and there is an abrupt 80 per cent. increase in heat capacity during the process, as the accompanying figure shows. In fact, the heat capacity reaches a maximum in this softening region and then falls off slightly as the substance becomes distinctly liquid at higher temperatures. Qualitative observations which we have made indicate that the volume of the alcohol also increases sharply in the transition process and it seems almost certain that other properties will likewise exhibit discontinuities in this region.

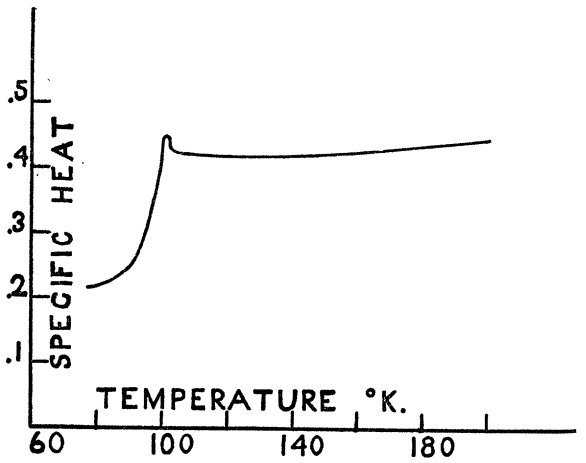

FIG. 1

In view of these considerations, it would seem reasonable to regard glass as a fourth state of matter, distinct from the liquid and crystalline states, and yet showing to some extent characteristics of both these states. A liquid is characterized by a random, haphazard arrangement of its component molecules or units and by the existence of variable, mobile bonds between these units; while a crystal possesses a definite, orderly structure and is held together by tight, rigid bonds. A glass, like a liquid, possesses a random arrangement of its units; on the other hand, like a crystalline substance, it is held together by a fixed, rigid bonding between these component particles. Because they are alike in this latter respect, the glass and crystalline states have nearly the same heat capacity. Furthermore, the comparatively large heat absorption in the case of the glass during the softening process is analogous to the heat of fusion in the melting of a crystalline material; in both cases the energy is required for breaking fixed, rigid bonds. On the other hand, because of its irregular, random structure these bonds in the case of a glass vary in strength and therefore do not all lose rigidity at exactly the same temperature; hence the "melting" of a glass is not sharp and invariable as in the case of a crystal.

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THE DIVISION OF CHEMICAL EDUCATION OF THE AMERICAN CHEMICAL SOCIETY

THE opening session at the Philadelphia meeting was devoted to a symposium on International Chemical Education. Professor Ernst Cohen outlined the system of graduate study in European universities and called attention to some points in which improvement may be made in the American practice. Dr. P. E. Verkade explained the system of education in Holland by which students are trained for graduate work in the universities. Dr. Neil E. Gordon gave an illustrated review of the graduate work done in various countries of Europe. He urged the adoption of a number of international exchange fellowships, from which great benefit should result on both sides of the Atlantic. Dr. Harry N. Holmes called attention to the necessity of knowing French and German and gave many interesting personal touches in his recent study of chemical education in Europe.

A half day of miscellaneous papers presented many helpful suggestions to the teacher of chemistry. The most outstanding factor in this group was a series of four papers on various types of visual education. These were illustrated by charts, drawings, lantern slides and motion pictures. Another very helpful paper gave many suggestions on the proper way for chemists to cooperate in securing publicity for their own work and for the science itself.

One session was devoted to a joint discussion with the Division of Industrial and Engineering Chemistry and the Committee on Chemical Engineering Education on the topic "What is Chemical Engineering?" Dr. E. R. Weidlein presided and the discussion was led by Dr. Charles L. Reese and Dr. Harry A. Curtis. At the conclusion a resolution was adopted calling for a continuation of the study, with an extension to include the general curricula to be represented by the term "chemical engineer."

The concluding session contained papers especially designed to interest teachers of chemistry in secondary schools. Papers were read on a cooperative plan between high schools and sections of the American Chemical Society; on the vocabulary employed in high school textbooks of chemistry; on laboratory instruction in chemistry; and on vocational guidance in secondary schools as a training for a career in chemical industries.

The following officers were elected for the ensuing year: Chairman, B. S. Hopkins; vice-chairman, G. W. Sears; secretary, Ross A. Baker; members of the executive committee, Wilhelm Segerblom, W. D. Engle and M. V. McGill. The term of the treasurer-business manager, E. M. Billings, did not expire at this time.

B. S. HOPKINS,
Secretary