

DETERMINATION OF SORBITOL IN THE PRESENCE OF CARBOHYDRATE

A PROCEDURE for the determination of sorbitol in the presence of sugars was described in a recent article by Adcock.¹ Boiling with dilute sodium carbonate was recommended for the destruction of interfering sugars. The acids so produced are removed from the solution by ion-exchange treatment, and sorbitol is determined by periodate oxidation. The procedure is suggested for use with foods and biological materials. Adcock stated that the method removes all carbohydrates from a sorbitol-carbohydrate mixture, and that, contrary to other methods, the procedure does not require knowledge of the carbohydrates present.

We have found, in a study preliminary to the use of Adcock's method on honey, that all carbohydrates are not removed from a solution by this treatment. Reducing sugars are quantitatively destroyed, as would be expected, but non-reducing sugars are not destroyed and subsequently interfere in the periodate determination of sorbitol. The resistance of sucrose, for example, to alkaline treatment is well known.

A mixture was made of 350 mg of D-glucose, 350 mg of D-fructose, 6 mg of α -trehalose, 22 mg of raffinose, 20 mg of melezitose, 52 mg of maltose and 26 mg of sucrose in 1 ml of water. This was heated under reflux for 4 hours with 79 ml of 0.1 N sodium carbonate. The solution was cooled and treated batchwise with Dowex 50*; the pH changed from 10.5 to 2.33. The solution was then passed through a column of Duolite A-4*; the pH of the effluent was 6.4. It was evaporated to dryness and fractionated on a charcoal column,² the monosaccharide, disaccharide and higher sugar fractions being collected. These were evaporated and subjected to paper chromatography, together with a portion of the original mixture. No reducing sugars were found, but sucrose, raffinose, trehalose and melezitose were present at concentrations approximating to those of the original solution. The procedure used would have detected the presence of 20 μ g of reducing sugar remaining in the alkali-treated solution.

Three carbohydrate mixtures were prepared. Mixtures A and B contained 100 mg each of D-glucose, sucrose and sorbitol. Mixture C contained 100 mg each of D-glucose and sorbitol. Mixture B was hydrolysed by heating on a steam-bath for 20 minutes with 5 ml of 0.1 N hydrochloric acid, and then 25 ml of 0.1 N sodium carbonate were added. Mixtures A and C were each dissolved in 20 ml of 0.1 N sodium carbonate. The three solutions were heated under reflux for 4 hours and then subjected to the above-described ion-exchange treatment. Sorbitol was determined in the solutions by the acid periodate procedure described by Adcock. Solution A appeared to contain twice as much sorbitol (195 mg) as the average of the other two solutions (96 mg), although each in fact contained the same amount.

It is obvious that the identity of the carbohydrates present in a solution to be analysed for sorbitol by Adcock's procedure must be taken into account, certainly when they are non-reducing sugars. Interference by such sugars can be avoided by the inclusion of a suitable hydrolytic step before the alkali treatment.

REFERENCES

1. Adcock, L. H., *Analyst*, 1957, **82**, 427.
2. Whistler, R. L., and Durso, D. F., *J. Amer. Chem. Soc.*, 1950, **72**, 677.

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* Mention of trade names does not constitute endorsement by the Department over others of a similar nature not named.