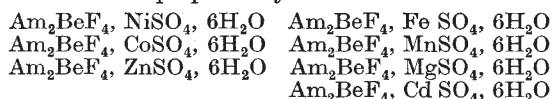


Department of this Laboratory, has been studying the relationship of chemical homology and mixed crystallisation, and starting from Langmuir's theory of 'octets', came to the conclusion that isoelectric isosteres should exhibit close relationship in chemical and physical properties.

Transport experiments showed that the so-called double fluorides of beryllium and ammonium or potassium are really complex salts having  $\text{BeF}_4$  as a bivalent anion, though partially dissociated into  $\text{Be}^{++}$  and  $4\text{F}^-$ .  $\text{BeF}_4^{--}$  is isosteric and isoelectric with  $\text{SO}_4^{--}$ , having 5 atoms and 32 peripheral electrons, the valences of beryllium and sulphur being 4 in each case. Molecular volumes of  $(\text{NH}_4)_2\text{BeF}_4$ ,  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{K}_2\text{BeF}_4$ , and  $\text{K}_2\text{SO}_4$  are found to be very closely alike. They form mixed crystals in all proportions. Further, the constituent ions, namely,  $\text{S}^{++++}$  and  $\text{Be}^{++}$ , as well as  $\text{O}^-$  and  $\text{F}^-$ , have identical ionic radii as determined by v. Goldschmidt.

Regarding mixed crystallisation of two chemical species, which entails equality of molecular coefficients, thermal and elastic, as the best criterion of chemical analogy, Dr. Sarkar has prepared the following double salts:  $\text{K}_2\text{BeF}_4$ ,  $\text{NiSO}_4$ ,  $6\text{H}_2\text{O}$ ;  $\text{K}_2\text{BeF}_4$ ,  $\text{ZnSO}_4$ ,  $6\text{H}_2\text{O}$ ;  $\text{K}_2\text{BeF}_4$ ,  $\text{CoSO}_4$ ,  $6\text{H}_2\text{O}$ ;  $\text{K}_2\text{BeF}_4$ ,  $\text{CuSO}_4$ ,  $6\text{H}_2\text{O}$ , which are monoclinic and isomorphous with the well-known double sulphates of potassium and those of the magnesium family of elements studied by Locke. Curiously enough, potassium sulphate forms only the above four double salts, whereas with the double fluoride of ammonium and beryllium,  $\text{Am}_2\text{BeF}_4$ , the following isomorphous double salts have been prepared by Dr. Sarkar:



Here also the only missing one is that of copper, as was observed by Locke with  $\text{Am}_2\text{SO}_4$ .

In the above examples,  $\text{BeF}_4^{--}$  has partially replaced  $\text{SO}_4^{--}$ . Dr. Sarkar has also succeeded in isolating a series of double salts in which  $\text{SO}_4$  ions have been completely replaced; for example,  $\text{Am}_2\text{BeF}_4$ ,  $\text{NiBeF}_4$ ,  $6\text{H}_2\text{O}$ , perfectly isomorphous with the aforesaid series. Further corroborative evidence of the analogy is afforded by the preparation of the following alums:  $\text{Am}_2\text{BeF}_4$ ,  $\text{Al}_2(\text{SO}_4)_3$ ,  $24\text{H}_2\text{O}$ , and  $\text{Am}_2\text{BeF}_4$ ,  $\text{Fe}_2(\text{SO}_4)_3$ ,  $24\text{H}_2\text{O}$ .

By fusion of barium chloride with  $\text{Am}_2\text{BeF}_4$ , Dr. Sarkar has isolated crystalline  $\text{BaBeF}_4$  corresponding to crystalline  $\text{BaSO}_4$ . The crystallographic constants of the double salts are found to be very close to those of the double sulphates studied by Tutton.

A detailed account of the investigation will appear in a forthcoming issue of the *Journal of the Indian Chemical Society*.

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**Origin of Nor'westers.**

DURING spring and summer Bengal is occasionally visited by a type of severe thunderstorms locally known as the *Kal-Baisakhi*, or the 'fateful thing' of the month of *Baisakh* (April 15–May 15). These storms usually approach a station from the north-west and burst suddenly with great fury. The path of a nor'wester may vary in width from a few hundred feet to a mile, and the distance overrun seldom exceeds 50 miles. These storms are more frequent in the late afternoon, although they are known to occur also at

other times of the day. A nor'wester is always associated with a thunder-shower, and the precursory signs of its approach are the same as those which herald the coming of a violent thunderstorm.

During last summer one of us (G. Chatterji) led an expedition to south Bengal to study the upper air conditions associated with nor'westers. On three occasions it was possible to collect some information from soundings by Dines and Chatterji meteorographs. A typical height-temperature graph obtained on one occasion just before the passage of a storm is reproduced in Fig. 1. It appears that the nor'wester type of thunderstorms originates through the overrunning of a warm moist southerly or south-westerly wind by

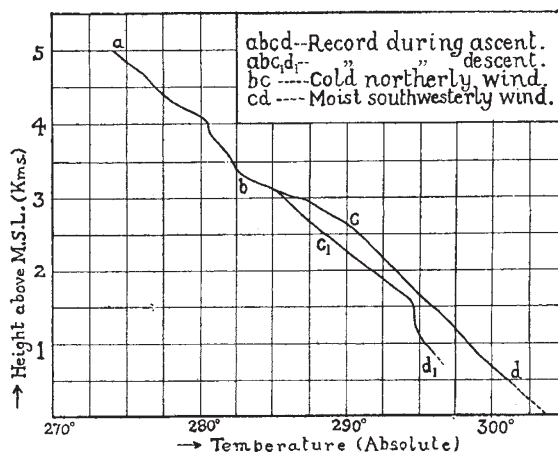


FIG. 1.—Upper air soundings over Jhikargacha, Bengal, on May 17, 1929, at 17 hr. 35 m. L.S.T., just before a nor'wester.

a westerly or north-westerly cold air with a high lapse rate. In the present case the cold air overran the moist air at 2.7 km. and extended to 3.3 km. The air in this layer had a superadiabatic lapse rate of 12° C. per km. while the air underneath was almost saturated and had a lapse rate of 5° C. per km. On all the three occasions the 'overrunning' took place in the south-eastern quadrant of a low pressure area which developed a 'wind-shift line' more or less defined.

Thus the general conditions under which nor'westers occur in Bengal appear to be exactly similar to those giving rise to 'tornadoic' thunderstorms in the Mississippi Valley of the United States of America (Humphreys, "Physics of the Air", p. 344). Upper air soundings on nor'wester days show that there is a marked increase in the absolute humidity of the southerly current from the Bay of Bengal in the afternoon. This probably explains why the nor'wester type of thunderstorms is more frequent during the afternoon than at any other hour of the day.

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**Control of Diseases and Weeds in a Forest Nursery.**

SINCE 1920 seedling diseases caused by *Corticium Solani* Bourd. and Galz. and *Botrytis* sp. have done considerable damage in the Ministry of Agriculture's forest nursery at Baronscourt, County Tyrone. The attack has involved the two species Sitka spruce (*Picea Sitchensis* Carrière) and Douglas fir (*Pseudotsuga Douglasii* Carrière).