ACIDITY OF TEA LEAVES

Chemistry Investigatory Project 2019-20

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Something About Tea

Tea is an aromatic beverage commonly prepared by pouring hot or boiling water over cured leaves of the tea plant, Camellia synesis. After water, tea is the most widely consumed beverage in the world. It has a cooling, slightly bitter, astringent flavour which many people enjoy.

Contents of Tea

Tea contains catechins, a type of antioxidant. In a freshly picked tea leaf, catechins can comprisal up to 30% of the dry weight. Tea also contains L-theanine, and the stimulant caffeine at about 3% of its dry weight, translating to between 30 mg and 90 mg per 8 oz (250 ml) cup depending on type, brand, and brewing method

.Tea also contains small amounts of theobromine and theophylline. Due to modern environmental pollution, fluoride and aluminium have also been found to occur in tea, with certain types of brick tea made from old leaves and stems having the highest levels. This occurs due to the tea plant's high sensitivity to and absorption of environmental pollutants.

Something About Tannic Acid

Tannic Acid in tea is actually a myth, a rather popular one. The acidity of tea leaves is not due to the tannic acid. Tea contains polyphenols (aka catechins), which are a specific type of tannin. Green Tea contains more of these substances (30-42% of the extractable solids) than Black Tea or Oolong Tea. Tea does not contain Tannic Acid. Thus, the acidity of tea is due to tannins and not tannic acid.

Reason for Acidity of Tea Leaves

Tea contains a variety of naturally acidic and basic compounds which interact to form a mildly acidic solution. A 2001 analysis of black tea found that the dominant anions (acidic parts of compounds) in brewed tea were oxalate and citrate. Citrate is associated with citric acid, and is a common organic acid also found (in much higher concentrations) in citrus fruit like orange and lemons. Oxalates are also widespread in leafy vegetables and fruits.

Aim

To compare the oxalic acid content in the various samples of tea leaves

Materials Required

1. 5gm of three different types of tea leaves
2. Calcium Carbonate ($CaCO_3$)
3. Filter Paper
4. Funnel
5. Beaker
6. Chemical Balance
7. Wire Gauge
8. Tripod Stand
9. Bunsen Burner

THEORY

The oxalic acid present in the tea leaves is precipitated as calcium oxalate by treatment of aqueous solution of tea with calcium carbonate. Calcium oxalate is then hydrolysed with conc. H_2SO_4 (concentrated sulphuric acid) and recrystallized from water.

PROCEDURE

1. Weigh exactly 5gm of 1st sample of tea leaves.
2. Take 100ml of distilled water in a beaker.
3. Put tea leaves in above beaker boil it for 10 minutes.
4. Filter above boiled solution using funnel and filter paper in another beaker.
5. IN filtrate add 2gms of $CaCO_3$ and boil it.
6. Filter above boiled solution using funnel and filter paper in another beaker. There will be a ppt. of Calcium oxalate on the filter paper.
7. Keep filter paper aside and let it dry.
8. Weigh the ppt. of oxalic acid.
9. Repeat the above 1-8 steps for the other two samples.

OBSERVATION TABLE: -

S.no	Brand of Tea	Weight of Tea Leaves	Weight of acid obtained	Percentage of Oxalic Acid
1	Red Label	10gm	0.91gm	9.1%
2	Twining's	10gm	0.97gm	9.7%
3	Taj Mahal	10gm	0.80gm	8.0%

Result

Twining's has high amount of oxalic acid among Red Label, Taj Mahal, and Twining's. Thus, Twining's has a good flavour.

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Thank You

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