The equatorial plane of the sphere will appear projected as the stereographic primitive circle. The diameter of the primitive will be twice that of the sphere if the sphere rests directly on the table; if the sphere be raised, the diameter of the primitive increases but the resulting projection is still a valid stereographic one.

In use a plane may be selected using the board; this plane is then depicted simultaneously by two projections: as a great circle on the sphere, outlined by the wire attached to the board; and as a great circle on the paper—the stereographic projection of the circle on the sphere. Illustration of the change in form of the stereographic arc with changing inclination of the plywood plane is both convincing and dramatic. Further applications will be self-evident.

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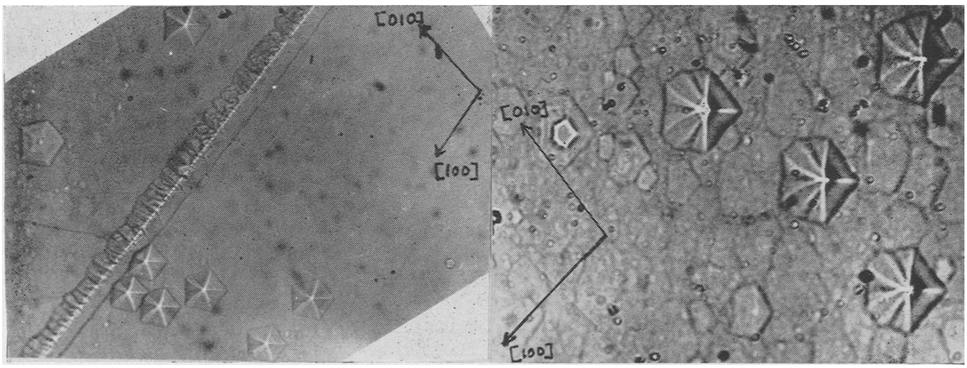
Effect of concentration of etchant on the shape of etch pits on cleavage faces of calcite

SEVERAL workers have reported the study of etch phenomena on calcite cleavages (e.g. Honess, 1918; Pfefferkorn, 1952; Bengus *et al.*, 1960; Keith and Gilman, 1960; Pandya and Pandya, 1961). The present communication reports some typical observations on the effect of concentration of etchant on the shape of etch pits on calcite cleavages.

Freshly cleaved rhombohedra of calcite were immersed in a still, dilute solution of A.R. quality hydrochloric acid in distilled water. The etching time was varied from 1 sec to about 5 min to get sharp, well-defined etch pits. The etched surface was thoroughly washed in distilled water and dried. For microtopographical studies of surfaces, thin silver films were deposited on them by thermal evaporation.

It was observed that the shape and symmetrical nature of the etch pits with respect to the vertex of the conical pits were functions of concentration of hydrochloric acid, time of etching, and temperature. Fig. 1 is a photomicrograph of a rhombohedral cleavage etched by 0·6 % HCl solution for 10 sec. It shows five-sided etch pits, the faces of which meet at a point at the deepest part of the pit. The faces of the pits are almost equally inclined to the cleavage surface. The linear group of etch pits has the direction [100]. Each of the four pits in the lower left-hand quarter of the figure has two closely spaced edges. The line joining the ends of the inward edges of these pairs lie in the direction [1$\bar{1}$0]. Such closely spaced edges are observed in a few pits that are not terraced and have faces meeting at a point. The terraced pit near the left-hand edge is devoid of such closely spaced edges. Fig. 2 shows a photomicrograph of seven-sided pits produced by etching the cleavage surfaces with 0·25 % HCl solution for 15 sec. This change in the shape of the pit is only due to the change in the concentration



Figs. 1 and 2: Fig. 1 (left). Five-sided etch pits on a cleavage surface of calcite etched with 0·6 % HCl; etched boundary in the direction [100] (×170). Fig. 2 (right). Seven-sided etch pits on a cleavage surface of calcite etched with 0·25% HCl (×230).

of the etchant and not to the change in time of etching. As a matter of fact, the authors were able to observe three-sided, four-sided, five-sided, and seven-sided pits on the cleavage faces by using 40–20 %, 1·5–2·5 % or 0·01–0·1 %, 3–10 % or 0·4–1 %, and 0·2–0·4 % acid respectively. In some cases time of etching is also an important factor in determining pit shape. Six-sided pits were observed by etching the cleavage surface in 1 % glacial acetic acid for 30 sec. With the range of concentrations of the etchant stated above, all these plane geometrical figures on the cleavage can be made regular or irregular, thereby giving rise to different types of quadrilaterals, pentagons, etc. The depth-point where the different faces of the conical pits meet also shifts its position in the upward or downward direction [110], or on either side of it. Thus with a suitable concentration of etchant the plane figures of the pits on the cleavage surface may be regular but the various planes within the pits may not be equally inclined to the cleavage surface, thereby giving rise to asymmetrical conical depressions, with depth-points not coinciding with the geometrical centres of the plane figures.

It is hard to explain the occurrence of asymmetrical pits of various shapes only on the basis of the rhombohedral structure of calcite. A comprehensive report is under preparation and will be published elsewhere.

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The melting points of synthetic apatites

THE melting points of six synthetic apatites were determined with a hot-stage microscope. The construction and operating principles of this apparatus have been described by Somer *et al.* (1964, 1966).

The sample weight used for the determination was between 100 and 200 g; it was first ground to a fine powder in a small agate mortar and mixed with a drop of ethyl alcohol to form a thick slurry, which was then transferred to the thermocouple; this was made of a Pt-6 %Rh–Pt-30 %Rh alloy, a combination chosen for its excellent temperature-emf characteristics. The melting points were all determined in air by two workers, and the thermocouple used throughout the investigation was checked at the liquidus temperature of lithium sulphate, 865 °C. The result obtained confirmed that no 'poisoning' of the thermocouple had occurred, and the melting points are accurate to within ± 5 °C. The temperature gradient, observed in the sample at the melting point, was about 5 °C at 1600 °C.

The results obtained were: $Ca_{10}(PO_4)_6(OH)_2$, 1614, 1614 °C; $Ca_{10}(PO_4)_6Cl_2$, 1612, 1612 °C; $Ca_{10}(PO_4)_6F_2$, 1615, 1622 °C; $Ca_{10}(PO_4)_6F_{0{\cdot}554}Cl_{1{\cdot}446}$, 1615, 1614 °C; $Ca_{10{\cdot}4}(PO_4)_6F_{1{\cdot}449}Cl_{0{\cdot}579}$, 1608, 1608 °C; $Sr_{10}(PO_4)_6(OH)_2$, 1670, 1670 °C.

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