factor for the $SiAl_1$ tetrahedron and the $SiAl_1$–O and O–O distances are larger than those of the second tetrahedron although the differences are not sufficiently large to indicate ordering of tetrahedral aluminium (Smith and Bailey, 1963). The basal oxygen triads are rotated 13°.

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Two staining tests for brucite in marble

IN a white or light grey marble brucite can be distinguished from the matrix minerals by staining. The traditional test for brucite in a marble is the Lemburg test, which involves dehydrating the brucite by heating the rock sample at 400° C for 30 minutes then immersing the sample in a solution of silver nitrate. The brucite is thus stained brown. Any method that involves heating is impracticable in the field or on mounted thin sections.

Two methods that can be used without heating have been developed; they use readily prepared reagents and are very easy to perform.

Alkali-hypoiodite test. Brucite is stained brown by adsorbed iodine in this technique; calcite and dolomite remain unstained. This brown is virtually permanent, fading only after a period of days. The reagents are:

Solution A. *N* potassium hydroxide, i.e. 56 g KOH per litre of distilled water.

Solution B. *N* iodine in 20 % potassium iodide solution, i.e. 127 g I_2 per litre of 200 g KI/litre aqueous solution.

On a freshly broken surface of the 'marble' place one drop of solution A (colourless solution). When this has soaked in (only a few seconds need elapse) add 2 or 3 drops of solution B (brown solution) on the same spot. If the brown colour disappears at this stage, add another drop of B. Leave this brown solution on for at least 15 seconds then add solution A dropwise until the liquid on the rock is colourless, the iodine in solution having reacted with the alkali solution. If brucite is present, a brown flecking remains on the sample. If the grains of brucite are finely divided and well disseminated, the brown flecking might appear as an over-all stain, but this can be resolved to individual specks when viewed under a hand-lens. This method is based on that in 'Spot tests in inorganic analysis', F. Feigl, 1958, p. 223, which is put forward as a test for magnesium but is directly applicable to magnesium hydroxide.

Alizarin Red S. This method exploits the ready solubility of calcite in dilute hydrochloric acid compared with the virtual insolubility of dolomite in the same acid. The calcite dissolves, releasing Ca^{2+} ions, which react with the Alizarin Red S reagent to produce a pink colour, the intensity of which depends on the length of time of staining. The dolomite does not react, while brucite, with its OH groups, is stained purple (the colour of alkaline solutions of Alizarin Red S) in quite a strong contrast to the pink calcite.

Reagents: 1:20 HCl, 0·2 % HCl (i.e. 2 ml conc.HCl/1 l), and 0·2 % Alizarin Red S in 0·2 % HCl.

Method. Etch the polished surface of the thin section or slice for 3–5 seconds with 1:20 HCl, wash with water or remove acid with an absorbent paper tissue. Apply 0·2 % Alizarin Red S solution dropwise over the etched area. Leave the reagent on until a strong pink colour has developed on the calcite, then *carefully* wash the sample with distilled water and allow it to dry at ambient temperature. View under $\times 10$ magnification preferably by reflected light, showing the contrast of pink calcite, purple brucite, and unstained dolomite. Note that the stain on the calcite is a surface layer only and, if the washing after staining is not carried out with some care, the stain will be rubbed off.

The use of Alizarin Red S as a stain for carbonate minerals is mentioned by Mitchell (1956) and Sainsbury (1965).

The alkali–hypoiodite method is more suited to brucite marbles in lump form because the brown iodine colour becomes more apparent the thicker the grain of brucite: in a thin section only a faint yellow colour develops. With finely divided brucite, even in a lump of rock, the

'bleaching' action of the alkali solution may remove the iodine in the brucite as well as the colour of the reagent solution. However, if an excess of the alkali solution is avoided when applied to remove the iodine in solution even very fine brucite will retain its stain. The reagents can be applied directly to a freshly exposed surface when in the field.

The Alizarin Red S test, which involves a reaction between calcium ions and the reagent, produces a red precipitate floating in the reagent solution. On a rough rock surface this could flow into pits and produce confusing results with apparent calcite where none exists. Thus this test is best confined to thin sections or polished slices. A technique found particularly useful by the writer has been to cover only half the slide by a cover slip, then the section is preserved for use with normal petrological techniques as well as providing a surface for applications of stains.

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A rotatable microscope slide ring holder for petrographic analysis

TRAVERSING of a thin section in petrographic analysis is normally effected with a mechanical stage and in petrofabric analysis with a universal stage. Neither of these stages easily accommodates thin sections on slides of uncommon dimensions or even accepts the larger sizes. Moreover, when accommodation is possible, traversing directions are invariably parallel to slide edges, regardless of whether the slide is held in a mechanical stage or in a sledge of a universal stage. The ring holder device described here was designed to overcome these limitations by