

TEA AND COFFEE (NON- ALCOHOLIC BEVERAGES)

Beverages

- Thirst quenching properties
- Value as social drinks
- Enhance pleasure of eating
- Nutritional value
- Medical reasons

Beverage categories

1- Non-alcoholic beverages (soft drinks)

a- Non-carbonated, non-alcoholic

Tea, coffee
Fruit and vegetable juices
Mineral water
Milk beverages
Functional and nutritional beverages

b- Carbonated, non-alcoholic

Flavoured fizzy drinks (high carbonation)
Sports or isotonic beverages (low carbonation)

2- Alcoholic beverages

a- Carbonated, mildly alcoholic (Champagne, Beer (low carbonation)

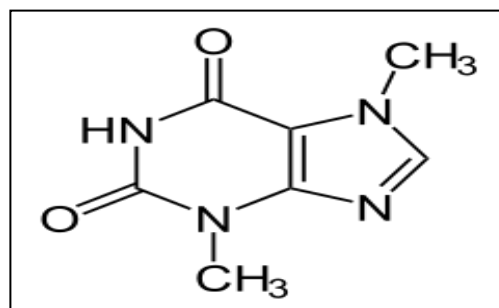
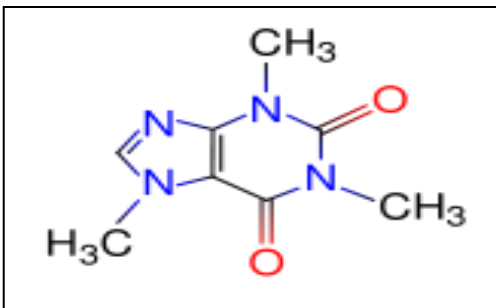
b- Non-carbonated, alcoholic (Wine, Whisky, Gin & Rum)

Drink for Caffeine

- Beverages that contain caffeine or purine derivatives, are used world wide for their stimulating and refreshing qualities.
- Caffeine is an alkaloid that is a diuretic and nerve stimulant (<2%)
- Tea originated in southeastern Asia
- Coffee originated in southwestern Asia

Purines

- Small molecules that contain nitrogen possessing purine skeleton.
- 15 compounds are reported
- Adenine and Guanine are nucleotides



Tea

- A beverage which consists of an infusion of the processed and dried leaves of the tea plant, *Camellia sinensis*
- No food value
- Refreshing and stimulating properties
- Contain caffeine
- Grown in tropical or near tropical climate
- Processed to develop flavour after harvest
- Flavour compounds extracted in water for consumption as beverage

Tea constituents affecting brewing quality

- Caffeine-stimulating effect
- Tannin-color and strength, astringency, body
- Essential oil-flavor & aroma

Main classes of tea

- Green (heat inactivation of enzymes causing oxidation)
- Black (enzymatic oxidation allowed)
- Oolong (intermediate where partial oxidation is allowed by delayed heating)

Countries involved

- Originated in around Tibet and is also indigenous to Assam, China and Southern Cambodia
- Production:
 - Asia – 70%
 - India 30% but consumes more than 50%
 - Sri Lanka – 10%
 - East Africa –Kenya
 - Indonesia, Thailand, China, Turkey, USSR
- British are world's biggest tea drinkers

Plant

- *Camellia sinensis*
 - Two main varieties
 - *C.sinensis var. sinensis*
 - *C. sinensis var. assaminca*
- *Family:* Theaceae
- Mainly grown in subtropics and mountainous regions of tropics
- It can be grown from above sea level and just over 2100 meters



Morphology

- Small evergreen trees
- From rooting of cuttings to maintain uniformity of particular variety
- They are allowed to grow knee high for easy picking
- Mature when 4 yrs
- Only first two young leaves and the terminal buds called as “flush” are picked (high concentration of caffeine)
- Can be picked every 10 -14 days

Process

- Chinese tea – Green tea, flowery flavor and light
- Assam tea – Black tea, “heavy” stronger
- Black tea: Process involves
 - Withering by blowing air through the leaves that are in troughs to reduce water content and enzymatic release of aroma
 - Fermentation – by rolling leaves and leaving them in a warm damp condition to rupture cells, allow oxidation of phenolics and turn copper color
 - Finally dry or fire the tea leaves with hot air to remove excess water, gives black color
- Green tea: Freshly picked leaves are steamed and dried without the withering stage and thus retain a faint but distinctive ‘grassy’ taste, and their green color.

Chemistry of tea

- Caffeine the stimulant 3-4%, theobromine (.017%) and theophylline (.013%)
- Tannins
- Polyphenols – flavonoids, catechins
 - Antitumor and antimutagenic
 - Prevent tumor cell growth and division
 - Green tea is 6 times better than black tea

Coffee

- Second only to petroleum, as a revenue earner, coffee is an immensely valuable commodity.
- This drink revives 1/3 of world’s population.
- Finns drinks on average 5 cups each day
- Japanese bath in coffee grounds for the health giving properties
- Turks scan the dregs of their coffee cups for omens of future

Discovery and spread

- Native of Abyssinia
- By Ethiopians goatherds
 - Noticed that their goats were unusually frisky after eating the ripe red berries of wild coffee bushes

- 2nd AD, local tribe men
 - made small cakes from the pulverized fruits mixed with fat and grains to sustain them on long journeys and to relieve fatigue
 - Made stimulant drink by fermenting berries and mixing with water.
- Arabs were the first to brew coffee
- 13th century – coffee houses were established and the drink became very popular
- Quickly spread to turkey and the surrounding areas.
- Gesture of hospitality by offering a cup of strong black brew to visitors.
- Reached Europe around 1616
- By 1675 it became a rage in London
- “penny universities”
- English stock exchange, the merchant banks and first insurance companies all had beginnings in coffee houses

The plant

- *Coffea arabica* (arabica coffee) – 75%, *C. canephora* (robusta coffee) 24% and *C. liberica* are grown commercially
- Family - Rubiaceae
- Three varieties are known
 - Arabica
 - Robusta
 - Liberica

Morphology

- Source of coffee is the seed that is part of a fleshy berry (sometimes called as cherry)
- Grows well at higher elevation. Plants are grown directly from seed. Harvesting after 3-5 yrs and will produce coffee for 30 yrs.
- Small tree with glossy, evergreen leaves and white, sweet smelling flowers
- After fertilization, mature berries turning dark green to yellow then red.
- Inside the sweet pulpy outer layers are two coffee-seed surrounded by a delicate silvery seed coat.
- Cannot tolerate frost they are grown in tropical and sub-tropical countries with an average rainfall of at least 1.9 meters per annum

Processing

- After picking berries, mostly by hand, the sweet pulp which surrounds the coffee beans (really seeds) which develop inside each cherry – like fruit is removed in one of two ways.
 - Dry process – produces beans sometimes known as ‘hard’, ‘native’, or ‘natural’ in trade
 - Dry whole fruit in the sun
 - Remove dried pulp and fine endocarp and the silver lining around the seed

- Wet processing produces mild but superior flavor coffee
 - Depulped machine
 - The parchment is washed and left for fermenting for 12 -24 hrs – leading to chemical change takes place to give characteristic aroma and taste
 - Beans then dried and the fine endocarp is removed

Instant coffee making

- Coarsely ground coffee is placed in sealed stainless percolators and brewed under pressure for several hrs.
- Coffee aroma is added
- The concentrate is either
 - ✓ sprayed under high pressure through fine nozzles into a very high towers. As the liquid falls back it dries into powder which is tumbled with steam to form granules
 - OR
 - ✓ Freeze dried - Coffee brew is dried into thin sheets which is often cut into granules. Temperature is then raised under vacuum. This will water is “boiled –off” without the coffee getting wet. There is no heat damage or loss of aroma
- Roasting – reduces the moisture and bring out aromatic oils
- Very sophisticated-computer control mechanism is involved
- Varieties: variety of coffee, region it is grown, preparation method and roasting time

Coffee Chemistry

- Caffeine (1-2%)
- Chlorogenic acid
- Tannins (3-5%)
- Sugars (15-17%)
- Fatty oils (10 -15%)
- Proteins (10 -15%)