point of view we should expect to observe low Bouguer anomalies on calderas of the Krakatoa type and high Bouguer anomalies on calderas of the Glencoe type. Actually, the result of a gravity survey carried out on the Volcano Mihara[3] shows a high anomaly, amounting to about 15 milligals. This fact, and the low Bouguer anomaly observed on the Kuttyaro caldera, seem to justify the proposed geological classification based on the formation of the calderas, but the mechanism of subsidence or collapse is another problem which we regard as unsolved.

A full account of gravity surveys on several volcanoes in Japan will be published elsewhere.

This work is being continued while one of us (I. Y.) is studying at the Istituto di Fisica Terrestre, Università di Napoli.

We wish to thank Prof. C. Tsuboi, who encouraged us throughout the course of this work.

Izumi Yokoyama

Geophysical Institute,
Hokkaido University,
Sapporo.

Hirokazu Tajima

Earthquake Research Institute,
Tokyo University.

[1] Kuno, H., *Trans. Amer. Geophys. Union*, **34**, 267 (1953).
[2] Williams, H., "Calderas and their Origin", Univ. Calif. Pub. Bull. Dept. Geol. Sci., **25**, 239 (1941).
[3] Yokoyama, I., and Tajima, H., *Bull. Earthquake Res. Inst., Tokyo Univ.*, **35**, 23 (1957).

Measurement of the Flocculation of Suspensions

I have read with interest the communication by R. L. Whitmore in *Nature* of January 31, p. 313, on the development of a test which was introduced by Prof. Fahraeus in 1958.

We have been using this method for testing 'Oildag' (colloidal graphite in oil, Acheson Industries (Europe), Ltd.) dispersions since 1939, and have, in fact, developed a special apparatus which allows a roll of Whatman No. 4 filter paper to be folded into a pack of 25 or more papers. The 'Oildag' concentrate is diluted with *SBP*.3 fluid, poured into the reservoir and allowed to flow through under gravity. A typical 'chromatogram' obtained by this method is shown in Fig. 1.

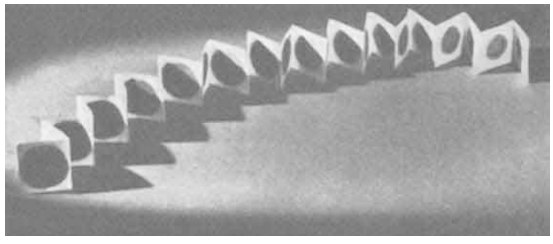

Fig. 1

I might add that we have supplied this test rig to people in many countries, as we found it a very easy method of distinguishing quickly between 'Oildag' and less stable dispersions of graphite in oil.

E. R. Braithwaite

Research and Development Department,
Acheson Colloids, Ltd.,
P.O. Box 12,
Plymouth. Feb. 9.

β-Type Interlamellar Sorption Complexes

In what we have called[1] the 'β-type' interlamellar sorption complexes of graphitic acid, the sorbed molecules are probably standing normally to the layers of the sorbate. The β-complexes with normal straight-chain amines, which we have been investigating, are particularly interesting, since they are formed over a complete range of chain-lengths.

Our new results are plotted in Fig. 1. Between 4 and 16 carbon atoms, the spacing rises linearly with the chain-length, and the slope of the line is 2·6 A. per carbon atom. This corresponds almost exactly to the projected length of two C—C single bonds, and indicates that there are two layers of sorbed molecules oriented normally to the sorbate layers. Fig. 1 shows a slight shift at 10 carbon atoms. We will not enlarge here on possible reasons for this.

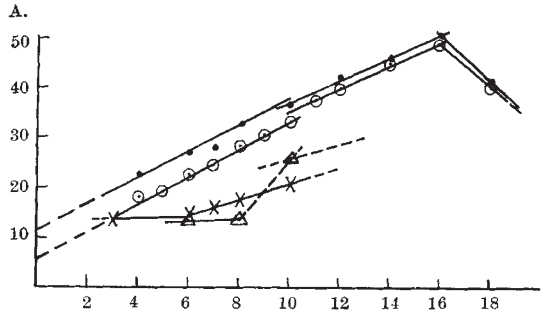

Fig. 1. Basal spacings plotted against chain-length of sorbed compound. ●, *n*-Amines with montmorillonite; ⊙, the same with graphitic acid; △, diamines with montmorillonite; ×, diamines with graphitic acid. Note that the diamines give half the slope of the *n*-amines, corresponding to only one layer of molecules

The actual value of the layer separation is, however, too low to accommodate two fully extended molecules. It seems necessary to assume, therefore, either that the free ends of the molecules overlap (to the same extent in each complex) or that the first two or three terminal carbon atoms, next to the amine group, are in contact with the sorbate layer, the rest of the molecule being turned around at right-angles. The last-mentioned supposition seems to us the more probable.

Beyond 16 carbon atoms, the spacing drops again, and this must apparently correspond to a tilting of the molecules. Unfortunately, only one amine in this range (octadecane-1-amine) was available to us.

We were rather surprised to find that completely analogous results are given by montmorillonite (upper graph of Fig. 1). These results are, however, not really in contradiction with those of Jordan[2], who found a flat orientation of long-chain amines, since in his case the amines were in ionic form, and in

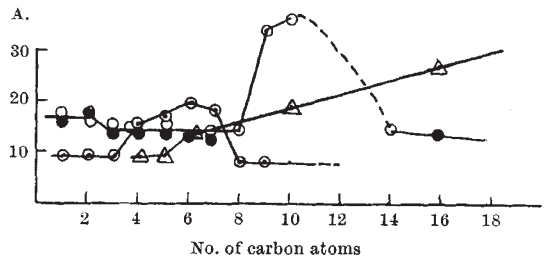

Fig. 2. As Fig. 1. ○, *n*-Alcohols with montmorillonite (Barshad); ●, same (MacEwan); ⊙, same with graphitic acid; △, glycols with graphitic acid