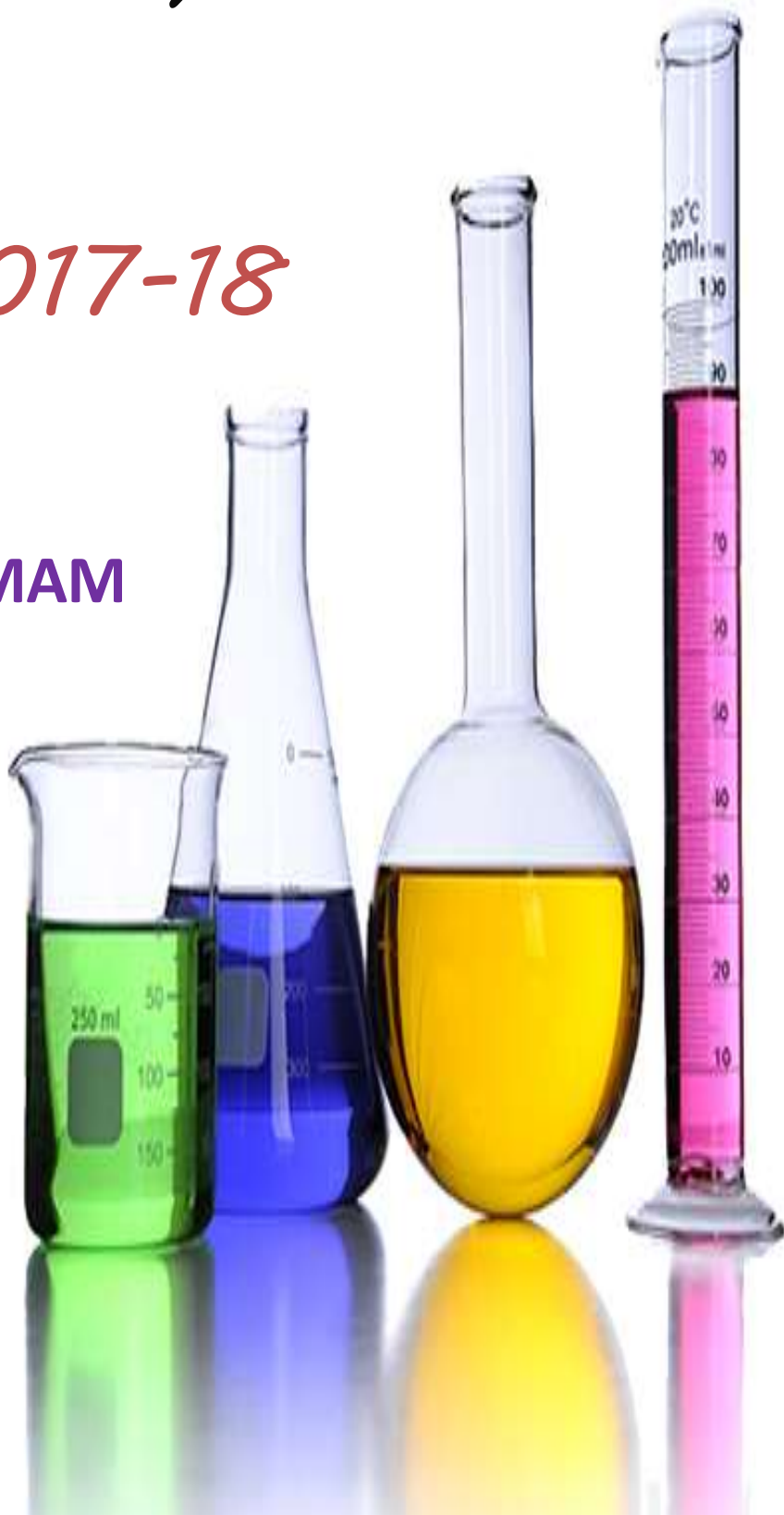# CHEMISTRY INVESTIGATORY PROJECT

SESSION 2017-18

SUBMITTED TO:
Ms. AMRIT KAUR MAM

SUBMITTED BY:
PRANSHU DIWAKAR
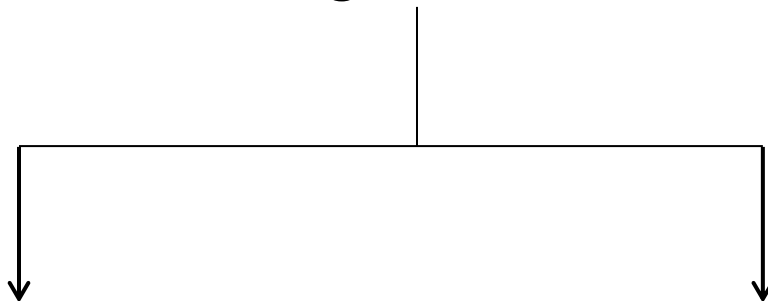**XII 'A'**
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CERTIFICATE

This is to certify that the original and genuine research work is carried out to investigate about the subject matter and the related data collection and has been completed solely and satisfactorily by this student regarding the Project titled,

"Determination of Caffeine in Tea Samples"

Signature of

External Examiner   **Chemistry Teacher**

ACKNOWLEDGEMENT

It gives me great pleasure to express my gratitude towards our chemistry teacher for her guidance, support and encouragement throughout the duration of the project. Without her motivation and help the successful completion of this project would not have been possible.

PRANSHU DIWAKAR
(Name and signature of the student)

CONTENTS

✓ **Bibliography**

INTRODUCTION

Tea is the most commonly and widely used soft beverage in the household. It acts as a stimulant for central nervous system and skeletal muscles. That is why tea removes fatigue, tiredness and headache. It is also used for lowering body temperature. The principal constituent of tea, which is responsible for all these properties, is the alkaloid-caffeine. The amount of caffeine in tea leavers varies from sample to sample. Pure caffeine has been found to be a tasteless substance.

The xanthene beverages found in tea also create a medical problem. Often the physicians face the question whether to

deny caffeine-containing beverages to patients or not. In fact children are more susceptible than adults to excitation by xanthene.

For this reason, tea and coffee should be excluded from their diet. It has a high tannin content may be as high as 50 mg per cup. After all our main stress is on the presence of caffeine in xanthene beverages and so in this project we will study and observe the quantity of caffeine varying in different samples of tea leaves.

Theory

Caffeine

The most important methylated alkaloid that occurs naturally is caffeine. Its molecular formula is $C_8H_{10}N_4O_2$. Its IUPAC name is 1, 3, 7-trimethylxanthene and common name is 1- ethylated thiobromine.
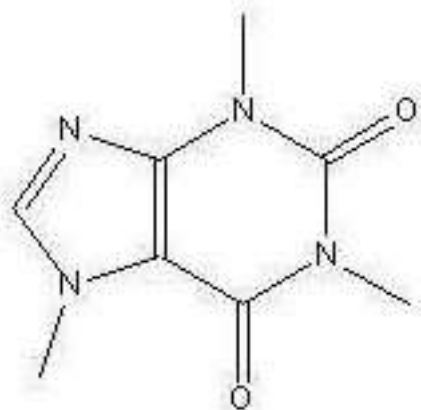
caffeine

Purely it is white, crystalline solid in the form of needles. Its melting point is 123^oc.

It is the main active principle component of tea leaves.

Uses of Caffeine

In medicine, it is used to stimulate, central nervous system and to increase flow of urine.

Because of its stimulating effects, caffeine has been used to relieve fatigue. But it is dangerous and one may collapse if not consumes it under certain limit.

Caffeine is also used in analgesic tablets, as it is believed to be a pain reliever. It is also beneficial in migraines.

Effects of Caffeine

It is psycho – stimulant.

It improves physical and mental ability.

Its effect in learning is doubtful but intellectual performance may improve where it has been used to reduce fatigue or boredom.

When administered internally, it stimulates heart and nervous system and also acts as diuretic. On the contrary their excessive use is harmful to digestion and their long use leads to mental retardation.

Procedure

⇒ First of all, 50 grams of tea leaves were taken as sample and 150 ml of water was added to it in a beaker.

⇒ Then the beaker was heated up to extreme boiling.

⇒ The solution was filtered and lead acetate was added to the filtrater, leading to the formation of a curdy brown coloured precipitate.

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

⇒ Again solution was filtered.

⇒ Now the filtrate so obtained was heated until it had become 50 ml.

⇒Then the solution left was allowed to cool.

⇒After that, 20 ml. of chloroform was added to it.

⇒ Soon after, two layers appeared in the separating funnel.

⇒Now separate the lower layer.

⇒The solution then exposed to atmosphere in order to allow chloroform to get evaporated.

⇒The residue left behind was caffeine.

⇒ Then we weighed it and recorded the observations.

Similar procedure was performed with different samples of tea leaves and quantity of caffeine was observed in them.

OBSERVATION

1. Red Label Tea (Brooke Bond)

Weight of china dish	46.60g s
Weight of china dish with precipitate	47.20gms.
Amount of caffeine	0.60gms

2. Yellow Label Tea (Lipton)

Weight of china dish	46.60gms
Weight of china dish	47.15gms.
Amount of caffeine	0.55gms

3. Green Label Tea (Lipton)

Weight of china dish	46.60gms.
Weight of china dish with precipitate	47.05gms.
Amount of caffeine	0.45g s.

RESULTS:-

Quantity of caffeine

Red label tea - 60mg. /sample of 50 gm.

Yellow label tea - 55mg./sample of 50 gm.

Green label tea - 45mg./sample of 50 gm.

Percentage of caffeine

Red label tea – 0.12%

Yellow label tea – 0.11%

Green label tea – 0.9%

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