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EXTRACTION OF CAFFEINE IN VARIOUS TEA SAMPLES

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ABSTRACT

The tea, coffee and various other soft drinks that we consume in our daily life contain Caffeine. As Caffeine plays a vital role when ingested into our body, both positively and negatively, it becomes necessary to determine the amount of caffeine content in each food sample. This Project aims at determining the amount of caffeine present in various tea samples and a comparative study on them. From the studies, the tea containing maximum and minimum caffeine can be determined.

Keywords: - Tea Samples, Suction Pump, Bunsen burner, Standard Deviation

1. INTRODUCTION

Caffeine is a member of class of compounds called alkaloids, which are N containing compounds. Its IUPAC name is 1, 3, 7-trimethy 1 purine 2, 6-dione.It is a bitter, odourless white crystalline purine. The most well-known source of caffeine is seed of coffea Arabica coffee plant. It is also present in the leaves of the tea bush. The growing conditions, processing techniques and other contribute to caffeine content in tea .Other sources include energy drinks, chocolate, soft drinks etc .... These caffeine containing beverages are very popular and are consumed by 90% of adults daily. The global consumption of caffeine is estimated at 120,000 tons per year. Caffeine is a psychological stimulant. It is the world's most widely consumed psychoactive drug. Caffeine is classified by the Food and Drug Administration as "generally recognized as safe" (GRAS) is that toxic doses, over 10 grams per day for an adult, are much higher than the typically used doses of under 500 milligrams per day. A cup of coffee contains 80-175 mg of caffeine. There are several known mechanisms of action to explain the effect of caffeine. The most prominent is to reversible block the action of adenosine on its receptor, which blocks the onset of drowsiness induced by adenosine, also stimulates selected portions of the autonomic nervous system. Caffeine can have both positive and negative health effect. Caffeine citrate was placed on the WHO Model List of Essential Medicines in 2007.It may confer a

modest protective against some diseases, including Parkinson's disease and certain types of cancer. One meta analysis concluded that cardiovascular disease such as coronary artery disease and stroke is less likely with 3-5 cups of coffee per day but more likely with over 5cups per day. Some people experience insomnia or sleep disruption if they consume caffeine, especially during the evening hours. Evidence of risk during pregnancy is equivocal; some authorities recommend that pregnant women limit consumption to the equivalent of two cups of coffee per days or less. Caffeine is a central nervous system and metabolic stimulant, and used to reduce physical fatigue and to prevent or treat drowsiness. It produces increased wakefulness, faster and clearer flow of thought, increased focus, and better general body coordination. The amount of caffeine needed to produce these effects varies from person to person, depending on body size and degree of tolerance. In athletes moderate doses of caffeine can improve sprint, endurance, and team sports performance, but the improvements are usually not substantial.

2. MATERIALS AND APPARATUS

1. TEA SAMPLES
- l00 gpackofA.V.T Tea
- l00g pack of Ripple Tea
- l00g pack of Kannan Devan Tea
- l 00g pack of Green Tea
- l00g pack of Nilgiri Tea

2. ORGANIC SOLVENT - chloroform
3. SEPARATING
4. GLASS WARES - Beakers, glass rod.
5. SUCTION PUMP
6. CHEMICALS USED - Lead acetate, deionised water
7. BUNSEN BURNER.

3. PRINCIPLE OF EXTRACTION

Liquid-liquid extraction, also known as solvent extraction and partitioning, is a method to separate compounds based on their relative solubilities in two different immiscible liquids usually water and an organic solvent. It is an extraction of substance from one liquid phase into another liquid phase. Liquid- liquid extraction is a basic technique in chemical laboratories where it is performed using a separating funnel. This type of process is commonly performed after a chemical reaction as part of the work-up. For a given compound, solubility different b/w solvents are quantified as the distribution coefficient. A separating funnel is the most commonly used piece of glassware to achieve the extraction. The aqueous layer is added to the separating funnel and then the extraction solvent is added. The mixture is shaken and the separating funnel is "burped" to release any pressure in the funnel. The funnel is then placed in an iron ring to allow the layers to separate from each other. The stopcock at the bottom of the separating funnel is then opened to remove the bottom layer into a flask. One extraction is usually not enough to remove the entire organic compound, so more

organic solvent is added to the aqueous layer and shaken. This is allowed to separate out again and then the bottom layer is removed once more. This procedure can be repeated as necessary. For an extraction to be successful, the two solvents used must be immiscible in each other. That is they must be insoluble in one another. Water is immiscible in most organic solvents. Some of these solvents arc butanol, chloroform, cyclohexane, methylene chloride, ethyl acetate, hexanes, toluene, diethyl ether and pentane when choosing a solvent for extraction, there are some things to consider. One is that the extraction solvent is immiscible in the first solvent. The compound being extracted needs to be soluble in the extraction solvent and unrcactive with the solvent. Major impurities should not be soluble in the extraction solvent so that they will remain in the first solvent The extraction solvent should be fairly volatile so that it can be removed from the solute and nontoxic and nonflammable. Most organic solvents are toxic or flammable so caution must be used with extraction solvents.

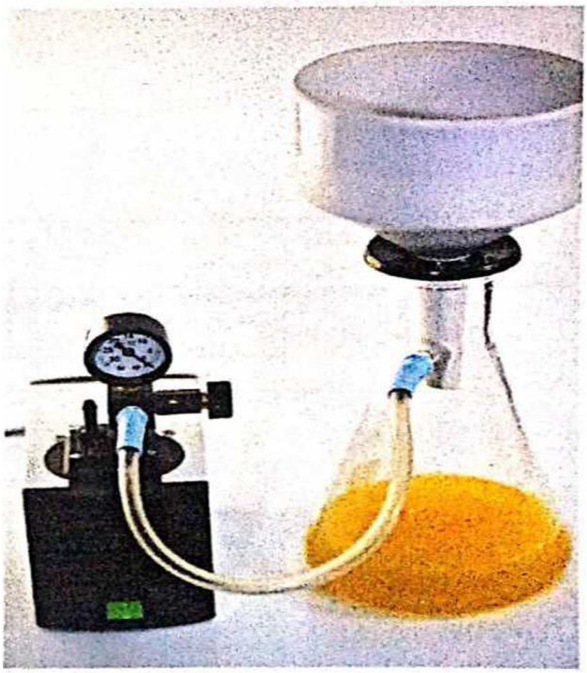
4. METHODOLOGY

Preliminary Procedure

• 5g of tea leaves, from each sample, are weighed in an electronic balance.

• Transferred the weighed tea leaves into a beaker.

• China dish are weighed and noted the empty weight.



5. EXPERIMENTAL PROCEDURE

i) 5g of tea leaves were taken as sample and 150 ml of water added to it in a beaker.

Then the beaker was heated up to extreme boiling.

ii) The solution was filtered and lead acetate was added to the filtrate leading to the

formation of a curdy brown colored precipitate.

iii) We kept on adding lead acetate till no more precipitate has been formed.

iv) Again solution was filtered and the filtrate so obtained was concentrated.

v) Then solution was allowed to cool. After that, 20ml of chloroform was added to it and shaken well, allowed to stand for a while.2 layers appeared in the separating funnel.

vi) In order to determine the caffeine content in tea sample, we separated the lower layer.

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vil) The solution then exposed to sunlight in order to allow chlorofonn to get evaporated.

viii) The residue left behind was caffeine and we weighed it and recorded the observations.

6. RESULTS AND DISCUSSIONS

Comparative Study

Tea Name	Sample 1 (in gm)	Sample 2 (in gm)	Sample 3 (in gm)	Mean	Standard Deviation
Green Tea	0.0715	0.0725	0.0717	0.0719	5.2915 xl0^{-4}
Kannan Devan	0.1370	0.1356	0.1364	0.1363	7.0356 x 10^{-4}
AVT	0.1735	0.1745	0.1728	0.1736	8.5440 xlO^{-4}
Ripple	0.2349	0.2239	0.2167	0.2252	9.1659 x 10^{-4}
Nilgiri	0.2408	0.2438	0.2529	0.2458	6.3011 x Hf^{4}

Report

From the above table , we concluded that Green tea has lowest amount of caffeine (0.0719g) followed by Kannan Devan (0.1363g), AVT (0.1736g), Ripple (0.2252g) and the highest for Nilgiri (0.2458g) Thus in 100 g of sample the amount of caffeine contained is tabulated below.

TEA SAMPLE	AMOUNT OF CAFFEINE IN 100 g.
Green Tea	1.438
Kannan Devan	2.726
AVT	3.472
Ripple	4.504
Nilgiri	4.916

7. CONCLUSION

Most of us begin our day with a cup of Tea or Coffee. Caffeine is an alkaloid present in tea, coffee and may other beverages that we consume. The presence of caffeine increases alertness, tension and decreases fatigue, as it infracts with our neuro system. It also increases our metabolic rate. But, caffeine overdose (1000 to 1500 mg/day) may live to irritability, headaches, restlessness etc. Hence, it is need to know the recommended dose of caffeine intake.

Here we compare five different tea samples, from that we noticed that Green tea is good sample which has the lowest caffeine content and followed by Kannan Devan A.V.T, Ripple and Nilgiri This Project helped us to know caffeine contents in the most commonly used tea samples. Through this project, we thus got an understanding why green tea is preferred over the others. As discussed earlier, green tea has good impacts on our health.

8. BIBLIOGRAPHY

1. Dose response effects of a caffeine-containing energy drink on muscle performance: a repeated measures design. Juan Del Coso*, Juan J Salinero, Cristina Gonzalez-Millan, Javier Abian- Vicen and Benito Perez-Gonzalez. Journal of the International Society of Sports
Nutrition 2012.

2. Arendash G W, Cao C (2010). "Caffeine and coffee as therapeutics against Alzheimer's disease", J. Alzheimers Dis. 20 Suppll: SI 17-26.

3. Santos C, Costa J, Santos J, Vaz-Cameiro A, Lunet N (2010). "Caffeine intake and dementia: systematic review and meta-analysis". J. Alzheimers Dis. 20 Suppll: S187-204.

4. Bolton S, Null G (1981). Caffeine, psychological effects, use and abuse. Orthomol. Psychiatr., 10(3): 202 -211.

5. Komes D, Horzic D, Belscak A, Kovacevic GK, Boljak A (2009). Determination of caffeine contents in tea and mate tea by using different methods. Czech J. Food Sci., 27:69.

6. Gunter G, Tuan V-D (2003). Handbook ofspectroscopy. Wiley-VCH Verlag GmbH and CO. KGa A, Weinheim ISBN 3 - 527- 29782,1: 0, 69.

7. Ruchi varma,Lalit kumar.Characterisation of caffeine isoiated from camellia sinensis leaves of Sikkim Himalayan reagion

8. http://wiki.answers.eom/Q/Which beverage has the highest caffeine content

9. http://www.nlm.nih.gov/med1ineplus/encv/article/002445.htm.

10. http://en.wikipedia.org/wiki/Caffeine.