Adaptation of the TAC test for determination of sugars antioxidant activity

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INTRODUCTION: Testing for total antioxidant capacity (TAC) is fast and inexpensive, making it an excellent method to evaluate carbohydrate antioxidant property. However, TAC test condition could cause hydrolysis of sugars due to reaction conditions (H₂SO₄/100 °C/90min). Nevertheless, there is nothing in the literature that claims such occurrence. Thus in order to determine the best conditions to carry out the TAC test without degradation of sugars, we assayed the TAC test using different time of reaction MATERIALS AND METHODS: We performed CAT test with 11 monosaccharides in conditions following the standard protocol, with all reagents without molybdate, and only with water, all at 100 ° C and the temperature at different times (45-360 min.). The CAT test was also performed with five dextrans with different molecular weight (for 90 to 480 min). Total sugar (TS) and reducing sugar presents in the sugar solutions was determinate after the CAT reaction. RESULTS AND DISCUSSION: CAT test was able to determinate the antioxidant activity of the all monosaccharides. However, the higher activity of each monosaccharide depends on the reaction time. In addition, in all reaction times fructose was the most potent monosaccharide. TS showed that the all monosaccharides were not hydrolyzed after TAC test in all conditions. The high molecular weight polysaccharides need less reaction time to reach maximum activity on the TAC test than the low molecular polysaccharides. Besides, they were not hydrolyzed. CONCLUSION: As there was no hydrolysis of the sugars, the TAC values observed here are produced by sugars and not by their hydrolysis products. Therefore, TAC can be used to determine antioxidant activity of sugars, but the reaction time of the test has to adapt for each different type of sugar analyzed.

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