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DETERMINATION OF FIXED PERCENTAGE OF OPEN CHAIN FORM OF D (+)- XYLOSE BY BORSCHE'S REAGENT

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ABSTRACT

The present study is carried out to fix the percentage of open chain form of D (+)-xylose by condensation with 2, 4-dinitro phenyl hydrazine. The product has been estimated by gravimetric analysis. It is observed that the constant percentage is obtained by this method with the variation of concentration of sugar. It is noticed that only the open chain form undergone the condensation process to give the product. This study is in correlation with NMR studies which indicate less than one percentage of open chain form in equilibrium.

INTRODUCTION

Xylose is not a main nutrient. It is metabolized by human beings and excreted through kidneys. It is a mono saccharide first isolated from wood. It contains a formyl functional group. It can adopt several structures depending on conditions. With its free carbonyl group it acts as a reducing sugar. It is one of the major fermentable sugars.

Borsche's reagent is an important reagent for a wide variety of functional groups and mainly for the carbonyl group. It is used as a mutagen (1-3). The DNPH-Uracil compound showed antioxidant properties (4). This reagent has significant role in biological, agricultural and pharmaceutical applications (5-8).

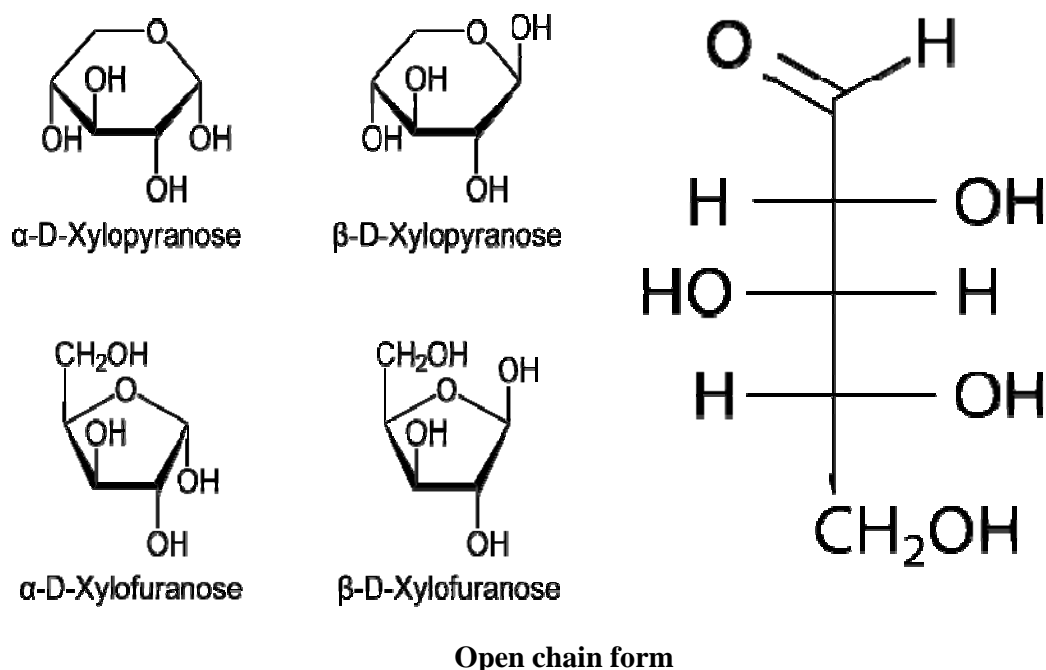
MATERIAL AND METHODS

All the reagents used are of analytical reagent grade.

METHOD

The condensation product of D (+)-xylose with 2, 4-dinitro phenyl hydrazine has been estimated by gravimetric analysis. Excess of reagent is added to known weights of D (+)-xylose taken in Erlen Meyer flasks. The flasks are shaken for five minutes to ensure that the sugar samples are dissolved. These flasks are allowed to stand for one hour in an ice bath. The product is filtered through a sintered glass crucible and washed with 2 N HCl, followed by water. The crucibles are dried to constant weight at 100⁰c in an oven.

Illustrations:



Tables:

S.no	Weight of D(+) Xylose taken (g)	%yield		% of open chain form
		Theoretical yield	Actual yield	
1	0.50	1.099	0.25	0.1137
2	1.00	2.20	0.25	0.1137
3	1.50	3.30	0.25	0.1137
4	2.00	4.40	0.25	0.1137
5	2.50	5.50	0.25	0.1137
6	3.00	6.59	0.25	0.1137
7	3.50	7.69	0.25	0.1137
8	4.00	8.79	0.25	0.1137
9	4.50	9.89	0.25	0.1137
10	5.00	10.99	0.25	0.1137

RESULTS

D (+)-xylose on condensation with Borsche's reagent gives corresponding hydrazone. Unlike Fehlings and iodo metric methods, the condensation process leads to quantitative determination of only the open chain form(9). Therefore with the variation of concentration of sugar, the yield of the product does not vary and the same amount of product is obtained.

DISCUSSION

D (+)-Xylose in solution exists as α - form (29%) and β -form (71%). It indicates the equilibrium mixture does not contain any perceptible amount of open chain form. We have carried out analytical study of determination of D(+)-xylose by 2, 4-DNPH. The product yield has been checked by carrying out ten independent experiments quantitatively using gravimetric method. The constant percentage obtained by this method is due to the open chain form present in equilibrium mixture along with α and β cyclic forms. The fixed percentage of open chain form which exists in the mixture reacts to give an indication of aldehydic form. The present study confirms about 0.1137% of open chain form in the equilibrium mixture. Our study is in correlation with NMR studies which indicates possibility of less than 1% of open chain form in case of 5 membered sugars.

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