By taking account of the dissociation constants of singly-charged anions to be involved in the reaction, soluble complexes with aluminum release silicate.

Likewise, anions forming stable coordinated 'aquo aluminum' ions and tetrahedral-silicate to dissociate ultimately into octahedrally-coordinated silicates. It has been studied. The reaction is found to occur depending upon the activity products of the components. The synthetic products is explained and the importance of their amorphous condition on their reactivity is also referred to. On the basis of ultra- and electron-microscopic studies it is demonstrated that these synthetic products are not crystalline, but amorphous aggregates, and it is also shown how their reactivity can be increased by appropriate dispersion before use.

W. F. Bradley discussed 'The Green-Compression Strength of Natural Bentonites'; in summary he said:

Cored specimens of several commercial bentonite beds were preserved at field moisture levels for laboratory examination. Green strength, water content, and x-ray diffraction character of mildly disturbed material were found to conform substantially to the relation that strength is proportional to the solid fraction.

I personally felt that this paper was one of the most outstanding contributions offered during the entire meeting.

E. A. Hauser spoke on 'The Colloid Science of Silica and Silicones'; the abstract of his lecture follows 1):

A detailed explanation of the most important properties of natural and synthetic silica and silica gels is given. Specific reference is made to the differences between the formation of synthetic silica gels and of quartz and cristobalite. The effect exerted by the synthetic products is explained and the importance of their amorphous condition on their reactivity is also referred to. On the basis of ultra- and electron-microscopic studies it is demonstrated that these synthetic products are not crystalline, but amorphous aggregates, and it is also shown how their reactivity can be increased by appropriate dispersion before use.

The colloidal properties of silicone resins are then pointed out and their production explained. Their advantages over purely organic matter and the reasons for this difference are also referred to.

1) This paper was primarily based on Hauser's book, "Silicic Science" (Princeton und New York 1956).
Finally, reasons are given why more attention must be paid to colloid science in any field where silica or silicates are studied or put to use.

S. Henin of Paris gave a paper on „Synthesis of Clay Minerals at Low Temperature“, in which he remarked:

Numerous attempts have shown that it seems to be impossible to crystallize co-precipitates of silica and hydroxides; we were therefore led to try to prepare clay minerals starting from solutions of their constituents. By arranging that these dilute solutions (tents of milligrams per litre) pass slowly into a flask containing distilled water, it has been possible to prepare substances similar to clay minerals. These have been identified by x-rays, chemical analysis, dehydration curves and electron micrographs.

Using as cations Mg, Fe, Ni, minerals of montmorillonite type have been prepared for various pH values, but generally greater than 7. Below this value, depending on the cations, oxides, hydroxides or amorphous materials are obtained.

Under certain conditions in the absence of a supply of silica there was an attack on the glass vessel, and antigorites of Mg and Ni were then obtained. Always when the supply of silica was small, and with the cation introduced in the form of a very dilute solution, the process gave rise to montmorillonite. In the presence of K, illites were sometimes formed.

The method appears to be of very general application. Only the purely aluminum minerals seem to offer difficulties of preparation. The significance of these results is discussed.

U. Hofmann, Professor of Inorganic and Silicate Chemistry at the Technical University of Darmstadt, Germany, first gave a „Summary of Clay Mineral Studies in Germany, 1954-5“. In his discussion he made the following remarks:

Corryn and Lippmann have extended the work carried out in England on swelling clays by some investigations on Keuper clays.

Dietzel has succeeded in showing that the infra-red absorption band of kaolinite at 2.7 μ can be correlated with the two different kinds of (OH) groups in the structure.

The „fire-clay“ type of clay mineral has been found in Grossalmeroder clay by Lippmann and in Frantex clay and a clay from Province by von Engelhardt. In Frantex clay especially the layer sequence is highly disordered. Halloysite is distinguished from these minerals by its greater layer spacing and metahalloysite by its tubular morphology.

Winkler has studied the particle size distribution of numerous brick clays and has established that the material must have a certain proportion of fine and coarse clay and fine sand, but also a very smooth particle size distribution curve from the finest to the coarsest particles if the clay is to be suitable for thin-walled ware.

The clay mineral section of the Deutsche Keramische Gesellschaft tested various methods for quantitative clay mineral analysis. Some laboratories used the following methods: x-ray analysis, expansion analysis, d. t. a., dehydration curves, microscopic analysis and the determination of free silica by solution in phosphoric acid.

By the investigation of mixtures made up of the purest quartz, feldspat, halloysite, illite, kaolinite, montmorillonite and „fire clay“ mineral, the correct values were found for the most part within a few percent.

In the investigation of natural clays, greater differences were found, amounting to as much as 10%. Von Engelhardt especially investigated the errors arising with Geiger counter x-ray equipment.

M. Hofmann followed this discussion with another paper on „Inner Crystalline Swelling, Cation Exchange, and Anion Exchange of Minerals of the Montmorillonite Group“. In that paper he offered the following information:

The structural formulas were determined of very pure specimens of montmorillonite, beidellite, saponite, nontronite, vermiculite, and illite. The lattice perfection of these minerals and the nature and variation of their crystalline swelling depend in a significant way on the surface density of the exchangeable cations between the silicate sheets.

A neutral solution of NH₄F, OH ions were replaced by F ions. The exchange capacity is smaller the greater the diameter of the silicate layers of the various montmorillonite minerals. Since the anion exchange capacity of nontronite can be increased through oxidation of Fe³⁺, it is probable that the exchangeable OH ions are located on the boundaries of the octahedral layers.

With kaolinite, the cation exchange capacity decreases with increasing thickness of the crystal plates. In this case the OH ions of the basal surface can be exchanged with F ions which leads to the destruction of the lattice.

A one-dimensional Fourier synthesis of K-battavite, like the investigations of Walken on vermiculite and of Brown and also Mering on montmorillonite, provides confirmation of the structure and enables the lattice positions of the K ions to be determined.

H. van Olphen spoke on „Forces Between Suspended Bentonite Particles“. This paper was one which colloid scientists could not accept without entering into a serious discussion. In speaking of thixotropy the author claimed that the minimum concentration of a bentonite sol which would give a thixotropic system was well over 0.9% and that thixotropy must be classified as the start of coagulation. In the discussion which followed his presentation he was told that a thixotropic gel could be obtained already at a concentration of 0.05% clay. He was also told that thixotropy has nothing to do with coagulation at all and that a survey by him of the literature available might be advisable before making such statements as he did. He had based all his work on mathematics, rather than on experimental facts. He seemingly also did not realize that the type of counter ions present in bentonites must be taken into serious consideration.

G. T. Kerr, R. H. Zimmerman, H. A. Fox, Jr., and F. H. Wells offered a paper on „Degradation of Hectorite by Hydrogen-Ion“. They remarked:

Hydrogen (acid) hectorite-water sol was prepared using mixed-bed ion-exchange resins. At 25°C, the rate of change of concentration with respect to time was determined for the following species:

(a) primary and secondary hydrogen-ions,
(b) low-molecular weight, unassociated silicates,
(c) soluble, unassociated magnesium-ion.

The experimental data indicate that two consecutive first-order reactions are occurring: (1) primary