

results calculated from the formulas in the pharmacopoeias. This is owing to the fact that a considerable amount of decomposition takes place in the process of manufacture. Hence tartaric acid, and all other constituents with the exception of carbon dioxide, come out higher in the analysis than in the result calculated from the formula. This consideration does not apply to the test analyses given, as in these the whole of the mixture made up was taken for analysis, and no attempt was made to imitate exactly the "granulated" commercial article.

Group III.—Direct readings of rotation in ammoniacal solution are inadmissible in analyses of the substances of this group on account of the influence of iron and aluminum on the rotation of tartaric acid, and owing to the small, but unknown, rotation of the trace of inverted starch (Appendix 27, 40, 87-101).

Accurate determinations may, however, be made in the presence of excess of ammonium molybdate in neutral solution. The latter salt not only annuls the effect of iron and aluminum, but also has the property of greatly increasing the rotation of tartaric acid, so that by its use the small rotation of the inverted starch is rendered insignificant. It is to be noted, however, that this increased rotation is very sensitive to the presence of acid and alkali, and is, moreover, modified by the presence of phosphates. It therefore becomes necessary to first remove the phosphoric acid, and then to bring the solution to a definite state of neutrality. These results are attained by the following procedure, the details of which must be strictly adhered to.

Solutions Required.—The following solution must be prepared, but need not be made up very accurately.

Molybdate solution, 44 grams ammonium molybdate in 250 cc.

Citric acid solution, 50 grams citric acid in 500 cc.

Magnesium sulphate solution, 60 grams $MgSO_4 \cdot 7H_2O$ in 500 cc.

Ammonia solution, 165 cc. ammonia (sp. gr. 0.924) in 500 cc.

Hydrochloric acid, 60 cc. concentrated acid in 500 cc.

An amount of the sample containing not more than 0.2 gram tartaric acid, not more than 0.3 gram alum and not more than 0.3 gram calcium acid phosphate is weighed into a dry flask. To this, 10 cc. citric acid and 10 cc. molybdate solution are added, and allowed to react with the substance for ten or fifteen minutes,