

an objection to the process, as the acid becomes too dilute, and loss of time is the result. Another objection is that open vessels—or at least nothing more than an inverted funnel, placed over the phosphorus—must be employed. The loss of acid, by evaporation, is, therefore, considerable.

In view of these objections I have modified the process, and for about three years have worked it successfully. The improvements may be thus stated, and relate to an operation upon ten pounds of phosphorus:—The employment of a partially or almost closed vessel resembling a tubulated long-necked matrass, and of ten gallons capacity. The use of a water-bath, the temperature of which can be quickly reduced by the addition of cold water: the action may thus be checked without diluting the acid. At the commencement 1 pound of phosphorus, 24 pounds of nitric acid sp. gr. 1.315, and 6 pounds of water, are used. Further quantities of phosphorus of like amount are successively added as dissolved, together with additions of 8 pounds of acid sp. gr. 1.315. Further additions of water are seldom or ever required. The quantity of acid of 1.315—50 per cent. HNO_3 —consumed during an operation, ranges from 72 to 78 pounds. The quantity required, theoretically, is 67.72 pounds.

In regard to the concentration of the phosphoric acid, I have found it best to drive off as much as possible of the water and nitric acid in the same vessel in which the oxidation has been carried on, merely removing the upright head or neck. In this way an acid of oily consistence may be obtained which may be further evaporated in platinum or porcelain. Berlin ware and enamelled ware are both sensibly attacked.

Previous to reading the paper presented by Mr. L. Dohme* at the meeting of the American Pharmaceutical Association in 1874, I had been in the habit of carrying the heat as far as incipient redness, allowing the acid to cool, and, next day, dissolving the solid mass in water. Acid so prepared always mixed, without precipitation, with solution of ferric chloride. Mr. Dohme's statement that the concentration should not be carried beyond 450° occasioned, therefore, some surprise. On the next occasion on which ten pounds of phosphorus were oxidized, a thermometer was kept in the acid during concentration, and the temperature carefully kept under the

*Proc. Amer. Pharm. Assoc., Vol. xxii., p. 431.