cost at that). The ACS is run primarily for members, hence the member must come before everybody else. Should we charge for CA on a holdings basis, the bottom rate would have to be $500.

We agree strongly with you and your Association that CA should be available to all chemistry students, and you passed the motion that the Society should be responsible for quick relief to colleges in need. This the ACS cannot do directly. However, I suggest for all colleges which feel the pinch of the $500 price that they set up special funds to pay for CA. They might turn to alumni groups, local industry (if it uses the college library) or their local ACS sections. Fifty people contributing $10 each would take care of a CA subscription for a year. Since CA in its present size and scope (187,000 abstracts in 1963) has become like a basic piece of laboratory equipment, such special funds make sense.

Cordially,

(Signed) Richard H. Belknap

RHB:ml