or "gel" of its own composition, or by devitrifying a glass of the correct composition were always unsuccessful. When the completely melted and quenched stoichiometric mixtures (having a $BaTiSi_3O_9$ composition) were treated hydrothermally above about 965° C. at 5000 psi water pressure and only as long as 4 hours, benitoite was not observed as a stable phase. In all cases the *x*-ray pattern indicated mainly the presence of the compound $BaTiSi_2O_7$ with tridymite appearing only in the longer runs. At temperatures below 965° and at 5000 psi however, these same mixtures converted readily to a crystalline phase having an *x*-ray diffraction pattern identical to that of the natural benitoite. Furthermore, it was possible to obtain the benitoite pattern from mixtures slightly off the stoichiometric composition. In the latter case, the patterns for both benitoite and the compound $BaTiSi_2O_7$ were obtained thus indicating that equilibrium had been attained since these appear to be the stable phases at these temperatures as determined in the study of the system $BaTiO_3$-SiO_2. It appears therefore that the maximum stability temperature of benitoite as determined hydrothermally is about 100° lower than the apparent maximum under dry conditions, a situation not uncommon in hydrothermal literature and one which might well be expected. Although benitoite can be synthesized quite easily by a hydrothermal devitrification process, in no case was it possible to obtain any indication of its presence from the initial sintered oxide mixtures even when treated at temperatures and pressures known to favor the synthesis.

Thus we have been able to synthesize benitoite hydrothermally and to fix its upper stability limit as $965° \pm 10°$ C. at 5000 psi.

References

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FAULTS IN GYPSUM ACCESSORY PLATES

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It may not occur to some petrographers to question the accuracy of the engraving on an accessory plate, unless they begin to get anomalous results. A beginning student may not even realize that his results are anomalous. Our experience suggests that all such plates should be closely inspected when received from the manufacturer or from overhaul.

In 1951 a new gypsum full-wave plate was received with a microscope returned from factory overhaul. Although the plate was given a brief visual inspection, only during subsequent use was it discovered to have an interference color in deep blue instead of magenta. Investigation revealed that the plate was actually gypsum, oriented in the correct way, but of too great a thickness. The plate was also found to have its fast direction at an angle of 18° with the edge of the holder. Further tests on our seven other plates showed a maximum angle of 8°, with an average of 3 degrees. All these plates are from the same manufacturer, who states that the inspection tolerances are:

Retardation—535 ± 15 mμ,
Orientation—fast ray parallel to edge of plate within ±1°.

Of course the manufacturer graciously replaced the defective plate, and the new plate was found to have a satisfactory thickness, and parallel extinction. Unfortunately, and almost incredibly, the parallel extinction was found later to be slow instead of fast, in other words, the plate with an 18° deviation had been replaced with one of 90°.

According to Wright (1911, p. 133) the orientation of the plate does not impair its usefulness in determining the extinction position, in fact the optimum orientation is almost parallel to the nicols. Furthermore, the small deviations make no difference in work with interference figures. However, in determining whether the elongation of a crystal is nearest to the slow or fast ray ("sign of elongation"), a deviation of the plate as large as 18°, or even 8°, might give wrong answers for minerals of large extinction angle. Of course the deviation of 90° should soon be noticed by even a poor student.

REFERENCE

WRIGHT, F. D. (1911), The Methods of Petrographic Microscope Research: *Carnegie Inst., Publ.* 109.

THE DIAMOND TOOL INDUSTRY IN 1954

This is the 10th successive report in this series on the Diamond Tool Industry. It is divided into 18 sections, for instance, scientific aspects, hardness and microhardness, surface finish testing, fine boring and turning, truing of grinding wheels, etc. In each of these sections it is referred to outstanding work published during 1954 and in some instances also to publications in 1953. The publication of 12 pages contains about 200 references. The literature referred to in this report can be obtained on loan, in England only, on application to: the Industrial Diamond Information Bureau, St. Andrew's House, 32-34 Holborn Viaduct, London, EC 1.

The American Crystallographic Association will hold its annual meeting on the campus of the California Institute of Technology, Pasadena, California, during the week of June 27, 1955.