hot water for its solution, its sodium salt is very soluble, and from its concentrated liquid separates in beautiful red colored needles forming bundles.

The amide of the acid ($\text{C}_6\text{H}_3(\text{NO}_2)\text{OH}.\text{CONH}_2$) consists of beautiful orange-yellow colored tufts. It melts at 160° – 161° , and dissolves easily in hot alcohol.

The above account concludes my study of the action of the vapors from nitric acid and arsenic-trioxide upon the three hydroxy-benzoic acids. The results briefly summarized are these:

With ortho-oxy-benzoic acid two nitro acids were obtained; with meta-oxy-benzoic acid one nitro acid and a tri-nitro-meta product resulted, and with para-oxy-benzoic acid one meta-nitro acid.

The course of the reaction in these three cases (the *m*-oxy-acid excepted) was not attended by any troublesome intermediate products, and for this reason the method may perhaps become serviceable in the nitration of other oxy-acids.

CHEMICAL LABORATORY OF THE UNIV. OF PA.,
PHILADELPHIA, November 18, 1889.

VANADIUM IN CAUSTIC POTASH.

BY EDGAR F. SMITH.

[Read at the Stated Meeting of the Chemical Section, November 19, 1889.]

The occurrence of vanadium in commercial caustic soda has been noticed (See Baumgarten, *Zeitschrift für Chemie*, 1865, **605**, and Donath, *Zeitschrift für Analyt. Chemie*, **21**, 45). As far as I am aware, it has not been observed in caustic potash, hence the following lines.

While engaged in making certain decompositions, for which I employed the ordinary stick potash, I was rather surprised, after saturating the alkaline solutions with hydrogen sulphide, acidulating with hydrochloric acid, and heating for several hours, to discover that the separated sulphur showed a decidedly chocolate-brown color. This occurred

repeatedly. The quantity of dark material was never very great, yet it was present, even in potash from alcohol. Some preliminary experiments were made which pointed to vanadium. I therefore saturated the warm aqueous solution of three pounds of stick potash with hydrogen sulphide. Heat was applied for several hours longer, and during this period the liquid gradually assumed a yellow to deep red color. Hydrochloric acid was added to distinct acid reaction. The separated sulphur was quite dark in color. After filtration and washing, the residue was dried and treated with carbon disulphide to extract the free sulphur. The chocolate-colored mass remaining after this treatment dissolved, with exception of a slight quantity, in yellow ammonium sulphide, from which it was reprecipitated by dilute acid. Again washed, treated with carbon disulphide, and carefully ignited, there remained a crystalline mass. With a small quantity of this last product I made the phosphorous bead test—yellow, passing through dark to green when cool. Another special test consisted in dissolving a portion of the ignited residue in a drop of conc. sulphuric acid, free from iron. One cc. of water was next added, and to this colorless solution from one to three drops of a dilute potassium ferrocyanide solution, whereupon the liquid acquired a fine green coloration. This latter test Dr. Walz (*American Chemist*, vol. vi, p. 453) employed in detecting the minute quantities of vanadium in American magnetites. He considers it conclusive evidence of the presence of vanadium. The most important test, and that which I applied to the remainder of the ignited residue, after effecting its solution in nitric acid, was to add a large piece of ammonium chloride to the ammoniacal solution. The morning following, crystals of ammonium vanadate had separated. These gave the true vanadium bead, and when ignited, moistened with pure, strong nitric acid and evaporated, left the deep red-colored residue characteristic of vanadium compounds.

The vanadium sulphide, as first obtained, was impure, consequently the reactions were at times masked, and it was only after eliminating some silver and iron that the reactions were unquestionable.

The impure sulphide from the three pounds of caustic potash weighed about one-half gramme.

CHEMICAL LABORATORY OF THE UNIV. OF PA.,

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NOTES AND COMMENTS.

CHEMISTRY.

NEW PHOTOGRAPHIC DEVELOPERS.—*Eikonogen*, introduced but a few months ago by Dr. Andresen, of Berlin, as a developing agent for dry plates and bromide paper, seems to have grown into favor with more extended tests and to justify in a high degree the expectations formed. The following are the most prominent facts of its current literature, already quite extensive. Chemically it is the sodium salt of amido- β -naphthol- β -sulphonic acid, having the symbol

The formulæ for its use, as well as its action, are closely analogous to those of hydroquinone. The deposit formed by it is, however, said to be finer and of a very delicate bluish-black color, thus bringing out all the finest details. By some hydroquinone is regarded as giving stronger negatives, all things being equal, but the eikonogen as giving better half shadows, and consequently better for portraiture than for landscape photography. It is said to be particularly well adapted for lantern slides and line work negatives; and in spectroscopic photography it seems as sensitive as pyrogallol in giving the shades of depth corresponding to variation in brightness of the spectral lines, and at the same time to give a picture with blacker lines, more easily seen under the microscope.

For bromide paper, according to General Brown, it is undoubtedly the developer of the future, affording warmer tones than the oxalate, and beautifully clear whites, without acid flushing, with simple rinsing with water before fixing. Whilst the appearance of the picture is slow, especially as a used developer, preferably twenty-four hours old, is preferred, the development is regular and uniform to every detail, without risk of staining; and the same solution can be used for a number of prints. It is said to be unaffected in its action by variation in temperature, and therefore adapted to all climates. It is non-poisonous; does not stain the fingers; will keep over a month mixed; acts so energetically that only half the exposure is required as that with pyrogallol, and development occupies a much shorter time. The solution can be used over and over again without staining until its reducing power is exhausted. It is, on the other hand, especially adapted to development of over-exposures. With all its excellencies it is a cheap developer, and will keep indefinitely as a dry powder. Its slight solubility, however, will prevent its use in concentrated stock solutions, as pyrogallol.