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ART. XIX.—*Description and Analysis of Pickeringite, a native Magnesian Alum;* by AUGUSTUS A. HAYES.

THIS mineral occurs in masses, which are composed of long parallel fibres, easily divisible, and generally affords rhombic prismatic forms. There are numerous cross-fissures, and the fracture at these is even. Transparent to translucent, having the satin-like lustre of the finest specimens of satin spar, which it much resembles. Color white, but when viewed in the direction of the fibres, pale rose red, or a delicate green. Taste, like that of alum. Sp. gr. 1·78 to 1·80. In dry air it effloresces, in moist air it attracts water, and the fibres become flexible. It is soluble in cold water, without residue, and the solution has an acid action.

By chemical analysis, it affords

Water of crystallization, ...	45·450
Sulphuric acid, ...	36·322
Alumina, ...	12·130
Magnesia, ...	4·682
Protoxides of manganese and iron, . .	0·430
Lime, ...	0·126
Hydrochloric acid, ...	0·604
Loss, ...	0·256
	100·000

Neglecting the substances, evidently existing in the state of mixture with the double salt of alumina, its chemical formula is

$$\dot{\mathrm{M}}\mathrm{g}\,\dddot{\mathrm{S}}+\dddot{\mathbf{A}}\mathrm{l}\,\dddot{\mathrm{S}}^{3}+22\dot{\mathbf{H}}.^{*}$$

In the analysis, bicarbonate of ammonia was used for precipitating the alumina and retaining the larger part of the magnesia, in solution with the sulphuric and hydrochloric acids. The precipitate was ignited, so long as it lost weight; it was then redissolved in strong nitric acid, and its solution was decomposed by a large excess of potash solution. The hydrates, insoluble in a

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[*] The water in the above analysis approaches so near 24 atoms, that this is probably the amount contained, in which respect it will then conform to the general formula for the alums, $\dot{\mathrm{R}}\,\dddot{\mathrm{S}}+\dddot{\mathbf{A}}\mathrm{l}\,\dddot{\mathrm{S}}_{3}+24\dot{\mathbf{H}}$. The exact formula would be $(\dot{\mathrm{M}}\mathrm{g},\dot{\mathrm{M}}\mathrm{n},\dot{\mathrm{F}}\mathrm{e})\,\dddot{\mathrm{S}}+\dddot{\mathbf{A}}\mathrm{l}\,\dddot{\mathrm{S}}_{3}+24\dot{\mathbf{H}}$, which, excepting the iron, is identical with that of an African alum analyzed by Stromeyer. (See Rammelsberg's Handwörterbuch, &c. Vol. I, p. 10; also Dana's Mineralogy, 2d edition, 1844, p. 554.)—EDS.

boiling solution of caustic potash, were redissolved in hydrochloric acid; the lime was combined with oxalic acid and separated. A solution of chlorine in carbonate of soda removed manganese and alumina, leaving only magnesia in solution. The small quantity of magnesia was estimated as an ammonia phosphate.

The solution containing an excess of bicarbonate of ammonia was boiled, and thus rendered slightly acid. Nitrate of silver removed the chlorine of the hydrochloric acid, as chloride of silver; neither iodine or bromine could be detected. On rendering the fluid acid, by hydrochloric acid, the silver was separated, and hydrochlorate of baryta separated the sulphuric acid, as a pure sulphate of baryta. By an excess of sulphuric acid and evaporation, the baryta was precipitated, and the clear solution of saline matter was slowly reduced to a dry mass. By heating with the usual precautions, a light gray anhydrous sulphate of magnesia was obtained, from the weight of which, the weight of the magnesia was calculated and added to that precipitated with the alumina. By warm water, some flocks of ferruginous oxide of manganese had been separated from the dry saline matter; these were added to those from the alumina, and all converted by heat into the red oxide, from which the weights of protoxides were calculated. For determining the quantity of water contained in the mineral, a part of the fragments used in the above analysis, and weighed from the same state of dryness in air at 84° F., was chosen. Fifty parts contained in a tube retort, connected with a vessel of ammoniacal solution, were heated slowly and uniformly. The porous mass lost 22·625 parts, and the ammonia had received 0·268 of hydrochloric acid. On heating the mass till vapors of sulphuric acid were disengaged, the loss was 23·310. The sulphuric acid weighed, in the state of sulphate of baryta, 0·287 parts, which, with 0·268 of hydrochloric acid, give ·585 of acids, which were deducted from the total loss of weight due to heating. This mineral generally contains phosphoric acid, which in part replaces the sulphuric acid. It precipitates in union with the alumina, and appears to be an accidental impregnation. I found the most ready mode of detecting its presence in the alumina, to be that of forming ammonia alum, by adding a great excess of muriate of ammonia to a sulphuric solution while warm. On cooling, not only alum, but crystals of muriate of ammonia should form. By washing these crystals in a solution of muriate of ammonia, all the phosphoric acid which was combined with the alumina remains in the fluid.

This mineral occurs in large quantity, in South Peru, near the port of Iquique. It invests the well known flesh-colored trachyte, and is mixed with masses of sulphates of ammonia, soda and magnesia, and salts of iron. The careful examinations of these saline deposits of Peru, by Mr. John H. Blake, led to the discovery of this mineral, and I have named it in compliment to John Pickering, Esq., the learned and distinguished President of the American Academy of Sciences.

Roxbury Laboratory, March 8, 1844.

Art. XX.—*System of Mineralogy, including the most Recent Discoveries, Foreign and American;* 640 pp. large 8vo, with 320 Wood Cuts, and four Copper Plates, containing 150 additional Figures. By James D. Dana, A. M. London and New York: Wiley & Putnam. 1844.

It is seven years since we had the pleasure of announcing the first edition of this valuable work. (Vol. xxxii, p. 387.) The sale of a large edition of a book so purely scientific in this space of time gives good evidence alike of the growing interest in the subject in America, and of the high place which Mr. Dana's system holds in the estimation of mineralogists. During the period which has passed since the appearance of the first edition, the science of mineralogy has made rapid advances both in Europe and in this country. Abroad, many eminent chemists have been working up the obscure parts of the subject, and throwing new light on those better known. "The progress in analysis is especially apparent in the growing interest excited for the natural method of classification, and the opening prospect that, before long, the chemical and natural systems will be identical. There formerly seemed to be no bond of union between the species, hornblende, augite, tabular spar, acmite, and manganese spar, and in chemical methods we have found one with the ores of manganese, another with those of iron, another with salts of lime, and so on; but even Chemistry now suggests the natural system of arrangement, and demands their union in a single family, as given in some of the latest chemical treatises. Numerous other