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COMPARITIVE STUDY OF THE AMOUNT OF CAFFEINE PRESENT IN DIFFERENT TYPES OF TEAS

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Abstract: The experiment to isolate caffeine from different types of teas was done by two different procedures and the result was found to be synchronizing. Nine different types of samples from different places were taken. From these samples caffeine was isolated by two different methods.. By first procedure, the amounts of caffeine present in different samples are in the following order:Herbal tea <Dilmah tea < Earl Grey tea < Green tea < Darjeeling tea < Black tea <Orange tea < Jasmine tea < Assam tea.
By second procedure, the amounts of caffeine present in different samples are also in the same order as above.
The variation of content of caffeine is from 0.5 gm. in Herbal to 3.46 gm. in Assam tea. According to the chemical constitution (structure) of caffeine, urea presentin the soil of different places may be an important factor for the variation of caffeine in different samples of teas because it has direct relationship with caffeine structure.
Keywords: Isolation, chemical constitution, caffeine, tea, stimulant, central nervous system, alkaloids, drugs, uric acid

Introduction

According to Chinese mythology, in 2737 BC the Chinese emperor, ShenNung, scholar and herbalist, was sitting beneath a tree while the servant boiled drinking water. A leaf from the tree dropped into the water and Sheng Nung tried the brew. The tree was a wild tea tree.

Conversely the Indian and Japanese legends both attributed the discovery of tea to Bodhi dharma priest who found Zen Buddhism. The Indian legend tells how in the fifth year of a seven sleepless contemplation of Buddhism he began to feel drowsy. He immediately plucked a few leaves from a nearby bush and chewed them which dispelled his tiredness. This bush was a wild tree. From the earliest time tea was renowned for its properties as a health, refreshing drink. By the third century AD many stories were being told and some written about tea and its benefits of drinking, but it was not until the Tang dynasty (618 AD-906 AD) that tea became China's national drink and the world Ch'a was used to describe tea.

The first book on tea "Ch'aChing", crica 780 AD, was written by the Chinese author Lu Yu. It comprises three volumes and covers tea from its growth through to its making and drinking, as well as covering a historical summary and famous early tea plantation. There are many illustrations of tea making utensils and some say that the book inspired the Buddhist priest to create the Japanese tea ceremony. The spread of cultivation throughout the China and Japan is largely accredited to the movement of Buddhists priest throughout the region.

Tea and health

Not only tea is soothing and delicious, but it is healthy too. In fact, the American Health Foundation recommends we consume 5-6 cups daily because tea contains 1/3^{rd1}less caffeine than coffee or cola, helps reduce fatigue, maintains mental alertness, stabilizes fluid levels and is fat free and calorie free. The antioxidant in tea helps prevent….cancer of mouth, stomach, pancreas, lungs, esophagus, colon, breast and prostate. The

antioxidants in a single cup of tea equal those in one serving of vegetables. Tea's flavonoids prevent heart disease by reducing blood clotting, lowering blood pressure and lowering cholesterol.

Tea consists mainly of volatile oils, polyphenols (often incorrectly called tannins), caffeine, amino acids and trace vitamins and minerals. The polyphenols are responsible for most of tea's roles in promoting good health.

ftolyphenols- catechism, anti-oxidants known to help lower cholesterol and the risk of heart disease, inhibits some cancer and assists in cell repair. Caffeine –an alkaloid which stimulates the central nervous system, increases reaction time and ability to concentrate.

Vitamins- several B- complex vitamins.

Minerals – it contains Fluoride which acts to prevent caries and strengthen tooth enamel,

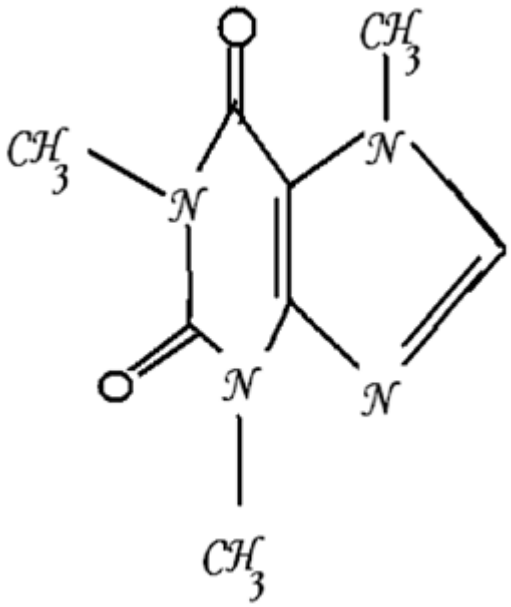
ftotassium which stimulates enzymeproduction,

Manganese which regulates blood sugar levels,

It also contains calcium, chromium, cobalt, copper, iron, magnesium, molybdenum, phosphorus, potassium and zinc.

Caffeine

Caffeine occurs in dried tea leaves, coffee beans, and in cola leaves. It is a mild stimulant to the central nervous system and a nitrogen heterocyclic compound. Thus, it is now termed an alkaloid. Caffeine is also a mild stimulant to the heart and the respiratory system. That is why we feel refreshed when we take tea, coffee, or cola soft drinks. Caffeine is used in nonprescription stimulants and sleep-preventing pills. It is a diuretic



Caffeine

CaffeineBecause caffeine is a drug, there are other direct effects on the human body. Caffeine goes to work as soon as it is ingested. Within. The use of caffeine usually delays the onset of sleep. Despite this, it also shortens the length and depth of sleep. 5 minutes it is absorbed into the blood reaches its peak level. Because caffeine is a mild stimulant, it affects the brain. It increases neural activity in many parts of the brain. It increases performance of simple intellectual tasks and enhances processing of information. Caffeine also increases alertness and the ability to concentrate, along with countering fatigue

The quality of sleep is also reduced. Caffeine users experience more movement during sleeps and is easily awoken. If caffeine consumptionincreases.

Experimental

Required chemicals- lead acetate, lead monoxide, sulphuric acid, anhydrous sodium sulphate, sodium carbonate, dichloromethane, nitric acid, liquid ammonia, salicylic acid, benzene, petroleum eather, and mercuric chloride were of AR grade. For reagent preparation chemicals were weighed accurately by using sophisticated

electronic balance. Triple distilled water was used wherever required in reagent preparation.
Glass wares and apparatus were of borosil grade.

Experiments were performed by following 2 procedures ftrocedure 1 / lead acetate extractionmethod.
ftrocedure 2/ sodium carbonate- dichloromethane extraction method.
Caffeine isolated by two procedures was confirmed by color
formation reaction and derivatives.
Results obtained are summarized in the following two
tables, table-1

Table-1

Samples	Procedure-1 (percentage of caffeine)	Procedure-2 (percentage of caffeine)
Darjeeling tea	2.2	2.6
Assam tea	3.46	3.64
Orange tea	3.1	3.14
Jasmine tea	3.12	3.16
Dilmah tea	1.5	1.56
Black tea	2.6	2.7
Earl grey tea	1.9	1.94
Herbal tea	0.5	0.55
Green tea	2.1	2.14

Result and discussion

samples	Procedure-1 (percentage of caffeine)	Procedure-2 (percentage of caffeine)
Herbal tea	0.5	0.55
Dilmah tea	1.5	1.56
Earl grey tea	1.9	1.94
Green tea	2.1	2.14
Darjeeling tea	2.2	2.6
Black tea	2.6	2.7
Orange tea	3.1	3.14
Jasmine tea	3.12	3.16
Assam tea	3.46	3.64

By first procedure, the amounts of caffeine present in different samples are in the following order:
Herbal tea <Dilmah tea < Earl Grey tea < Green tea < Darjeeling tea < Black tea <Orange tea < Jasmine tea < Assam tea.

By second procedure, the amounts of caffeine present in different samples are the following order:
Herbal tea <Dilmah tea < Earl Grey tea < Green tea <Darjeeling tea< Black tea <Orange tea < Jasmine tea < Assam tea.
Here again the order is same as first procedure i.e. Herbal tea has least content and Assam tea has the highest content of caffeine among the various sample. The variation of content of caffeine is from 0.5 %. in Herbal to 3.46 %. in Assam tea. According to the chemical constitution (structure) of caffeine, urea present in the soil of different places may be an important factor for the variation of caffeine in different samples of teas because it has direct relationship with caffeine structure.

Conclusion

Caffeine has been incorporated in our everyday lives in a way that minimize the potential hazards. Although it is viewed by science as a mildly addictive substance, caffeine is grouped with other drugs (alkaloids)of dependency in the International Classification of Diseases. Caffeine can cause health problems when it is abused and when people become addicted to its use. However, when this substance is used in

moderation it is safe for human consumption. Assam tea has more caffeine, hence its consumption should be in moderate quantity (2-3 cups per day, one cup of tea contains 300-350 mg caffeine). Consumption of caffiene1000-1200 mg per day results in dependence of the drug. Many side effects may result from very high caffeine consumption. Caffeine has always been known as habit forming. Many people cannot start their day without that first cup of tea merely because they are used to it. But by consuming large amount of caffeine, one runs the risk of also becomingaddicted.

Summary

In present work caffeine was isolated from different types of teas by two different processes -ftrocedure 1 / lead acetate extraction method. ftrocedure 2/ sodium carbonate- dichloromethane extraction method.

And results of both methods were found very close to each other and their quantity was confirmed by suitable confirmatory tests. Results found by both methods are in the same order as follows-

Herbal tea <Dilmah tea < Earl Grey tea < Green tea < Darjeeling tea
< Black tea <Orange tea < Jasmine tea < Assam tea.

Cause for variation of quantities of caffeine in different samples of tea may be attributed to urea/uric acid present in different soils where teas were grown because uric acid has direct relation with chemical structure ofcaffeine.

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