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Determination of Sugar content in extracted juices of fruits available in local market

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***ABSTRACT*:** Present examination estimated sugar content in extracted juices of four different fruits (grapes, orange, pineapple, and watermelon) available in the local market. For this work, Fehling's solution was standardized by using glucose and then estimated the reducing and non-reducing sugar of samples by titrimetric analysis. The sugar content of different samples was compared by drawing a bar diagram. From my analysis, it is clear that almost all fruits contain a considerable amount of sugar. Orange was formed to be the richest source of sugar and watermelon the least. The amount of sugar and relative proportions present in various fruits depend on their nature and degree of maturation.

Keywords: Reducing sugar, Non-reducing sugar, Different fruits, Glucose, Fehling's solution I & II, Methylene blue, Titration, Bar diagram.

INTRODUCTION

Carbohydrates are organic compounds formed from carbon dioxide and water under the influence of sun's radiations in photosynthetic plant cells (Suman khowala *et al*., 2008). Plants contain the green pigment chlorophyll which catalyses the conversion of carbon dioxide and water into sugar. Sugar has some nutritional values and they function as flavouring agents, sweetening agents, preservative, texture modifier, fermentation substrate etc. Sugar is building blocks of carbohydrates and it is found in fruits, vegetables, grain, milk etc. (Margaret Zaitoun *et al*., 2018). Existence of sugars is confirmed before life itself appeared on earth (Suman Khowala *et al*., 2008).

Carbohydrates play an important role in human nutrition as energy reserves. Due to this, carbohydrate detection methods have received and continue to receive a great deal of attention. A polysaccharide molecule is composed of a large number of sugar or sugar-like units. Fruits are rich sources of vitamins, minerals, calories and other needful nutrients (N.A. Kazi1 *et al*., 2015). Most fruits contain reasonable amount of carbohydrates. This may include varying proportion of glucose, fructose and sucrose and possibly starch. Fructose and glucose are reducing sugars. Reducing sugars are sugars where the anomeric carbon has an OH group attached that can reduce other compounds. Non-reducing sugars do not have an OH group attached to the anomeric carbon so they cannot reduce other compounds. Common disaccharides are maltose, lactose, and sucrose. These can either be reducing or non-reducing sugars (Sukirti Singh *et al*., 2010). The amount of sugar and relative proportions present in various fruits depend on their nature and degree of maturation.

Fehling test is used as a test for reducing sugars. It is prepared initially in two separate solutions, known as Fehling's I and Fehling's II. Equal volumes of the two solutions are mixed to get the final Fehling's solution. Which has a deep blue colour (T. Kunz *et al*., 2011).

METHODOLOGY

Four different fruits (grapes, orange, pineapple and watermelon) available in local market were collected and washed well in running tap water. The glass wares required for this work were washed with chromic acid and then with water and rinse with distilled water before use. After washing and rinsing, the glass wares were dried (Nusrat *et al*.,2010).

Preparation of Sample solution

50g of each fresh fruit were accurately weighed. Each sample is then grind well using a mixer grinder. Washed well using small amount of distilled water two or three times and collected in respective beakers. The juice collected is filtered using cotton and the cotton is pressed well to extract all the juice. It is then quantitatively transferred into a 500 ml standard flask and made up to the mark (Mahendra sivare & Arpan Day, 2018).

Standardisation of Fehling's solution

Weighed out accurately about 1.25 g of A.R. Glucose and transferred to 250 ml standard flask. Pipette out 10 ml each of Fehling's solution I and II into 250 ml conical flask, diluted with 30 ml of water. Heated to boiling and added the glucose solution from another burette to the boiling solution until the colour of solution almost disappear. To this, 4 or 5 drops of methylene blue indicator is added. Completed the titration in one minute more by adding glucose solution drop wise until the colour of solution almost disappears. Repeat the titration until concordant values are obtained.

Estimation of Reducing sugar

125 ml of each prepared juice is transferred to 250 ml standard flask and made up to the mark. This solution is taken in the burette.

10 ml each of Fehling's solution I and II are pipetted into a 250 ml conical flask. 30 ml water is added and heated to boiling. To this, juice taken in the burette is added drop wise until the blue colour of solution disappears. It is heated to boiling for two minutes and without removal of flame, added 3 to 5 drops of methylene blue indicator. Complete the titration in one minute by adding the juice solution drop wise until the colour of methylene blue almost disappears. Repeated the titration till the concordant values are obtained. This will give the weight of reducing sugar present in the definite amount of samples (T.A. Marques *et al*., 2016).

Estimation of Non-reducing sugar

125 ml of each juice is taken in a round bottomed flask. To this, 20 ml of 0.5N HCl is added and refluxed for about 45 minutes to undergo hydrolysis. It is cooled and NaOH is added to neutralize the acids. The solution is then transferred quantitatively to a 250 ml standard flask and made up to the mark. This solution is taken in a burette.

10 ml each of Fehling's solution I and II are pipetted out and titration are repeated as above. This will give the weight of total sugar. By subtracting the weight of reducing sugar from this, weight of non-reducing sugar can be determined.

RESULT AND DISCUSSION

To determine the amount of reducing sugar and non-reducing sugar present in various samples, first the weight of glucose equivalent to 20 ml of Fehling's solution was determined. Let this be 'a' gram. If 'V' is the volume of the sample equivalent to 20 ml of Fehling's solution. Then 'V' ml of sample solution contains 'a' gram of glucose. From this, weight of glucose in the whole of the prepared sample solution can be determined. This corresponds to the amount of glucose in the weighed quantity of fresh sample.

20 ml of Fehling's solution = 32.5 ml of glucose solution.

Weight of glucose in 250 ml = 1.25 g

Therefor, 20 ml of Fehling's solution = 0.1625 g of glucose solution ('a' gram)

The values of fruits juices (V ml) equivalent to 20 ml of Fehling's solution before and after hydrolysis is given below.

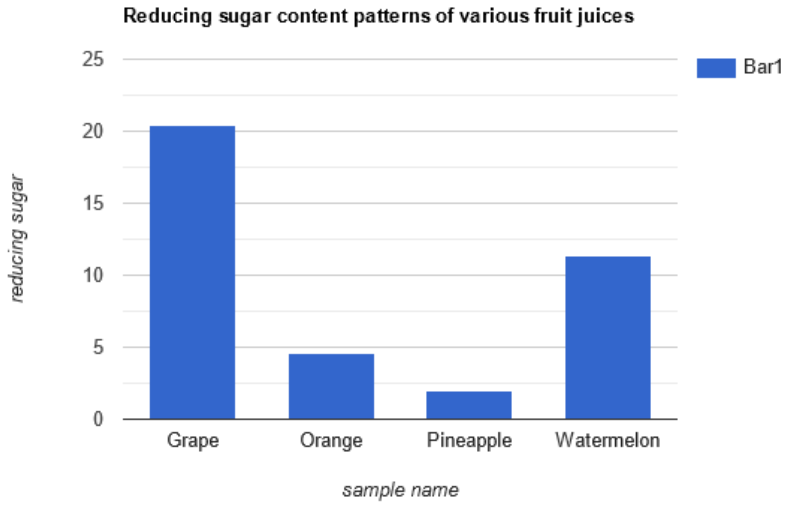
Name of Fruit Sample	**Volume before hydrolysis (reducing sugar) V1**	**Volume after hydrolysis (Total sugar) V2**
Grapes	15.9	14.6
Orange	71.1	25
Pine apple	161	36.7
Watermelon	28.5	23.5

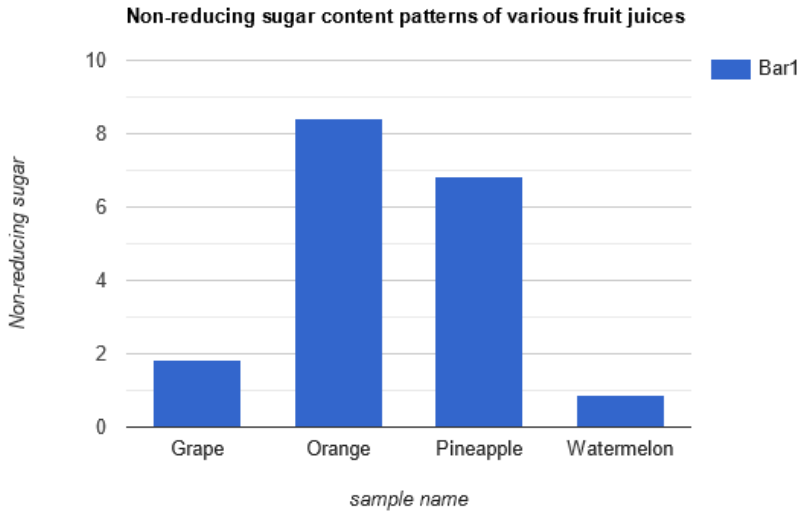
Mass of sugar present in 50 g of various fresh fruits

Name of Fruit Sample	**Reducing sugar (a×1000/ V1)**	**Total sugar (a×1000/V2)**	**Non-reducing sugar**
Grapes	10.2201	11.1301	0.91
Orange	2.2855	6.5	4.2145
Pine apple	1.0093	4.4278	3.4185
Watermelon	5.7018	6.9149	0.4472

Mass of sugar present in 100 g of various fresh fruits

Name of Fruit Sample	**Reducing sugar**	**Non-reducing sugar**
Grapes	20.4402	1.82
Orange	4.571	8.429
Pine apple	2.0186	6.837
Watermelon	11.4036	0.8944





CONCLUSION

From my analysis of various fruits, it is noticed that almost all of them contain considerable amount of sugar content. Orange was formed to be richest source of sugar. But the diabetic patients must be avoided the fruits containing richest source of sugar. Since the fruits contain energy mainly in the form of sugar and our body can easily turn this sugar into energy using oxygen, taking fruit is a very quick, clean and easy way to extract energy. Thus, it is advisable to include cheap and commonly available fruits as a part of our daily diet.

REFERENCES

Mahendra sivare, Arpan day, 2018. Determination of iron in some organic product juice identified with healthcare. *International journal of advances in science engineering and technology*. 6(4): 110–111.

Margaret Zaitoun, Maissam Ghanem, Seba Harphoush. 2018. Sugars: Types and their functional properties in food and Human health. *International Journal of Public Health Research.* 6(4): 93–99.

N.A. Kazi1, J.P. Yadav, M.G. Agale, 2015. Nutritional value of Fruits. *Scholarly research journal for interdisciplinary studies*. 3: 2937–2943.

Nusrat J., Farooq A., Thasneem G. K., Uzma Rashid. 2010. Determination of essential elements (Cu, Fe and Zn) in juices of commercially available Pakistan. *Food and Chemical Toxicology*. 48: 2737–2740.

Sukirti Singh, Pooja Kumari, Amita Prasad. 2010. Determination and study of reducing and non-reducing sugar from different food samples. *Explore*. 2:41–43.

Suman Khowala, Deepak Verma, Samudra Prosad Banik. 2008. Biomolecules (Introduction, Structure and Functions). *National Science Digital Library*. 6:1–93.

T. A. Marques, Erick M. R., Rafael R. Z., Patricia A. A. M., B. Fabio. 2016. Automated sugar analysis. *Food Science and Technology*, 36(1): 70–75.

T. Kunz, E. J. Lee, V. Schiwek, T. Seewald, F-J Methner. 2011. Glucose- a reducing sugar ? Reducing properties of sugars in Beverages and Food. *BrewingScience*. 64: 61–67.