ART. XXIII.—*On a new Test for Hyposulphites*; by
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IN an examination of the platinum metals which I published some time back in this Journal, I described a very delicate test for ruthenium, by which the faintest traces of that metal could be detected through the agency of hyposulphite of soda. Recently, having occasion to test for the last-named substance, it occurred to me as probable that ruthenium might be rendered available for that purpose. This I found to be the case, and that the reaction exhibited considerable delicacy. It is true that ruthenium is at present a very rare metal, and not within the reach of all who might wish to use it, but the changes from rarity to more or less abundance are now so common and sudden that present scarcity is no reason for ignoring any useful reagent.

When a solution of ruthenium is rendered alkaline by ammonia and boiled with hyposulphite of soda, it gradually assumes a rose color which passes into a rich carmine; with strong solution the color is so intense as to be almost black. When diluted the shade is magnificent, rivalling the aniline red in richness.

I have already stated within what limits ruthenium can be detected by hyposulphite of soda. I now subjoin the limits observed with respect to hyposulphite of soda.

A solution containing one four-thousandth of hyposulphite, gave a clear rose red.

* Journ. Chem. Society, II, iv, 69.

One containing one twelve-thousandth gave a well marked pink liquid.

One containing one twenty-five-thousandth gave a salmon color.

The experiment was not carried further because the salmon color in the last-mentioned trial showed that the test had then reached its practical limit. I do not doubt that even with one hundred thousandth a coloration could be obtained, but it would not have the specific distinctness given by the carmine and rose shade previously described.

A few words remain to be said as to the best mode of applying this test.

I have recognized in solutions of sesquioxyd of ruthenium a strong tendency to decompose by dilution: dilute solutions have a strong tendency to gradually deposit their ruthenium as oxyd. And even before the slightest sign of a precipitate appears, in fact immediately upon dilution, solutions show a tendency to change their reactions. So that I find it invariably better on diluting the ruthenium solution for use in testing, to boil it (as I have elsewhere pointed out in speaking of the dilution of ruthenium) with a few drops of hydrochloric acid, and this even although the solution is to be immediately afterward rendered alkaline by ammonia. To ascertain with certainty that this improved the delicacy of the reaction, I made comparative experiments on two portions of the same ruthenium solution, and found that the coloration by hyposulphite was at least three times stronger in the case of the portion that had been boiled with HCl than with that that had not.

As ammonia was thereafter immediately added, it might appear that the function of the hydrochloric acid was to form hydrochlorate of ammonia. But it was found by experiment that the addition of sal-ammoniac in no way aided the reaction.

The addition of ammonia to a hot solution of sesquichlorid of ruthenium immediately darkens it to a blackish olive color, which, according to the dilution and the light that falls on it, is of a reddish or a greenish shade. By standing, the ruthenium is precipitated as oxyd. As this condition is the necessary preliminary (as before explained) to the production of the characteristic carmine reaction, it is not a little singular that the delicacy of that reaction should be so greatly enhanced by taking steps to strengthen the combination with excess of acid and boiling, immediately before the affinities are to be loosened by ammonia.

In using this reaction for the detection of small quantities of hyposulphite, it is useful to remark that it succeeds best when very little ruthenium is present. After the ruthenium solution

has been boiled with acid and supersaturated with ammonia, and the liquid to be tested for hyposulphite added, the mixed solution should have so little ruthenium in it as to exhibit only a very pale transparent olive coloration—should in fact be *almost* without color. Otherwise if the hyposulphite is present in mere traces, we get a salmon or flame color instead of the pure carmine.