

Harrison's petrographical determinations demonstrated that, among the various products of weathering of igneous rocks (comprising bauxite, primary laterite, red earths, quartzose sands and kaolins), only those that contained identified gibbsite gave positive evidence of the presence of free alumina by the alizarin test. Hence it is concluded that gibbsite is the chief and perhaps the only form in which free alumina occurs in certain of these products. Being crystalline, gibbsitic alumina presumably cannot contribute to the colloidal attributes exhibited by certain tropical soils, although hydrous iron oxides that usually accompany it may so contribute.

Further evidence of the presence of free gibbsitic alumina in bauxites, laterites and lateritic soils, and its absence from most tropical red earths and kaolinitic earths, has been since obtained by determinations of heats of wetting. Whilst most natural soils yield heat of wetting values commensurate with their degree of colloidal, the values given by the ignited soils are small or negligible. Exceptions to this generalisation are presented by gibbsite, bauxites, laterites and lateritic earths containing gibbsite, and by various types of hydrous alumina, all of which exhibit relatively large heat of wetting values after ignition, though not necessarily before ignition. Thus, values ranging from 15 to 20 cal. per gm. have been obtained for ignited gibbsite and highly aluminous bauxites and laterites, whilst many red soils, usually designated 'lateritic', gave very much lower values, and most kaolinitic and bentonitic types of soil gave negligible values after ignition. Thus the heat of wetting test may furnish a simpler and more rapid alternative method than the alizarin test for detecting free alumina in the products of rock weathering and soils. Detailed results for a series of selected soils and other materials are being compiled for publication. F. HARDY.

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¹ Studies in Tropical Soils. (1). Identification and Approximate Estimation of Sesquioxide Components by Adsorption of Alizarin. F. Hardy, *J. Agric. Sci.*, 31, 150-166; 1931.

² Studies in Tropical Soils. (2). Some Characteristic Igneous Rock Soil Profiles in British Guiana, South America. F. Hardy and R. R. Follett-Smith, *ibid.*, pp. 739-761.

³ The Katamorphism of Igneous Rocks under Humid Tropical Conditions. Sir John Harrison, *Imp. Bur. Soil Sci.*, Rothamsted Expt. Sta., June 1934, pp. 1-79.

Crystal Structure of the Alums

WE have been able to determine the complete crystal structure of the alums.

The magnitudes of the F 's corresponding to the various (hko) planes were found from X-ray rotation photographs, using the measured F 's of Cork¹ as a guide. The signs of the F 's were found from a photographic comparison of reflections from $KAl(SO_4)_2 \cdot 12H_2O$, $KCr(SO_4)_2 \cdot 12H_2O$ and $KAl(SeO_4)_2 \cdot 12H_2O$, and on carrying out a double Fourier synthesis, we were able to arrive at a structure which satisfies all intensity considerations, and at the same time all requirements of distances.

The structure is a very beautiful one. Half the waters are grouped round the potassium atoms in such a manner that they also have contacts with two oxygens and one of the aluminium waters. These four contacts are arranged approximately tetrahedrally. The remaining half of the waters form regular octahedra around the aluminiums, and each of these waters makes external bonds with one oxygen and one potassium water. We find that these

two bonds and the one from the water to aluminium itself are almost exactly coplanar.

The behaviour of the waters in alum is, therefore, in accordance with the behaviour of water in other hydrated crystals, and with the theoretical model of Bernal and Fowler².

The details of the structure are as follows:

Al on (000), etc., K on ($\frac{1}{2}\frac{1}{2}$), etc.,
S on (.31 .31 .31), etc., O on (.24 .24 .24), etc.
O on (.30 .27 .43), etc.

H₂O on (.04 .13 .30), etc., and (.02 .02 .16), etc.

These parameters mean that the large peak in the Fourier projection in planes parallel to (111) obtained by Cork is due to the coincidence of a number of oxygens and waters, and the real sulphur peak is the smaller one at $\theta = 80^\circ$ in his diagram³.

We hope to publish a more complete account of the structure elsewhere.

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¹ Cork, *Phil. Mag.*, 4, 688; 1927.

² Bernal and Fowler, *J. Chem. Phys.*, 1, 515; 1933.

³ *Loc. cit.*, p. 694.

Some Experiments on Heavy Water

THE following results have been obtained with water containing 4-5 per cent H₂O.

(1) By crystallising sodium sulphate, normal and heavy water are divided practically equally in the water of crystallisation and the solution.

(2) Diethyl ether dissolves, within this range of concentration, at equilibrium, normal and heavy water in equal quantities. On the other hand, if ether drops are allowed to rise through such water and to dissolve in this manner mainly water out of the interfaces water-ether, then the interfaces prove to be enriched in heavy water.

(3) The compound KH₂PO₄ does not interchange its hydrogen atoms in this solution.

(4) The compound [Co(NH₃)₆](NO₃)₃ (stable to concentrated nitric acid) interchanges all its 18 hydrogen atoms in this solution. Crystals of the compound in equilibrium with the solution at 0° C. do not interchange their hydrogen atoms.

Full descriptions of these experiments will be published in *Helvetica Chimica Acta*.

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Lost Fragrance of Musk

APROPOS the statement made in NATURE of July 14, p. 54, that the lost scent of musk (*Mimulus moschatus*) was first noticed in Britain in 1909—an oft-quoted statement—I think the following reference ought to be put on more permanent record. Mr. Thomas Wilkinson, a native of Lancashire, now a Fifeshire farmer, some sixty years ago began growing musk for the Liverpool market. He soon had a monopoly of the trade and sold 5,000 plants a week during the months of May. In 1898, he stated, he noticed the plants began to acquire a rank, leafy smell, and at the end of the summer he sold his business. Four years later he returned to Liverpool and found the musk plants then on sale scentless.

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