Note

Fehling's Solution and Isomerism of Tartaric Acids

By Harry Sobotka

Certain relations between steric configuration and reducing power of sugars were discussed by us in regard to the observation that galactose displays a much lower reducing power for ferricyanide than glucose.[1] Similar differences exist in the behavior of sugars toward Barfoed's reagent and, to a certain extent, toward Fehling's solution. Since, on the other hand, Fehling's solution contains an optically active ingredient, Rochelle salt, we tested the influence of the steric configuration of the tartrate on the oxidizing power of the copper complex.

Two alkaline tartrate solutions (Fehling No. 2) were prepared, one with dextro-tartaric acid, the other with meso-tartaric acid; 4.12 g. of tartaric acid was added to a solution of 3.0 g. of sodium hydroxide plus 1.4 g. of potassium hydroxide and made up to 20 cc. This corresponds to the concentrations of the standard solution as prepared with Rochelle salt. Equal volumes of 4.0% copper sulfate solution (Fehling No. 1) were added to these tartrate solutions before analysis. The "meso" Fehling solution, like the standard solution, was found not self-reducing on five minutes of boiling.

Varying amounts of sugar in 4 cc. of solution were boiled with 2 cc. of freshly mixed Fehling's solution, either dextro or meso, for two minutes. The non-reduced copper was titrated iodimetrically according to Lehmann and Maquenne. 2.6 mg. of glucose reduced 0.082 milliequivalent of copper in meso Fehling, and 0.082 milliequivalent in dextro Fehling; 5.2 mg. of glucose reduced 0.153 milliequivalent of copper in meso and 0.152 milliequivalent in dextro Fehling solution.

Thus it appears that there is no difference between the oxidizing power of the two stereomeric Fehling's solutions under the conditions of Lehmann and Maquenne. It was proved in a separate experiment that the optically active alkaline Rochelle salt solution does not alter its rotation more than 0.3% upon five minutes' boiling. Therefore a rearrangement into the meso form can be excluded as reason for the above agreement between dextro and meso tartrate. One may conclude *e maiore* that the enantiomeric levo tartrate likewise does not deviate in this respect from dextro tartrate.

This agreement is in contrast to the behavior of tartaric acids toward vanadic acid. The optically active tartaric acid (*trans*-dihydroxysuccinic acid) forms stable amber-colored complexes with metavanadic acid at P_H 3 to 5, while the meso (*cis*) compound reduces the metavanadic acid in the cold to the greenish blue stage of tervalent vanadium.

The Laboratories of the
Mt. Sinai Hospital
New York, N. Y.

Received February 23, 1933
Published May 6, 1933

---

[1] Sobotka and Reiner, *Biochem. J.*, **24**, 194 (1930).