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Determination Of Iron Content In Juices Of Various Fresh Fruits

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***ABSTRACT*:** In the present work, the concentration of iron content in four commonly available fruits (grapes, orange, pomegranate and watermelon) was determined and compared to their values to provide sufficient information to people. For this, the absorbance of sample solutions was measured using UV Spectrophotometer. When the concentration of the solution increases, absorbance also increases. That is, a high value of absorbance indicates the rich content of iron. This work shows that Grapes were formed to be the richest source of iron since their solution gives high value of absorbance.

Keywords: Commonly available fresh fruit juices, Ammonium thiocyanate, Iron, Colourimetry, UV Spectrophotometer, Absorbance.

INTRODUCTION

Iron is one of the many minerals required by the human body (Nazanin *et al*.,2014). It is used in the manufacture of the oxygen carrying proteins, haemoglobin (Coates T.D., 2014) and myoglobin. The deficiency of iron in the body can leave a person feeling tired and listless, and can lead to a disorder called anaemia. Many of the foods we eat may contain small quantities of iron. To make the presence of iron in solution visible, thiocyanate is added.

Fruits are an excellent source of essential vitamins and minerals and they are high in fibre. A diet rich in fruits can reduce a person's risk of developing heart disease, cancer, inflammation and diabetes (Mirdehghan & Rahemi, 2007; Mahendra sivare & Arpan, 2018).

METHODOLOGY

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).

For my study, four different fruits (grapes, orange, pomegranate and watermelon) collected and washed thoroughly in running tap water. The fruit juices were collected by squeezing and filtered through narrow cotton cloth to clean containers.

Ammonium thiocyanate is added for the indication of presence of iron. Which react with Fe^{3+} ions to form a blood red coloured complex $[FeSCN]^{2+}$ (Saya Ajito *et al*., 2021). By comparing the intensity of colour of the solution with colours of a series of standard solutions, with known Fe^{3+} concentrations, the concentration of iron in the sample may be determined. This technique is called colourimetry (Rachana *et al*.,2015).

Preparation of standard solution

2.41 g of A.R. Ferric ammonium sulphate was accurately weighed into 500 ml standard flask. 5 ml of HCl is added to prevent hydrolysis. It was well shaken to dissolve the salt and made up to 500 ml. 50 ml of this solution was transferred into another flask and made up to 100 ml. 1 ml of this solution contains 0.2 mg of ferric ion.

1,2,3,4 and 5 ml of this standard solution were burette out into different 100 ml beaker. Required quantity of distilled water is added to beaker to make the total volume 5 ml. 10 ml of HCl and 4 ml of 30V H_2O_2 were added to each beaker and boiled to decompose excess H_2O_2. The solutions were then cooled. These were transferred to 100 ml standard flask quantitatively. 10 ml of 20% ammonium thiocyanate solution was added to each standard flask to develop colour and made up to the mark.

Preparation of sample solution

5 ml of different fruit juices were transferred to 100 ml beaker, each of which provide with a cover glass rod. 10 ml of HCl and 4 ml of 30V H2O2 were added to each beaker and boiled till the evolution of oxygen ceased. Then solutions were cooled and filtered into a 100 ml standard flask. 10 ml of 20% ammonium thiocyanate solution was added to each standard flask to develop colour and made up to the mark.

The absorbance of standard solution and the solutions prepared from fruits are measured using UV Spectrophotometer (Cosimo & Claudia., 2015). Iron shows absorbance at 480 nm. The instrument set zero absorbance with the blank solution prepared.

RESULT AND DISCUSSION

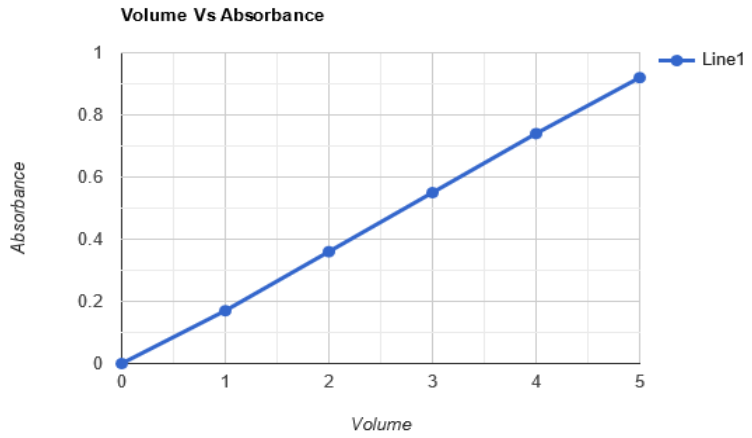
To calculate the iron content of various samples, standard curve was prepared by plotting absorbance against the volume of standard solution. From the standard curve, the concentration of iron corresponding to the measured absorbance of unknown sample solution were determined.

Absorbance data of standard solution

Volume of standard solution(ml)	Absorbance
1	0.17
2	0.36
3	0.55
4	0.74
5	0.92

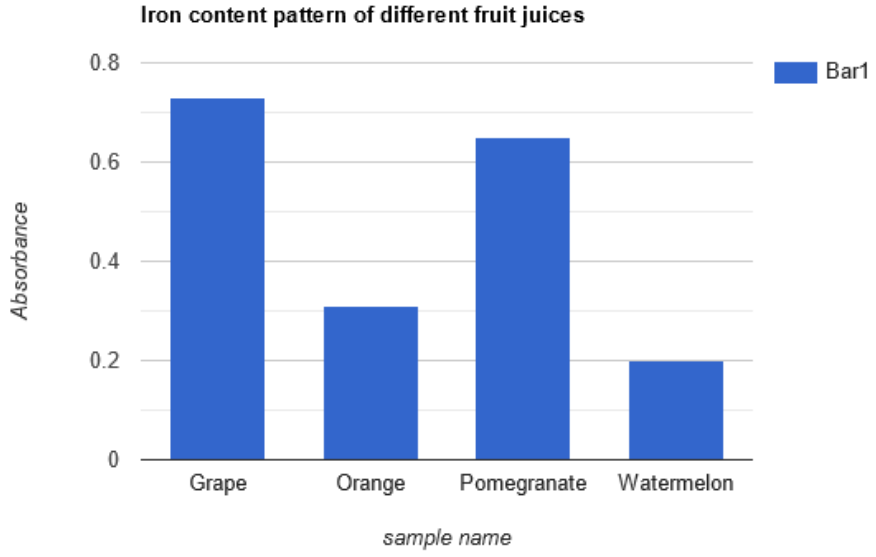
From the above table it is clear that when concentration of the solution increases, absorbance also increases. ie, high value of absorbance indicates rich content of iron.

Volume Vs Absorbance Graph



Absorbance data of sample solution

Sample	Volume(ml)	Absorbance
Grapes	5	0.73
Orange	5	0.31
Pomegranate	5	0.65
Watermelon	5	0.20



CONCLUSION

The study was interesting and informative. The high value of absorbance indicates rich source of iron. Therefor the work shows that Grapes were formed to be richest source of iron. As the interest in nutrition increases, people are getting more and more conscious about what they are eat, so that the interest in consumption of fruits have also increased consumer interest and expectation in conjunction with the rapid increase in food compositional information. From the above discussion, it is clear that fresh fruits must be included in our diet in plenty. The community should thus be made aware of the importance of fruits and their cultivation.

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