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Caffeine from different brand of tea with green tea

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Abstract
Theasinesis (Tea) consist many components are useful and some are harmful to human health. Green tea is useful than other brands of tea in the market according to the Isolation of caffeine from different brand of tea and comparative analysis with Green tea by using U.V spectrophotometer and TLC procedure for the estimates the content of caffeine in various brands of tea and it is compared with green tea. This comparative study gives the differences between the various brands of tea and green tea. Also gives the various amount of caffeine in various brands of tea. This study gives that the green tea is healthy for human than other brands.

Keywords: caffeine, spectrophotometer, TLC, green tea

Introduction

In India tea is famous and habit forming beverage, tea promotes health as it has various advantageous properties such as antioxidant activity due to presence of catching. (Flavonoid) But it also causes health problems due to its caffeine current thus to make the healthy use of tea, the caffeine content should be minimized. There are various brands of teas are available in market they are different in their colortorture quality and cost and also the content of the caffeine Generally a relatively stronger tea containing 60 mg / cap, 8 cups a day would be safe for normal person, But different people react differently with different amount of caffeine so the safe content for one person may not be healthy for everyone. Caffeine has some beneficial effects on the human body such as regulation of B.P heart rate and also promotes the basal metabolic rate. It also acts as diuretic, but the caffeine also shows tropic effect so it cannot be used as drug. Caffeine can cause in seminar headache, nervousness and dizziness it also causes addiction and depression so the intake of the caffeine should be safe that's why I choose this subject for project work

Materials & Methods

Materials – Different brands of Tea powders and Green Tea Powders.
Chemicals:- Chloroform, Leadacetate, Watersamples of tea leaves
Apparatus: 1) Bunsen burner
2) Spectrophotometer
3) Analytical Balance
4) Separating Funnel
5) Beaker
6) Glassrod

Extraction procedure of caffeine

Take 50gm of tea powder and mix 200ml of water boil this mixture for 30 min after that allow it to cool then filter the mixture and take the filtrate by Dhaka NP, Kumar K.
Then add 10% lead acetate and allow it to precipitate filtrate this mixture and take the filtrate and 10ml dil. H_2SO_4 to that filtrate and add 100ml of chloroform take separating funnel and add above mixture to this allow it to separate and forms organic and aqueous layer then take organic layer of chloroform in china dish.
Then keep it for evaporation after evaporating the chloroform the white flakes content of caffeine remains in china dish.

Purification of Crude Caffeine

The crude Caffeine is must Purified for removing of impurities for this, crude caffeine was purified by Aishwarya Vijaykumar.
Dissolving it in a small quantity of boiling water and then allowing it to cool undisturbed.
The needle-shaped crystals of caffeine were filtered out and dried between folds of filter paper. Similar procedure was performed.
With different samples of tea leaves and quantify of caffeine observed in them. The percentage of Caffeine is calculated by using following formula

$$\textbf{Percentage of Caffeine} = \frac{\text{Weight of substance Obtained}}{\text{Weight of Tea powder Taken}}$$

Thin Layer Chromatography Technique (TLC)

Sample of pure caffeine, crude caffeine and purified caffeine were dissolved in Dichloro Methane Prepare TLC by H. Wagner S., Bladt
Plates by using silica gel G. pure caffeine was spotted on the TLC plates by using a new capillary spotted each time.
Place the TLC plates into the mobile phage i.e. 9:1 ratio of chloroform and acetone placing the spotted end into the mixture.
Allow to run the Mobile phase without any disturbance. Remove the plates from the mobile
Phase allow to dry then viewed under UV light and note the readings. Calculate the RF value then viewed
Under UV light and note the readings calculate the RF values by using following formula.

$$\textbf{RF Value} = \frac{\text{Distance travelled by the solute from origin line}}{\text{Solvent Front}}$$

Procedure for analysis of bulk density

Bulk density of powder is defined as the ratio of the mass of the powder to its bulk volume. For determination of the bulk density, a weighed quantity of tea powder was introduced into a graduated measuring cylinder. The measuring cylinder was tapped manually till a constant5 volume was obtained. This volume is known as the bulk volume of the tea powder.

The same procedure was followed for each brand of tea powder.

Bulk Density =Mass of the Powder
Bulk volume

Result and Discussion

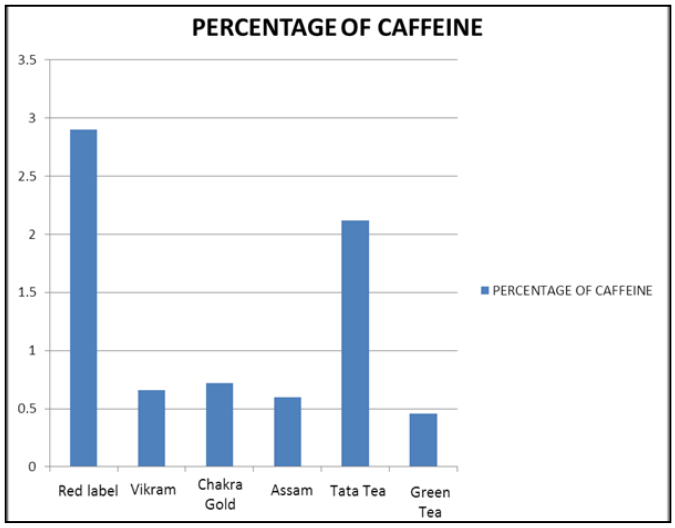

Fig 1: caffeine contents of the six different brands of tea powder

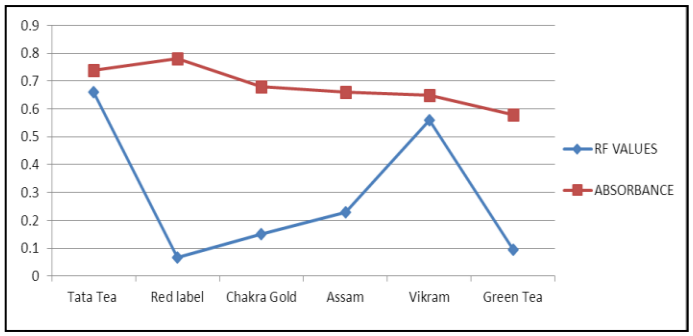

Fig 2: RF and Absorbance values of the six different brands of tea powder

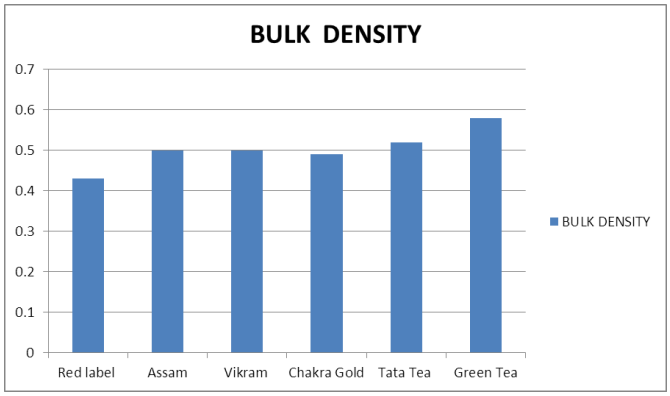

Fig 3: Bulk Density of the six different brands of tea powder

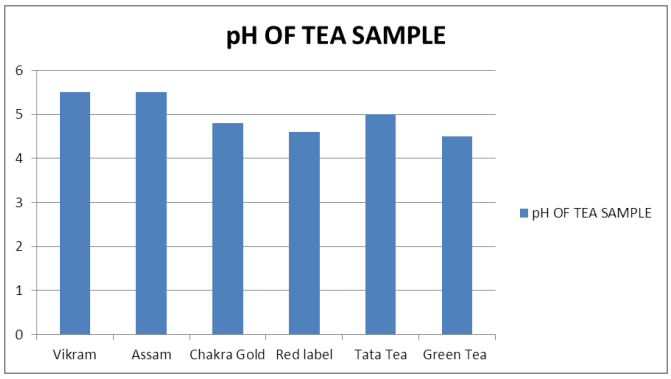

Fig 4: pH of the six different brands of tea powder

Discussion

Caffeine content

The result (Table 1 and fig 7) show that red label tea has the highest caffeine content of 1.45gm / 50 grams of the tea the lowest caffeine content was seen in green tea which had only 0.33 gm. The other products fall in between with Tata tea having 1.06gm chakra gold 0.36gm Vikram 0.33gm and Assam 0.30gm.

Table 1: Caffeine content of the six different brands of tea powder

Commercial Tea brands	Weight of caffeine content (gm)	Percentage of caffeine (%)
Red label	1.45	2.9
Tata Tea	1.06	2.12
Assam	0.30	0.6
Vikram	0.33	0.6
Chakra Gold	0.36	0.72
Green Tea	0.23	0.46

Intensity of color

The result shows that the green tea has lowest absorbance 0.58at wavelength 450nm and Red label tea has highest Absorbance 0.78 and 450nm the green tea shows lowest absorbance that means it has low caffeine content and red label has high caffeine content.

Table 2: Color intensity of the six different brands of tea powder by Spectrophotometry

Brand of Tea Powder	Absorbance
Tata tea	0.74
Red label	0.78
Chakra Gold	0.68
Assam	0.66
Vikram	0.65
Green Tea	0.58

Bulk Density

The result shows that green tea content very high density and red label contains low bulk density.

Table 3: Bulk Density of the six different brands of Tea powder

Brand of Tea Powder	Bulk density
Red label	0.43
Assam	0.5
Vikram	0.50
Chakra Gold	0.49
Tata Tea	0.52
Green Tea	0.58

Tea Acidity and Taste

The results showed that green and red label tea had the lowest pH about 4.6 among the product tested.

Vikram and Assam tea showed a pH of 5.5 and 5.2 respectively which ranks both products as having the highest pH

The rest of the products fall in between with pH of 4.6 to 5.5

The green tea and red label has lowest ph of hence it has very bitter taste.

Assam and vikram has highest pH and hence it is mild bitter in taste

The rest with mid ph and hence it is better in taste.

Table 4: Acidity and taste of the six different brands of tea powder by pH meter

Tea sample	Taste	pH
Assam	Mild bitter	5.2
Tata Tea	Bitter	5
Vikram	Mild bitter	5.5
Red label	Very bitter	4.6
Chakra Gold	Bitter	4.8
Green Tea	Very bitter	4.6

RF Values

The results showed that green and red label tea had the lowest RF value that is 0.094 and 0.066 respectively. The other tea product has RF value in between them

Table 5: RF Values six different brands of tea powder

Commercial Tea Brands	RF values
Tata Tea	0.66
Assam	0.23
Vikram	0.56
Red label	0.066
Chakra Gold	0.15
Green Tea	0.094

Conclusion

By studying tea isolation of caffeine from different brands of tea and comparative analysis with green tea it is concluded that,

1. The green tea and red label has lowest ph and very bitter taste and Assam and Vikram has highest pH with mild bitter taste.
2. Red label tea has highest Absorbance 0.78 and 450nm the green tea shows lowest absorbance that means it has low caffeine content and red label has high caffeine content.
3. By comparing the various brands of tea it is clear that the green tea has lowest caffeine content and the red label and Tata tea is good for health due to low caffeine content taste. Tata tea and red label shows adverse effect of caffeine and it causes addiction due t high caffeine content.

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