(6) A skew molecule in which there has been rotation of the $\text{Ph} - \dot{\text{C}} = \text{O}$ groups out of the plane configuration about the central single bond only, each phenyl group being co-planar with the adjacent $-\dot{\text{C}} = \text{O}$ atoms.

(7) A skew molecule in which, in addition to the rotation about the central single bond, there has also been symmetrical rotation of the phenyl groups about their single bonds.

The investigation of possible crystalline structures based on skew molecules of types (6) and (7) is, unfortunately, both long and tedious, and is not yet complete. The elimination of the simpler molecular structures shows, however, that the molecule must be of such a skew type, in which case it can of course exist in a right-handed or a left-handed form. The crystals will contain spirals of oxygen atoms somewhat similar to those found in quartz. The optical rotatory power of crystalline benzil is even larger than that of quartz.

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¹ NATURE, 143, 803 (1939).

² Allen, N. C. B., *Phil. Mag.*, 3, 1037 (1927).

³ *Indian J. Phys.*, 11, 409 (1937).

Preparation of Grease-free Polished Surfaces

POLISHED surfaces of metals and minerals, completely free from grease, are frequently required for scientific purposes. Adam¹ has discussed the difficulties encountered in their preparation, and the complications that ensue, for example, in electron diffraction work, if there is a surface film of grease. Del Giudice^{2,3} and Wark and Cox^{4,5} have discussed the matter from another point of view. The four main sources of contamination in polishing mineral or metal specimens are: (1) the polishing materials, that is, the abrasives and the laps of soft metal or cloth; (2) grease from the fingers used to hold the specimen during polishing or in otherwise handling it; (3) the water under which the mineral is polished and stored before use; and (4) air-borne grease.

The abrasives can be cleaned by ignition, but the polishing cloths present greater difficulties, because of a film of grease acquired during weaving. In this Laboratory, the cloth is refluxed with benzene for some hours, next boiled for three hours with 4 per cent caustic soda solution, and finally boiled in several changes of distilled water until the alkali is removed. Thereafter the cloth is kept under water.

To prevent contamination from the fingers, the operator should wear surgical rubber gloves or finger stalls, cleaned thoroughly in a fresh chromic acid-sulphuric acid mixture. Though contamination from the sides of a specimen is rare, because of the lack of mobility of most adsorbed films, it is a wise precaution to grind, under water, all faces of the specimen. After polishing, the specimen should be handled, face downwards, by cleaned glass forceps: it should never be allowed to dry.

Contamination by air-borne grease is prevented by conducting the polishing operations on wet polishing cloths, using a liberal supply of abrasive. The abrasives and finely divided metal or mineral that

tend to cling to the specimen (del Giudice³ and Wark⁹) may be removed by wiping the surface with a pad of cleaned linen tied over the flattened end of a glass rod. In this Laboratory, aluminium oxide abrasive has been used for the final step in polishing: its known adsorptive power (upon which depends its use in vitamin extraction processes) tends to take care of any surface-active contaminants that find their way into the system. Freshly ignited magnesium oxide is a more rapid polishing agent, but because of its alkalinity it is unsuitable for some purposes.

A sensitive test for contamination is available. With the polished specimen still under water, a small bubble of air is brought into juxtaposition with the surface and pressed against it for a few minutes. In the absence of a grease film, the bubble will not spread, and comes away cleanly when it is raised. A still more stringent test is obtained by using a drop of grease-free benzene or 'Nujol' in place of the bubble of air. A convenient apparatus for these tests has been described by Taggart, Taylor and Ince¹⁰ and by Wark and Cox⁴; but if isolated tests only are required a simpler form could be used.

The readiness of contamination by water or the atmosphere is obviously dependent upon location. Taggart⁶ states that the New York water supply contains sufficient iron, and Talmud and Lubman⁷ state that the Moscow supply contains sufficient calcium, to alter the surface reactions of quartz. Distilled water, while free from dissolved salts, is usually found to be less free from grease.

The readiness of contamination from the atmosphere and/or the water supply is well illustrated by difficulties encountered in this Laboratory following severe bush-fires in the catchment area for the Melbourne water supply, distant about fifty miles from the city. Clean specimens could not be obtained for several days. Within a week, the difficulty disappeared for pyrite and calcite, but it was almost a month before clean specimens of chalcopyrite were consistently obtained. It is possible that the inability of some Continental investigators to obtain clean surfaces—judged by the bubble test—is due to their having to work with atmosphere or water always contaminated by some local industry.

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¹ Adam, N. K., "The Physics and Chemistry of Surfaces" (second edit., Oxford, 1938), 174.

² del Giudice, G. R. M., *Eng. and Min.*, 137, 291 (1936).

³ del Giudice, G. R. M., *Trans. Amer. Inst. Min. and Met. Eng.*, 112, 424 (1934).

⁴ Wark, I. W., and Cox, A. B., *Eng. and Min. J.*, 137, 641 (1936).

⁵ Wark, I. W., "Principles of Flotation", (Melbourne, 1938), 74.

⁶ Taggart, A. F., private communication.

⁷ Talmud, D., and Lubman, N. M., *Koll. Z.*, 50, 159 (1930).

⁸ del Giudice, G. R. M., *Trans. Amer. Inst. Min. and Met. Eng.*, 112, 398 (1934).

⁹ Ref. 5, p. 299.

¹⁰ Taggart, A. F., Taylor, T. C., and Ince, C. R., *Trans. Amer. Inst. Min. and Met. Eng.*, 87, 217 (1930).

Lamellar Structure of Potash-Soda Felspars

IN an extremely interesting paper, Ito¹ has recently described the results of an X-ray examination of a Korean moonstone which he assumes to be similar to a specimen (described by E. Spencer²)