

Study of Apple Juice Extraction Process, Estimation of Carbohydrates, Proteins and Comparative Study.

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ABSTRACT: Apple is well known as nutrient rich fruit. So it can be considered as raw source of nutrients. But under this banner lot of fruit juice brands make fake promotions of their fruit juices which are high in fat and carbohydrate content. If we test them it gives exactly opposite results on our health compared with natural fruit. So in this paper we explained the process of the fruit juice extraction from raw apple to measure the nutrient count of carbohydrates and proteins and do a comparative study between contents of raw fruit juice and ready juices available in market.

KEYWORDS: Apple, Extraction, Juice, Proteins, Carbohydrates, Enzymes.

I. INTRODUCTION

An apple has a place with the Rosaceae family. The scientific name given to the apple is *Malus Domestica*. Today, its development is encouraged in numerous pieces of the world including the USA as a significant crop.

Apple resembles the pear in shape. Its external strip shows up in various colours and shadings depending on the farmer's cultivation type. Taste of apple is mixture of sweet and tart flavour.

Seed have unpleasant taste. From inside they are grey in colour and also mashy in nature. The only problem with it is it get oxidised rapidly.

Normally apples are categorised into two major types first one is dessert type and other one is cooking apple. Cooking apples are crispier and tarter than dessert apples also they are bigger in size. Apple fruit and its products contain some great nutrients, so they can be used in our healthy diet.

But as we know some brands do fake marketing of their products which were not really good for our health as they not contain good

nutrients and have great amount of artificial sugars and fats. This causes ill effects on our body in long consumption period.

II. MATERIALS AND METHODS

1. Estimation of carbohydrates (Anthrone Method)

1.1 Preparation of Anthrone Reagent:

To make anthrone reagent sample for use total 200mg of anthrone reagent is dissolved in 100ml of concentrated H₂SO₄ acid.

1.2 Standard stock sample:

100mg of Glucose poured in 100ml of Distilled water.

1.3 Standard working sample:

Dilute 10ml of stock standard solution in 100ml with distilled water in a volumetric flask.

2. Estimation of Proteins (Bradford Method)

In five different test tubes, we added a volume of 0.2 to 1 ml sample and then we added 4 ml of anthrone reagent in it. Water is added to make up volume 1ml. After that blending process was carried out to mix them and those tubes are kept in the shower to cool them. At room temperature using a photoelectric colourimeter measured the optical thickness of the sample at 620nm.

Also, we took reading using distilled water to compare it with samples. The graph was plotted using the readings and sugar fixation ability calculated using the proper formula.

2.1 Bradford Reagent:

Dissolved 200mg Bradford Reagent in 100ml of Ethanol.

2.2 Sample:

Apple Juice, Standard Protein Solution (BSA).

2.3 Procedure:

In five different test tubes 0.2 ml to 1 ml sample was taken and then water is added to make up the volume 1ml. 5 ml of Bradford reagent was added in each test tube.

The samples in the tube were then blended and kept at room temperature for almost 10 min.

In the end, absorbance was taken at 595nm and for that process; clear water is used as a standard sample for comparison.

The curve graph is plotted for observation and also to take values for calculation. After calculation, we are able to find the amount of total proteins present in the sample.

III. CALCULATIONS

1. Carbohydrate Estimation: 6 standard test tubes were prepared and two unknown samples were used to determine the concentration.

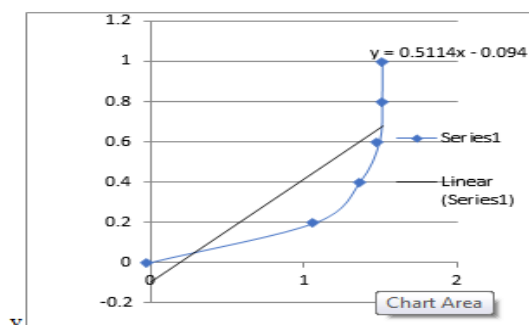


Fig-2: Graph for carbohydrates readings

1.1 Apple Fruit:

Observation tables are plotted as follows:-

Table-1: Observations for Apple fruit

| Tube. No. | Sol. (ml) | D/W (ml) | Anthrone (ml) | Conc. | OD 620nm |
|-----------|-----------|----------|---------------|--------|----------|
| 1 | blank | 1 | 4 | - | -0.641 |
| 2 | 0.2 | 0.8 | 4 | 0.2 | 1.083 |
| 3 | 0.4 | 0.6 | 4 | 0.4 | 1.368 |
| 4 | 0.6 | 0.4 | 4 | 0.6 | 1.495 |
| 5 | 0.8 | 0.2 | 4 | 0.8 | 1.511 |
| 6 | 1 | 0 | 4 | 1 | 1.5118 |
| U1 | 0.5 | 0.5 | 4 | 3.197 | 1.54 |
| U2 | 0.5 | 0.5 | 4 | 3.2035 | 1.543 |

1.2 Apple Juice:

Table-2: Observations for Juice.

| Tube No. | Sol. (ml) | D/W (ml) | Anthrone (ml) | Conc. | OD 620nm |
|----------|-----------|----------|---------------|-------|----------|
| 1 | Blank | 1 | 4 | - | -0.641 |
| 2 | 0.2 | 0.8 | 4 | 0.2 | 1.083 |
| 3 | 0.4 | 0.6 | 4 | 0.4 | 1.368 |
| 4 | 0.6 | 0.4 | 4 | 0.6 | 1.495 |

| | | | | | |
|----|-----|-----|---|---------|--------|
| 5 | 0.8 | 0.2 | 4 | 0.8 | 1.511 |
| 6 | 1 | 0 | 4 | 1 | 1.5118 |
| U1 | 1 | 0 | 4 | 3.2147 | 1.55 |
| U2 | 1 | 0 | 4 | 3.27336 | 1.58 |

Calculations:

$$X = (OD + 0.094) / 0.511 \text{ mg/ml}$$

Apple fruit:

Unknown 1 conc. = 3.197

Unknown 2 conc. = 3.2035

Appy fizz (apple juice):

Unknown 1 conc. = 3.21

Unknown 2 conc. = 3.27

Table-3: Carbohydrates in Juice.

| | |
|--|-----------------------------|
| Concentration in 160 ml carton (appy fizz) | Laboratory estimation mg/ml |
| 13.6 g | 3.21 ,3.27 |

2. Protein Estimation:

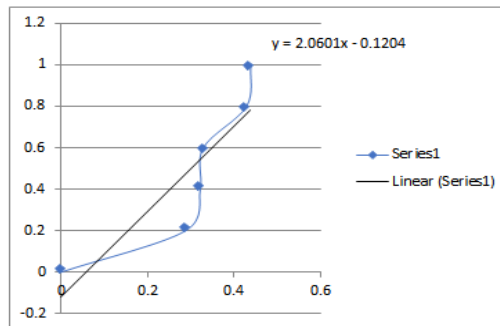


Fig-3: Graph for Protein readings

2.1 Apple Fruit:

Table-4: Observations for Apple fruit.

| Tube No. | Sol. (ml) | D/W (ml) | Bradford (ml) | Conc. | OD 595nm |
|----------|-----------|----------|---------------|-------|----------|
| 1 | blank | 1 | 5 | 0 | 0 |
| 2 | 0.2 | 0.8 | 5 | 0.4 | 1.1 |
| 3 | 0.4 | 0.6 | 5 | 0.8 | 1.28 |
| 4 | 0.6 | 0.4 | 5 | 1.2 | 1.391 |
| 5 | 0.8 | 0.2 | 5 | 1.6 | 1.332 |
| 6 | 1 | 0 | 5 | 2 | 1.493 |
| U1 | 0.7 | 0.3 | 5 | 0.909 | 1.332 |
| U2 | 0.9 | 0.1 | 5 | 0.948 | 1.493 |

2.2 Apple Juice:

Table-5: Observations for Juice.

| Tube No. | Sol. (ml) | D/W (ml) | Bradford (ml) | Conc. | OD 595nm |
|----------|-----------|----------|---------------|-------|----------|
| 1 | Blank | 1 | 5 | 0 | 0 |
| 2 | 0.2 | 0.8 | 5 | 0.4 | 1.1 |
| 3 | 0.4 | 0.6 | 5 | 0.8 | 1.28 |
| 4 | 0.6 | 0.4 | 5 | 1.2 | 1.391 |
| 5 | 0.8 | 0.2 | 5 | 1.6 | 1.332 |
| 6 | 1 | 0 | 5 | 2 | 1.493 |
| U1 | 0.7 | 0.3 | 5 | 0.06 | 0.016 |
| U2 | 0.9 | 0.1 | 5 | 0.040 | 0.036 |

2.3 Calculations:

$$X = OD + 0.120 / 2.06$$

Apple fruit

Unknown 1 conc. = 0.909

Unknown 2 conc. = 0.9480

Appy Fizz (Apple Juice)

Unknown 1 conc. = 0.06

Unknown 2 conc. = 0.040

Table-6: Proteins in juice

| Concentration in 160 ml carton (appy fizz) | Laboratory estimation mg/ml |
|---|-----------------------------|
| 0g | 0.06, 0.040 |

IV. CONCLUSIONS

From the observations, we can conclude that,

1. Apple is nutrient rich fruit.
2. The good amount of carbohydrates and protein present in the apple.
3. Amount of carbohydrates present in apples is nearly equal to carbohydrates present in appy fizz which is the fruit juice present in the market.
4. Fruit juice manufacturers show us that juice does not contain any proteins but from the experimental observation we can say that it is present in very trace amounts.
5. Apple contains a good amount of content than other fruits so it is a good source of nutrients for healthy living.

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