Coffee and Tea Processing

level II

May 2019, Version 2 Occupational standard

Module Title: - Performing basic sensory tests And Analysis in coffee and tea

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Instruction sheet 1

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Reviewing test request
- Identifying hazards and enterprise controls
- Identifying types of typical tests

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to

- Determine Test request is reviewed
- Identify Hazards and enterprise controls
- Identify Typical tests

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).

5	If your performance is satisfactory proceed to the next learning guide.

Information sheet 1	Reviewing Test Request

1.1 Importance of coffee and tea test

A natural products, coffee & tea are subject to differences in flavor depending on processing, grade, time from harvest, and in the case of coffee species and variety of plant. Manufacturing variations including processing, blending, roasting, grinding and packaging will affect the quality of the finished product. Coffee & tea are constantly changing in all its forms, from the farm to the cup. In order to maintain a consistent level of quality for sale (or for consumption), one needs to understand the nature and rate of these changes to make appropriate business decisions about the quality of product being served or sold. This can only be accomplished through regular scientific analysis.

1.1.1 Testing samples

- Different green coffee
- Different rolled tea
- bottled water
- Coffee to Water Ratio for Cupping

1.1.2 Equipments involve in sample tasting

- Grind For Cupping
- Roast For Cupping
- Cupping Spoons
- Cupping Tables
- Cupping, Vessel ,forks and knives, napkins, disposable water cup Thermometer
- Cupping Room Size

Figure 1: Reusable sample containers/tray

1.1.3 Test Request Review/ Requirement

Preparation and evaluation isolation room: in the room the environmental controls are very important. The temperature should be between 22-24 ^{o}C, the humidity 45-55 %.The lighting is between 300-800 lux. The wall of the room is white.

Sensory Analysis Booths/Room

- Near to the panelist room (transfer window).
- Well-lit, well ventilated, easy to clean surface
- Laboratory for physical, chemical analysis of raw and prepared foods
- Refrigerator, stove, Dishwasher
- Trays, cupping spoons. cupping vessel of the same color and size
- high surface area
- Shelves, cabinets, cupping tables
- Award spaces/panelist room

- Noise and odor free
- Draft-free, ventilated
- Separation of reviewers
- Instruments must be calibrated to give standardized measurements that can be universally produced and interpreted.
- Panelists also must be trained through direct experiences specifically designed to familiarize the individual with test procedures, to improve an individual's ability to recognize and identity sensory attributes and to improve an individual's sensitivity and memory thus permitting more precise and consistent sensory judgments.

Figure 2: panelist room/booth

1.2 Sensory Testing Methods

Sensory analysis (or sensory evaluation) is a scientific discipline that applies principles of experimental design and statistical analysis to the use of human senses (sight, smell, taste, touch and hearing) for the purposes of evaluating consumer products.

sensory testing methods are divided into **three** commonly used classes, each with a different goal and each using participants selected using different criteria.

1.2.1 **Discriminatory tests** - determine whether the two samples are perceptibly different. When 2 samples are chemically different and may be perceived as identical. When there is a change in the processing method of a food product

A. Triangle test: Panelist is presented with one different and two alike samples all three samples should be presented to the panelist at once and the panelist should be instructed to taste the samples from left to right. The panelist is instructed to identify the odd sample and record his/her answer.

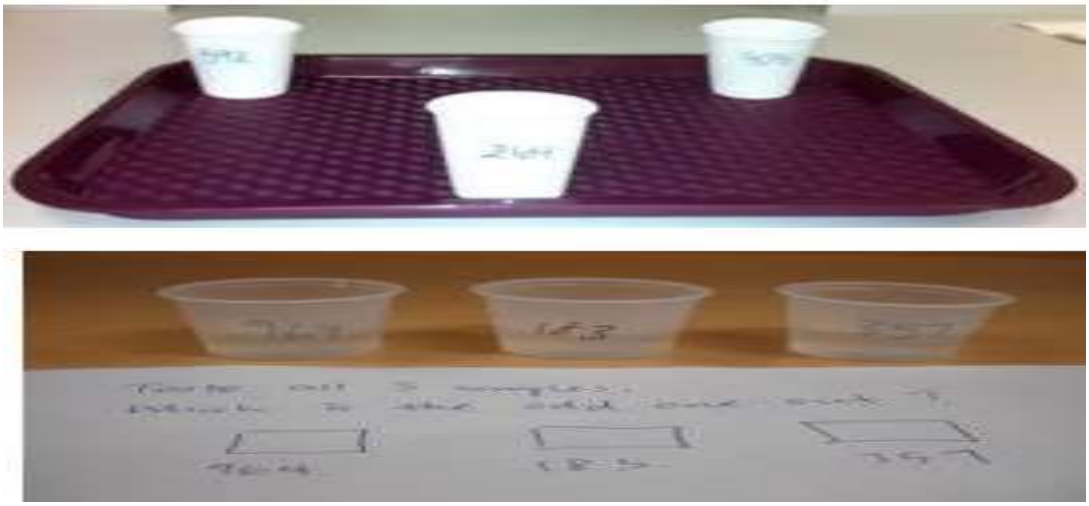


Figure 3: triangle testing samples

TRIANGLE TEST

2. **Indicate the degree of difference between the "identical' and "different' samples:**

- **Very less** ----------
- **Significant** ----------
- **Much** ----------
- **Very high** ----------

3. **Please tick the acceptable sample:**

- **Identical samples** ---------
- **Different sample** ---------

Remarks, if any:

Thank you.

Name: ---------- **Date** ----------

B. Duo-trio test: A Duo-Trio Test determines whether or not a sensory difference exists between two samples. The degree / intensity of difference is not elicited. To determine whether product differences result from a change in ingredients, processing, packaging, or storage.

C. Paired comparison test**:** determines whether two products differ in a specified attribute, such as sweetness, crispness, redness, etc. The paired comparison implicates the "forced" choice and therefore the judges must give an answer in any case. The chance probability associated with this test is 1/2. Frequently used in Preference tests.

D. Preference tests: Ranking test used for assessing order of preference

Figure 4: preference test

- Applications of difference/ Discriminatory tests
  - ✓ Screening and training assessors
  - ✓ Assessing the effect of changes in raw material, process and / or packaging on finished product quality
  - ✓ Investigating the presence of off-flavours and taints
  - ✓ Determining changes in product quality over shelf life
  - ✓ Verifying changes to formulations during product development

1.2.2 Descriptive /Descriptive Profiling Methods

Descriptive and discrimination sensory tests are referred to as "expert tests" because they may only be carried out by trained persons and can give very detailed information about individual product parameters. Usually consisting of a minimum of 6 – 8 assessors. The result is usually a sensory profile or fingerprint of each product.

- A

pplications of descriptive profiling

- ✓ D

efining the sensory properties of a target product for new product development

- ✓ D

efining the characteristics (specification) of a control or standard, for QA/QC and R&D purposes

- ✓ M

onitoring changes in sensory properties of a product during shelf life.

- ✓ D

escribing product attributes prior to consumer testing Affect.

1.2.3 **Affective/ Hedonic Test method**

Affective testing is useful for preliminary investigations prior to consumer research i.e. consumer-orientated testing. The tests require the use of untrained assessors; at least 50 – 100 are recommended .Separate sensory panels should be established for affective testing.

Acceptance (liking) tests 9 Point Hedonic Scale used for assessing degree of liking:

Table 1: 9 Point Hedonic Scale test

No-	9 Point Hedonic Scale level	6	dislike slightly
1	like extremely	7	dislike moderately
2	like very much	8	dislike very much
3	like moderately	9	dislike extremely
4	Like		

5	neither like or dislike		

A scale having “smiley” faces also elicits good response for food acceptability from children

Figure 5: Hedonic Scale

Table 2: Develop and rank a score sheet

RANK	TRAIT	1	2	3	4	5
1	FLAVOR					
4	BALANCE					
3	ACIDITY					
2	AROMA					
5	BODY					

Self-check 1	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Part 1: choose the baste answer (2 pt. for each)

1. One of the following is not sensory testing method?

   A. Discriminatory C. descriptive

   B. Hedonic D. qualitative

2. Which equipment is involved during coffee sampling?

   A. upping soon C. treys

   B. isposable water cup D. all

PART 2: write short answer for the following question (3 pt. for each)

1. Write the advantages of descriptive testing methods?

2. Explain the difference between Duo-trio test and triangle test?

3. What the requirements of sensory panel?

Note: Satisfactory rating - >10 points Unsatisfactory - <8 points

You can ask you teacher for the copy of the correct answers.

Information sheet 2	Identifying hazards and enterprise controls

2.1 Definition

Food Hazard is defined as anything that could contaminate food and cause illness or injury, or could otherwise violate established food safety program criteria if left uncontrolled. Food Hazard means dangerous or risky in our health.

2.2 Types of Food Hazard

1. **Biological hazards**: include any living organism which can cause adverse health effects in humans including: microbiological organisms and agents associated with soil, air, water, solar radiation, dust and noise
2. **Chemical hazards**: include compounds that can cause illness or injury due to immediate or long-term exposure, chemicals, aerosols, flammable liquids, fluids under pressure, and sources of ignition, solvents (e.g. toluene), fumes (e.g. welding),smoke (e.g. tobacco) ,mists.
3. **Physical hazards** : include foreign objects in food that can cause harm when eaten, such as glass or metal fragments , electric shock, aerosols sharps, broken glassware and hand tools, sources of ignition ,occupational overuse syndrome, slips, trips and falls, manual handling, working at heights and working in confined spaces ,Crushing, entanglement and cuts associated with moving machinery or falling objects.

2.3 Hazard Preventive Control

Health and Safety (OHS) and environmental management requirements includes all operations must comply with enterprise occupational health Safty (OHS) and environmental management requirements, which may be imposed through state/territory or federal legislation these requirements must not be compromised at any time all operations assume the potentially hazardous nature of samples and require standard precautions to be applied Wearing synthetic gloves, eye goggles , mouth muffs for protection of tea and coffee dust . where relevant, users should access and apply current industry understanding of infection control issued by the Concerned body of Health.

- **Hand Washing** : Human contamination of food is the highest ranked risk for food & beverage manufacturers, and hand washing is the preventive control. The number and location of hand washing stations is commonly overlooked. Installation of additional hand wash stations with signage, soap, hand drying and waste control can help prevent contamination.
- **Hand Sanitation**: Hand washing helps prevent human contamination of food – but it can't be constant. Expanded use of hand sanitizer stations helps provide a preventive control against contamination in between hand washings.
- **Drain Sanitation** Drains have been the source of many biological contaminants in serious recalls, including those involving higher risk bacteria such as Listeria M., responsible for many serious food safety outbreaks. Better maintenance, conditions, and sanitation help support preventive controls. Increase both sanitation (chemical), use of dry steam, and drain replacement and maintenance as preventive controls for drain sanitation.
- **Cross-Contamination/Food Contact Utensils** : Eliminating cross contamination is a real opportunity in nearly all food operations. The use of color-coded and controlled food grade utensils and tools, including sanitary storage, offers a significant opportunity and preventive control measure. The practice of controlling food contact utensils and tools needs to be expanded in food and beverage processing. Color-coding helps prevent cross contamination, and ensuring sanitation
- **Maintenance Tools and Parts**: A process for cleaning and sanitizing tools and parts must be in place for food use, and tools and parts need to be protected in storage or when staged for use. Use of multi-tiered maintenance carts to separate used and replacement tools, and used and replacement food equipment parts represents a significant preventive control opportunity. The control of cleaned parts and tools establishes a preventive control supported by the storage and separation of clean from used parts that might be contaminated.
- **Chemical Control** : Chemical and non-food material control is a key requirement not consistently met in most food and beverage manufacturing plants. The addition of segregated storage provides a preventive control. Most food plants do not store chemicals effectively; necessitating the addition of locked storage cabinets also, chemicals must be stored separately.

- **Environmental Testing** : Many plants perform environmental testing but expansion to higher risk sources and test verification is an accepted control to improve programs. The use and expansion of environmental testing for biological contaminant levels on food plant surfaces (non-direct surfaces of floors, walls and equipment) constitutes a preventive control. Additional areas to be tested include door handles, hoods, light switches, storage units, fork trucks, transports or any other non-food contact surfaces that could be a source of biological contamination.
- **M**

  inimizing environmental impacts : recycling of non-hazardous waste such as

  - ✓ c hemicals, batteries, plastic, metals and glass
  - ✓ appropriate disposal of hazardous waste
  - ✓ correct disposal of excess sample/test material
  - ✓ c orrect storage and handling of hazardous chemicals

Self-check 2:	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Part one: write short answer (10 pt.)

1) Write common types of hazards occurred in coffee and tea production?
2) How enterprise control hazards in coffee industry?
3) Write the most occurred hazarded in coffee industry?
4) How to minimize environmental impact?

Information sheet 3	Identify types of typical test

1 Types of Typical Test

A. Visual/Optical Tests

- **Appearance:** the appearance of the product and/or the package is often the only attribute that is used to base a decision to purchase or consume a product. every aspect of the appearance of test samples and must often attempt to obliterate or mask much of it with colored lights, opaque containers, etc.
- **Colour**: The evenness of color as opposed to uneven or blotchy appearance is important. Deterioration of food/coffee is often accompanied by a color change.
- **Texture**: Texture analysis these methods measure the mechanical properties of products; especially deformation modulus, breaking force and work, measuring by compressional procedure, etc. Penetrometer: A penetrometer is a device to test the strength of a material. They are usually round or cone shaped. The penetrometer is dropped on the test subject or pressed against it.

Figure 5 : penetrometer

B .

physical tests

- **D**

  ensity: To measure the density of green coffee beans, fill a graduated cylinder (tube with measure lines on it) with a known weight of green coffee. Note the volume reading. You can also do this in reverse (as we did) by filling the cylinder to your liking, note that fill volume value, and then weigh the coffee. Moisture content: Oven (standard method) the internationally accepted standard method for determining moisture in coffee is the loss of weight on heating. Although the loss in weight may not be only water, in coffee the other volatiles are not significant when using the standard drying time and temperature.

- **W**

  ater activity (aw): is a measurement of the availability of water for survival and growth of microorganisms on nutritious substrates, including green coffee.

- **p**

  article size, particle shape and size distribution : green coffee bean Size and shape includes length, thickness, width, particle size, geometric shape (square, circular, etc.), distribution of pieces, example of coffee Arabica, coffee Robusta, etc.; improper sizes and shapes may indicate defects. Surface texture is the dullness or shininess of a surface, the roughness, evenness; does the surface appear wet or dry, soft or hard, crisp or tough

C. chemical tests

- **c**

  olorimetric : used for coffee color measurement

Figure 6 : colorimeter

- n

  utrients/chemical compositions (e.g, free amino acid)

- a

  shes, crude fiber, water soluble extract

- **T**

  otal polyphenol compounds(TPP) Light and medium roasted coffees contain the highest content of polyphenolic compounds. determined using UV/ spectrophotometric methods.

D. **Biological test/ environment**

- **c**

  oli form bacteria : Also commonly known as "indicator organisms", coliform refers to a wide variety of bacteria that can be found throughout the environment. This means that these organisms can be found in soil, water surfaces, vegetation as well as on the skin or intestinal tract of warm-blooded organisms such as humans.

- **C**

  affeine: The “Common” guidelines The most accepted guidelines in the industry are that black tea has half the amount of caffeine as coffee. As the tea gets lighter in color the caffeine is reduced by half. The following is the amount of caffeine in a sample

  - ✓ C

    offee – 100mg

  - ✓ B

    lack tea – 50mg

- ✓ Oolong Tea – 25mg
- ✓ Green Tea – 15 mg
- ✓ White Tea – 10mg

D. packaging tests

- Sampling Bagged Coffee: When parchment coffee beans reach around 12% moisture, they are usually bagged in burlap or water-resistant bags and stored until grinding During storage, the beans are at risk of taking on more water so it's important to keep them in a dry, cool, and low-light environment and to keep monitoring moisture level
- **Permeability and/or leakage**: Permeability is a property of porous materials that quantifies the relative ease with which a transporting substance can pass through the material. To understand permeability, it must have good understanding of basic principles of mass, volume, concentration, heat, electricity and so on transport phenomena across a permeable barrier (permeation). Consider a polymer packaging film that is wrapped around a food product to avoid loss of a gaseous flavor and aroma from the food

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Part 1: choose the baste answer(2 pt. for each)

3. One of the following is not include in optical / visual tests?

C. olor C. texture

D. moisture content D. Appearance

4. Green coffee bean quality is affected by coffee bean size, coffee shape and size distribution. Which types of test is determine these?

C. ackaging tests C. Physical test

D. isual test D. chemical test

PART 2: write short answer for the following question (3 pt. for each)

4. Explain the Permeability and/or leakage. How affect the coffee quality?

5. Distinguish the difference between moisture content and water activity?

6. Mention the typical test?

Note: Satisfactory rating - >10 points Unsatisfactory - <8 points

You can ask you teacher for the copy of the correct answers.

LG #36	LO2: operate and monitor the blending, roasting and grinding process

Instruction sheet 1

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Recording and comparing sample description with specification and reporting discrepancies
- Preparing Sample
- Preparing representative samples for whole bulk and Blending tea
- Putting up the samples
- Marking the sample
- Using sample bag

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to

- Record and compare sample description with specification and Record discrepancies
- Prepare Sample
- Prepare representative samples for whole bulk and Blend the tea
- Put the samples

- M

  ake the sample
- Use sample bag

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” .
8. If your performance is satisfactory proceed to the next learning guide.
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1	Recording and comparing sample description with specification and report discrepancies

1.1 **Method of Coffee Grading/ specification**

According to The Coffee Exporter's Guide by the International Trade Centre, coffee is usually graded on the basis of one of more of the following criteria:

- A ltitude and region
- B otanical type
- P reparation (wet or dry process; washed or natural)
- B ean size, shape or color
- N umber of defects
- R oast appearance and cup quality (flavor, characteristics, cleanliness)
- B ean density.

1. S pecialty Grade Green Coffee: Specialty green coffee beans have no more than 5 full defects in 300 grams of coffee. No primary defects are allowed. A maximum of 5% above or below screen size indicated is tolerated. Specialty coffee must possess at least one distinctive attribute in the body, flavor, aroma, or acidity. Must be free of faults and taints. No quakers are permitted. Moisture content is between 9-13%.
2. P remium Coffee Grade (2): Premium coffee must have no more than 8 full defects in 300 grams. Primary defects are permitted. A maximum of 5% above or below screen size indicated is tolerated. Must possess at least one distinctive attribute in the body,

flavor, aroma, or acidity. Must be free of faults and may contain only 3 quakers. Moisture content is between 9-13%.

3. Exchange Coffee Grade (3): Exchange grade coffee must have no more than 9-23 full defects in 300 grams. It must be 50% by weight above screen size 15 with no more than 5% of screen size below 14. No cup faults are permitted and a maximum of 5 quakers are allowed. Moisture content is between 9-13%.

4. Below Standard Coffee Grade (4):24-86 defects in 300 grams.

Off Grade Coffee (5):More than 86 defects in 300 grams.

1.2. Quality requirements

The following is a list of quality characteristics with minimum and maximum values for raw coffee, that are usually required officially or by importers. Different minimum and maximum values can be agreed between importers and exporters, providing these do not clash with official regulations.

Table 2: coffee quality characteristics

Quality characteristics	**Minimum and maximum values**
Cup quality	• aromatic • clean • free from foreign tastes and smells
Bean shape	homogenous
Water content	max. 13 %
Residues	
Pesticides	Not measurable
Bromide and ethylene oxide	Not measurable
Mycotoxins	
Aflatoxin B1	max. 2 µg/kg
Total aflatoxins B1, B2, G1, G2	max. 4 µg/kg
Ocratoxin A	max. 2 µg/kg (4-437)
Patulin	max. 50 µg/kg

1.3 Reporting **discrepancies**

Discrepancies results analytical results indicating that the quality parameters of starting materials or product outcomes do not meet the specification are considered to be discrepancies (out-of-specification -results). There shall be a procedure describing the handling and investigation of such results, in which the following aspects shall be considered and covered.

1.4 Steps of recording discrepancies

Step 1: Investigation of the validity of the analytical result, in order to detect a potential analytical error or sample problem, which would render the out-of-specification –result invalid. When an out-of-specification -result is obtained, all material used for the analytical operations shall be kept for further investigation. A checklist should be available, based on which the laboratory result shall be scrutinized. The check-list should contain questions related to: The use of the right method and material (e.g. Instruments, reagents, chemical, glass-ware) Adequate training of the technician The correctness of calculations any potential abnormalities of the sample

Step 2: Re-analysis of the original sample preparation. The re-analysis may either confirm the Out-of-Specification -result or lead to results complying with the specification.

Step 3: Re-testing of further portions of the sample. The re-testing may either confirm the Out-of-Specification result or lead to results in specification. In the latter case, an investigation shall be performed to find the reason for the previous out-of-specification -result. Retesting results which are in specification may not overrule previous Out-of Specification -results without further investigation.

Step 4: Analyze of new samples .The analysis of new, additional samples may either confirm previous Out-of-Specification -results or lead to results in specification. In the latter case, an investigation shall be performed to find the reason for the previous Out-of-Specification -result.

The operator shall establish a documented procedure for dealing with products that do not comply with the intended requirements. This includes:

- Identification of product and batch code;
- Documentation
- Evaluation of the cause
- Segregation of batch or batches
- Disposal of products; and
- Internal information of relevant parties.

1.5 **Out of specification range of coffee**

Arabica: in excess of 86 defects per 300 g sample and for Robusta, in excess of 150 defects per 300 grams. Records as out of specification

For both Arabica and Robusta, moisture content below 8 percent or in excess of 12.5 percent refers to discrepancies. Temperatures: control the specification roasting temperatures at 205-250^{o} c .Throughput/roasting times for 10-20 minute

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: Say true or false for the following question (3 pt. for each)

1. Discrepancies results analytical results indicating that the quality parameters of starting materials or product outcomes do not meet the specification are considered to be discrepancies (out-of-specification -results).
2. The check-list should contain questions related to: The use of the right method and material (e.g. Instruments, reagents, chemical, glass-ware) during Investigation of result analyses.
3. Coffee is usually graded on the basis of one more criteria what are the criteria?
4. Explain the four green coffee grading methods?
5. List some coffee quality requirements /specification?

Note: Satisfactory rating – 13 points Unsatisfactory –<10points

You can ask you teacher for the copy of the correct answers.

Information sheet 3	Preparing Sample

3.1 Definition

Sample is the act, process, or technique of selecting a representative part of a population for the purpose of determining parameters or characteristics of the whole population. Samples should be properly identified and placed in coffee trays. If the test is to be blind, the identifications must be coded and the list that explains the coding must be secured.

3.2 **steps of coffee sample preparation/cupping**

Use small tags, either mounted on the tray or tape underneath for blind tests.

Step 1. Carefully roast all samples to a light medium shade with a light sheen (not shiny or oily). Coffees should be roasted past the first popping but not to the second. The light medium roast will allow all the flavours and aromas to develop but will not mask any off-tastes.

Step 2. Place 7.5 grams of roasted coffee form each sample in each cup and grind the content separately. This maintains the integrity of the sample in each cup. Use about 3 cups for each sample being tested.

Step 3. Grind each sample of coffee separately to a grind fitting for the percolator.

Step 4. Observe the fragrance of each cup of grounds before pouring the boiling water.

Step 5. When water has come to a boil, carefully pour the water into each cup. Be sure to wet all of the grounds.

Step 6. The coffee will form a head or foam at the top of the cup. Allow it to sit until all cups are poured then begin to break the head or foam and smell the aroma. Breaking involves placing the spoon into the cup below the crust and stirring vigorously while your nose is directly above the cup. Inhale the aroma rising from the grounds, rinse your spoon and move to the next cup. Focus on any aromatic differences from cup to cup. Off or unpleasant aroma will be a sure sign of a bad cup.

Step 7. Before tasting coffee it is important to remove floating grounds and fines; otherwise these will stay in your mouth and affect the taste of the following cup.

Step 8. Allow the cups of coffee to cool to a comfortable temperature then taste the coffee several times as it cools to room temperature. You should taste at a temperature with which you are comfortable.

Step 9. Place your spoon in the cup and draw two-thirds of a spoonful of brew (without any grounds) and sip in the brew with a great deal of noise and ceremony. (This will cause you to draw the sample of coffee into your mouth along with a large supply of air). When you exhale, some of the aromatics will reach into your nasal passage and allows you to detect the nose of the coffee.

Step 10. Swirl the coffee around inside your mouth and cover all parts of your tongue. Feel the texture get a sense of the body. Spit the coffee carefully into the spittoon and draw air into your mouth with a pop. This will aerate the residual vapors in the mouth and allow you to sense the after taste.

Step 11. Taste all of the samples in the same manner, and compare the results. Rinse your spoon before each sample, arrive at your conclusions and record them on your tasting chart.

3.3

Sample Preparation of Tea

Step 1: Inspect the dry leaf - Look for uniform leaf size; occurrence of stem, twigs or excessive particulate; characteristic rolling, curling or open leaf; proper color, proper "gloss" (appropriate on some teas and aroma).

Step 2: Steep- Measure the leaf, add water at the appropriate temperature, and steep for the appropriate time.

Step 3: Pour - using a cupping set, tip the cup (with lid intact) onto it's side and set it into the bowl. It should rest comfortably and allow the tea to pour out. If you are using other equipment, remove the filter or pour out the tea to stop the steeping process.

Step 4: Analyze the wet leaf - While the tea cools slightly, take the opportunity to take in the aroma and appearance of the wet leaf. One of the advantages of the cupping set is that you can slightly open the lid and inhale the aroma in concentrated form. This is a critical part of the cupping process. A seasoned taster can tell a great

deal from the aroma rising from the wet leaf. Look for uniformity of leaf size and proper color.

Step 5: Analyze the liquor - Tea tasters refer to brewed tea as the liquor, and inspect the liquor. First, check the aroma. Inspect the color and taste. A professional taster will suck the liquor in quickly (and loudly) attempting to "spray" the tea into the mouth, striking all areas of the tongue as well as the bottom of the nasal cavity (keep in mind, a good portion of taste comes from smell).

3.4 **Advantages of Sampling**

- ✓ Sampling saves time to a great extent by reducing the volume of data.
- ✓ Sampling Avoids monotony in works. When you have limited time, survey without using sampling becomes impossible. It allows us to get near-accurate results in much lesser time
- ✓ When you use proper methods, you are likely to achieve higher level of accuracy by using sampling than without using sampling in some cases due to reduction in monotony, data handling issues etc.

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: Say True or false for the following question (2 pt. for each)

1. u sing sampling, you cannot get detailed information on the data even by employing small amount of resources
2. If the test is to be blind, the identifications must be coded and the list that explains the coding must be secured.
3. S ampling saves time to a great extent by reducing the volume of data.
4. S ample is the act, process, or technique of selecting a representative part of a population not for the purpose of determining parameters or characteristics of the whole population.

Note: Satisfactory rating - 6 points Unsatisfactory -< 4 points

You can ask you teacher for the copy of the correct answers.

Information sheet 4	Preparing representative samples for whole bulk and blended tea

4.1 **Representative samples**

Representative samples are usually evaluated by difference tests and descriptive tests to ensure that the end product is having all the required qualities during production, distribution and marketing. Samples must be representative. When you send a sample be sure that it is fully representative of the actual coffee or, if you do not have the coffee in stock, that you can match the quality. tea blending is the blending of different teas together to produce a final product This occurs chiefly with black tea that is blended to make most tea bags but can also occur with such teas as Pu-erh, where leaves are blended from different regions before being compressed. The aim of blending is to create a well-balanced flavour using different origins and characters. This also allows for variations in tea leaf quality and differences from season to season to be smoothed out . Representative samples are one type of sampling method.

4.2 Method of Representative sample

Random sampling : is a simplified sampling approach; it comes with a higher risk of sampling error which can potentially lead to incorrect results or strategies that can be costly. Random sampling can choose its components completely at random, such as choosing names randomly from a list. Using the variety coffee bean example again, a random sample could include one coffee bean.

4.3 Terms of sampling definitions

- **Stock lot samples** are samples of the actual coffee that will be shipped if a contract is concluded.
- **Approval samples** are sent for coffees sold subject approval of sample. Such samples must be drawn from the actual parcel intend for shipment. Remember, a sale subject to approval is not really a sale until the buyer approves the sample.

- **Type samples represent** a quality agreed with the buyer, expected to be matched in all respects. If you cannot match the sample quality in some respect, tell your buyer sooner rather than later.
- **Indication samples** are an indication of what you expect to be able to ship, usually followed later by an approval sample which shows what you actually propose to ship.
- **Shipment samples** or **outturn samples** are fully representative samples of the coffee that has actually been shipped.

4.4 Factures Consider during representative sampling

A representative sample is generally expected to yield the best collection of results. Representative samples are known for collecting results, insights, and observations that can be confidently relied on as a representation of the larger population being studied. such, representative sampling is typically the best method for marketing Studies. Such considerations include understanding of: the reasons for and objectives of sampling. The relationship between accuracy and precision. the reliability of estimates with varying sample size. The determination of safe sample sizes for surveys. the variability of data. The nature of stratification and its impact on survey cost.

4.5 T eas Sample Evaluation Procedure.

1. The panelists evaluated the sensory characteristics of the green tea samples based on the attributes.
2. The appearance attributes were evaluated first followed by the flavor and mouth feel attributes.
3. The appearance attributes were examined under a daylight condition in a light box with the samples designated with new random numbers.
4. The flavor attributes were examined under a dim red light in the individual sensory evaluation booths to avoid possible bias because of differences in the colors of samples.
5. The intensity of each sensory attribute was rated on a 15-point category scale with the left end labeled as “weak” and the right end labeled as “strong.”

Self-check 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART choose the beast answer for the following question (3 pt. for each)

1. What is the use of representative sampling?
   A. Save time
   B. Save many
   C. ensure that the end product is having all the required qualities
   D. all are answer
2. what is the purpose of tea blending?

A. Used to balance flavor

B. D ecreasing to caffeine

C. T o increase bitterness

D. All are answer

Note: Satisfactory rating - 6 points Unsatisfactory -< 4 points

You can ask you teacher for the copy of the correct answers.

Information sheet 5	Putting up the samples

To put the sample:

- Make sure the tested sample free from any hazardous substance
- Label a tested sample, handle container with sampled name, date of sample, tested room.
- Place the sample in appreporat storage room
- Purpose of food labeling
  - To provide consumers with information on the product
  - To advertise the product
  - To distinguish the product from that of competitors (establish a brand)
  - It is a legal requirement

Self-check 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer (3 pt. for each)

1. P

   utting the sample inappropriate place ?

Information sheet 6	Marking the sample

6.1 Sample Coding and Presentation

Samples must be coded to eliminate bias. A three-digit code, chosen at random, is assigned to each product and used to identify the product sample to the panelist. Use of the alphabet or single- or double-digit numbers as codes is discouraged, because some letters and numbers can have special meaning to panelists. The order in which the samples are presented to panelists must be balanced, so that the influence of such factors as panelist fatigue, positioning of a high-quality wine next to a lower quality product, etc., will have little impact on the outcome of the test. A prejudicial preference for one wine over another, based on the order in which the samples are tasted, may occur.

Frequently the first sample is preferred over subsequent samples, particularly by inexperienced evaluators. Another bias may be created if greatly contrasting wines are evaluated in sequence; the sensory impression of the second wine can be greatly distorted by the response to the characteristics of the first wine evaluated. Balancing the sample order is used to overcome this potential bias.

For example, in a test with three wines, each product should appear in each position an equal number of times. The six possible combinations for positioning of three products (A, B, C) would be ABC, ACB, BAC, BCA, CAB, CBA. If the panelist is to receive more than one set of three samples. The order in which samples are presented might influence the panelist evaluation. To control this effect on the whole group of panelist, the presentation order must be randomized and this order must be different from one panelist to another.

Self-check 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer (6 pt.)

1. Explain the purpose of Sample Coding and Presentation during coffee processing industry?

Note: Satisfactory rating - 6 points Unsatisfactory -< 4 points

You can ask you teacher for the copy of the correct answers.

Information sheet 7	Using sample bag

7.1 Introduction

Coffee bags come in a wide variety of shapes, styles, colors and materials. Flexible Packaging and the invention of one-way degassing valves has reinvented and revolutionized coffee bag packaging. One-way degassing valves are designed to allow air pressure to exit from inside the package while preventing air from entering. Because freshly roasted coffee beans release carbon dioxide, one-way degassing valves allow roasters to package their products immediately without worry of the coffee bag bursting. The flexibility and benefits of flexible packaging bags with the use of degassing valves make them the perfect choice for coffee bag packaging.

Bags of green or parchment coffee should have identification labels and detailed records. For full transparency, record the following for each bag:

- Date that the coffee entered storage
- Temperature of the warehouse or storage space
- Weight
- Lot number
- Processing method used
- Percentage of initial humidity (the humidity measurement when it entered the warehouse)
- Dates of sampling, the quantity sampled, and the measurement of moisture content in each sample
- The name of the person who records the data and who performs the sampling.

7.2 **Advantages of Aluminum Foil Bag**

- F ood grade, healthy, non-toxic, waterproof, grease proof
- G ood tensile strength and good heat sealing ability.

- S
  uit for manual work and automatic packaging machine.
- C
  an be metallized or laminated with aluminum foil.
- A
  ny designs or colors can be printed on it.

Figure 3: coffee bags

Self-check 7	**Written test**

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: choose the baste answers (6 pt.)

1. B
ags of green coffee should have identification labels and detailed record includes.

A. D
ate that the coffee entered storage

B. T

emperature of the warehouse or storage space

C. W

eight

D.

the measurement of moisture content in each sample

E. a

ll

2. C

offee bags come in a wide variety what are the variety?

A. d

ifferent shapes

B. d

ifferent styles

C.

colors and materials

D. F

lexible Packaging

E. A

ll

3 . what are the merits of Aluminum Foil Bag?

A. F

ood grade, healthy, non-toxic, waterproof, grease proof

B. G

ood tensile strength and good heat sealing ability.

C. S

uit for manual work and automatic packaging machine.

D. C

an be metallized or laminated with aluminum foil.

E. L

ow water proof quality

F. A

ll except E

Note: Satisfactory rating - 6 points Unsatisfactory -< 4 points

You can ask you teacher for the copy of the correct answers.

Operation sheet	Procedure of coffee and tea sample preparation

laboratory sample preparation is to provide, without sample loss, representative a liquants that are free of laboratory contamination that will be used

A. Coffee sample preparation

1 Use small tags, either mounted on the tray or tape underneath for blind tests.

2 Carefully roast all samples to a light medium shade with a light sheen (not shiny or oily). Coffees should be roasted past the first popping but not to the second. The light medium roast will allow all the flavours and aromas to develop but will not mask any off-tastes.

3 Place 7.5 grams of roasted coffee form each sample in each cup and grind the content separately. This maintains the integrity of the sample in each cup. Use about 3 cups for each sample being tested.

4 Grind each sample of coffee separately to a grind fitting for the percolator.

5 Observe the fragrance of each cup of grounds before pouring the boiling water.

6 When water has come to a boil, carefully pour the water into each cup. Be sure to wet all of the grounds.

7 The coffee will form a head or foam at the top of the cup. Allow it to sit until all cups are poured then begin to break the head or foam and smell the aroma. Breaking involves placing the spoon into the cup below the crust and stirring vigorously while your nose is directly above the cup. Inhale the aroma rising from the grounds, rinse your spoon and move to the next cup. Focus on any aromatic differences from cup to cup. Off or unpleasant aroma will be a sure sign of a bad cup.

8 B

efore tasting coffee it is important to remove floating grounds and fines; otherwise these will stay in your mouth and affect the taste of the following cup.

9 A

llow the cups of coffee to cool to a comfortable temperature then taste the coffee several times as it cools to room temperature. You should taste at a temperature with which you are comfortable.

10 P

lace your spoon in the cup and draw two-thirds of a spoonful of brew (without any grounds) and sip in the brew with a great deal of noise and ceremony. (This will cause you to draw the sample of coffee into your mouth along with a large supply of air). When you exhale, some of the aromatics will reach into your nasal passage and allows you to detect the **nose** of the coffee.

11 S

wirl the coffee around inside your mouth and cover all parts of your tongue. Feel the texture get a sense of the **body**. Spit the coffee carefully into the spittoon and draw air into your mouth with a pop. This will aerate the residual vapours in the mouth and allow you to sense the after **taste**.

12 T

aste all of the samples in the same manner, and compare the results. Rinse your spoon before each sample, arrive at your conclusions and record them on your tasting chart.

B. Tea sample preparation

Step 1: Inspect the dry leaf - Look for uniform leaf size; occurrence of stem, twigs or excessive particulate; characteristic rolling, curling or open leaf; proper color, proper "gloss" (appropriate on some teas and aroma).

Step 2: Steep- Measure the leaf, add water at the appropriate temperature, and steep for the appropriate time.

Step 3: Pour - using a cupping set, tip the cup (with lid intact) onto it's side and set it into the bowl. It should rest comfortably and allow the tea to pour out. If you are using other equipment, remove the filter or pour out the tea to stop the steeping process.

Step 4: Analyze the wet leaf - While the tea cools slightly, take the opportunity to take in the aroma and appearance of the wet leaf. One of the advantages of the cupping set is that you can slightly open the lid and inhale the aroma in concentrated form. This is a critical part of the cupping process. A seasoned taster can tell a great deal from the aroma rising from the wet leaf. Look for uniformity of leaf size and proper color.

Step 5: Analyze the liquor - Tea tasters refer to brewed tea as the liquor, and inspect the liquor. First, check the **aroma.** Inspect the **color** and **taste**. A professional taster will suck the liquor in quickly (and loudly) attempting to "spray" the tea into the mouth, striking all areas of the tongue as well as the bottom of the nasal cavity (keep in mind, a good portion of taste comes from smell).

Operation sheet	Teas Sample Evaluation Procedure

1. The panelists evaluated the sensory characteristics of the green tea samples based on the attributes.
2. The appearance attributes were evaluated first followed by the flavor and mouth feel attributes.
3. The appearance attributes were examined under a daylight condition in a light box with the samples designated with new random numbers.
4. The flavor attributes were examined under a dim red light in the individual sensory evaluation booths to avoid possible bias because of differences in the colors of samples.
5. The intensity of each sensory attribute was rated on a 15-point category scale with the left end labeled as “weak” and the right end labeled as “strong.”

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task-1: Prepare coffee sample

Task-2: Prepare tea sample

Task-3: Evaluate tea sample

`LG# 37	LO 3: Perform tests on samples

Instruction sheet 1

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and preparing sample and Measuring sample standard
- Conducting testing
- Recording Data
- Performing calculations on data
- Identifying and reporting typical results
- Shutting down equipment

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to

- Identify and prepare sample and measure sample standard
- Conduct testing
- Record Data
- Perform calculations on data
- Identify and report typical results

1. Learning Instructions

2. Read the specific objectives of this Learning Guide.
3. Follow the instructions described below.
4. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
5. Accomplish the “Self-checks” which are placed following all information sheets.
6. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
7. If you earned a satisfactory evaluation proceed to “Operation sheets
8. Perform “the Learning activity performance test” which is placed following “Operation sheets” .
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets
10. If your performance is satisfactory proceed to the next learning guide

Information sheet 1	Identifying, preparing sample and measuring standards

1.1 Testing samples

- Green Coffee Bean : green coffee bean free from any Allowable Defects .Green Grading Sample Size A 350 gram sample of coffee is necessary to grade green coffee Water Activity Standard Specialty grade green coffee beans shall have a water activity (aw) measurement lower than 0.70 aw.
- Roasted coffee: The roasting of coffee for cupping take between 8 and 12 minutes, and used for cupping between 8 an d 24 hours after roasting. Standard Grind for Cupping and be measured on coffee at room temperature.
- Grind coffee: The ground coffee is then stored in special atmosphere-controlled silos, which protect it from oxidizing agents (light, oxygen, heat and moisture) before it is quickly sent for packaging. Packaging materials and shapes are essential for optimum preservation of the blend

1.1.1 standards

Standards can be great tools for the coffee industry as they are trusted reference instruments established by knowledgeable subject-matter experts..

Specifications/Standards the Company green and roasted specifications/standards should be available. Written standards and specifications for your coffee will assist in your evaluation process and provide a base or standard by which to judge.

Coffee industry process according to Ethiopian code of Good Manufacturing Practice (GMP) , calibration and maintenance schedules ,enterprise recording and reporting procedures, equipment manuals ,equipment start-up, operation and shutdown procedures, MSDS and safety procedures ,material, production and product specifications national measurement regulations and guidelines, production and laboratory schedules and quality manuals

- P rinciples of Good Laboratory Practice (GLP) The Principles of Good Laboratory Practice(GLP) are a managerial quality control system covering the organizational process and the conditions under which non-clinical health and environmental studies are planned, performed, monitored, recorded, reported and retained (or archived).
- E thiopia code of Good Manufacturing Practice (GMP): Good Manufacturing Practice (GMP) describes a set of principles and procedures that when followed helps ensure that therapeutic goods are of high quality.
- S tandard Operating Procedures (SOPs): is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations of coffee roaster, grinder, blender and roller. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with coffee industry regulations
- M aterial Safety Data Sheet (MSDS) is a document that contains information on the potential hazards (coffee defect. and environmental) and how to work safely with the chemical product. It also contains information on the use of coffee, coffee storage, coffee handling and emergency procedures all related to the hazards of the material.

1.2. M easuring sample standard

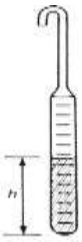
Coffee cupping needs to use the right proportion of ground coffee to hot water. By measuring with analytical balance/ coffee scale. Second, the water has to be boiled at

the right temperature; the coffee grinds and the hot water have to be in contact for just the right length of time .carefully measured each sample for standardization.

1.3.

Common measuring equipment

- a nalogue and digital meters and charts/recorders
- b asic chemical and biological test kits includes: A tube holder which fits in the kits lids/rack , Chemical agent detector tubes banded in blue or red
- D ipsticks : Dipsticks offer a simple means of measuring the level of liquids



- ti ming devices : measuring time for roaster, grinder ,brewing time
- t emperature measuring devices, such as thermometers and thermocouples
- L aboratory spoon / Tasting Spoon – The taster needs a good sterling silver spoon with a deep and wide bowl to accommodate a generous sample of the brew. Your tasting spoon should not be used for eating soup, etc.; tasting spoons must be kept pure.

Figure 2: coffee tasting spoon

- T

asting Cups - Simple, inexpensive, highly glazed china soup cups or pudding cups are adequate. The cups must be able to accommodate 5 ozs of water and the head or foam that forms when hot water is poured onto the coffee.

- s

ampling bag :- such as aluminum foil, carton, water proof

- w

eighing balance plates kittle :- measured coffee samples and other food materials in mg/kg

- m

oisture tester used to measure the amount of water in a given green coffee bean/sample

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: say True or False for the following question(3 pt. for each)

1. m
   oisture tester used to measure the amount of alcohol in a given green coffee bean/sample .
2. c
   offee testing spoon made from any materials
3. c
   offee Tasting Cups different from any other tasting cups

PART 2: write short answer for the following question

4. w
   hat are the coffee samples tested?
5. E
   xplain briefly purpose of coffee standards ?
6. D
   efine the abbreviation words of MSDE, GMP, GLP and SOP?

Information sheet 2	Conducting testing

3.1 Introduction

Coffee is a beverage where flavor plays the most important role in quality. Coffee can be nice looking without any defective beans, but flavor could be very marginal or even have off-flavor. Thus, flavor is the most important parameter. The main goal in cup tasting is to evaluate the coffee in an objective and reproducible way. It is not a matter of whether or not you like the coffee.

3.2 The Basic sensory Attributes Evaluated In Cup Tasting

The attributes of a food item are typically perceived in the following order:

- Acidity
- Odor/ fragrance
- Texture
- Body
- Flavor (aromatics, chemical feelings, etc.)

However, in the process of perception, most or all of the attributes overlap, i.e., the subject receives a jumble of near-simultaneous sensory impressions, and without training he or she will not be able to provide an independent evaluation of each.

Flavor is the combined impression perceived via the chemical senses from a product in the mouth i.e. it does not indicate appearance and texture. he term aromatic is used to indicate those volatile constituents that originate from food/coffee in the mouth and are perceived by the olfactory system via the posterior nares.

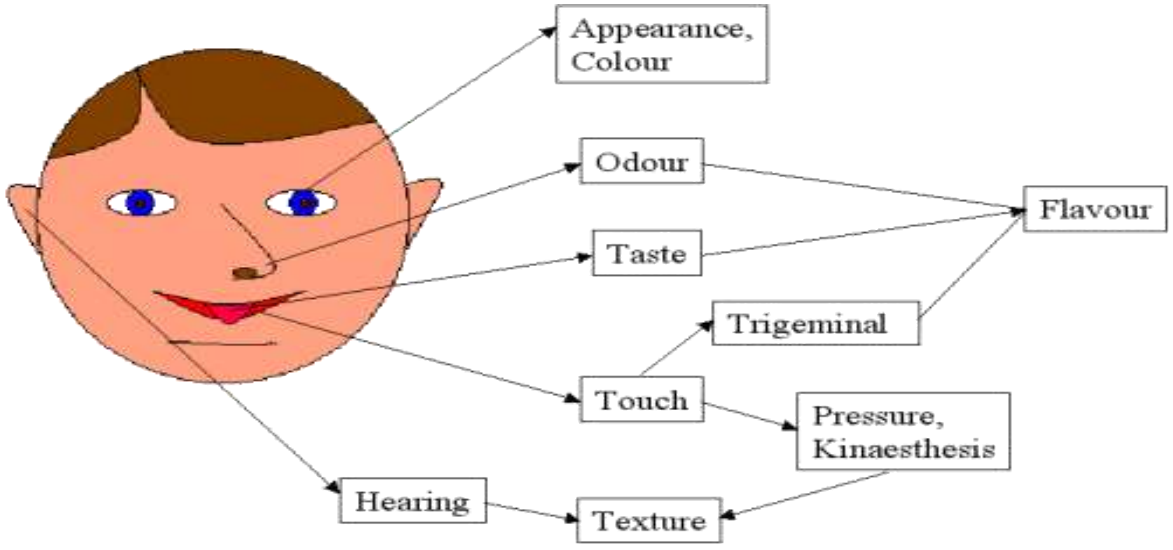


Figure 1 : olfactory system of human sense

Aroma:- is the fragrance or odor perceived by the nose.

A) A

roma of the freshly ground coffee

B) I

n-cup aroma which is produced when water has been in contact with the ground coffee for 3 to 4 minutes.

Acidity- is a sharp and pleasant taste. It can range from sweet to fruity/citrus and is considered as a favorable attribute. Acidity- is affected roasting, the more intense the roasting, the more acidity is affected. The perceived brightness of the coffee. Intensity ranging from 1 to 10

Flavor:-is described in terms of winery, spicy, fragrant etc. Off-flavors such as grassy, onion, musty, earthy etc. reduce coffee quality. the evaluation of taste sensations and flavor descriptors. Preference rating from 1 to 10.

Body/ Mouth feel: - is a feeling of heaviness and richness on the mouth and affected by viscosity and texture. It includes astringency and body. the evaluation of the fluid for fat content (oils) and heft (sediment/colloids). intensity ranging from 1 to 10

Sweetness: - sweetness and its interaction with acidity provide a broad spectrum of flavor for Arabica coffee.

Bitterness and saltiness: - is associated with Robusta and low quality, dry processed Arabica coffee.

Liquor: - is a fine dark brown powdered from roasted coffee bean brewed with boiling water and consumed as a drink.

Figure 2 : Coffee cuppers reviewing aromas

Table 1 ICO coffee flavor profiles

NO -	Coffee Tasting Terminology	Characteristics
1	Ashy	coffee odor similar to that of an ashtray or fireplace. An "Ashy" aroma indicates a dark roast, and is not necessarily a negative attribute. Ashy coffees generally have a carbonyl flavor.
2	Fruity/citrus	The aroma and taste of ripe citrus fruit. Citrus notes are often found in coffee, which is not surprising considering the fact that coffee beans are the seeds of coffee cherries. Coffees with flavor characteristics of unripe citrus are described as "sour - The aroma and taste of fruit. Many coffees have fruity notes, which is not surprising considering that coffee beans are seeds of a fruit (coffee cherries). A coffees acidity, or wine-like brightness, is often related to fruit, or citrus. Professional cuppers are careful to not use the term "fruity" when describing the aroma of unripe, or over-ripe, fruit.
3	Winery	he combined sensation of smell, taste ,and mouth feel experienced when drinking wine. A winey taste is generally perceived along with acidy and fruity notes. Often used incorrectly to describe a soury or over-fermented flavor.
4	chemical/medicinal	The smell of medicine, or iodine. A medicinal flavor with notes of iodine which can result from cherries drying while still on the coffee plant. Medicinal flavors cannot be hidden well by blending.
5	rancid/rotten	The terms "rancid" and "rotten" are used to describe characteristics of

		decomposing coffee. Professional coffee cuppers are careful to not describe a strong and unpleasant aroma as "rancid", if there are no other signs of deterioration.
6	Nutty	The aroma and flavor characteristic of fresh nuts. Coffee cuppers are careful to avoid using the term "nutty" when describing coffee with taste or aroma characteristics of rancid nuts or bitter almonds. Coffees from South America commonly have a nutty flavor.
7	grass/green/herbal	An aroma associated with freshly mowed lawn, green grass, herbs, green foliage, green beans, and unripe fruit. Herbal characteristics are typical of coffees not fully dried to the usual 10% to 12% moisture content during processing. An herbal aroma is also called green, grassy, or herby.
8	Spicy	The aroma of sweet spices such as cloves, cinnamon, and allspice. The term "spicy" when describing coffee does not include the aroma of savory spices such as pepper, oregano, and curry.
9	Woody	A taste characteristic of old coffee. Woody coffee has a smell of dry wood, an oak barrel, dead wood, or cardboard. This defect results when beans are improperly stored for an extended period of time. Coffees stored at low altitudes in high temperatures and humidity (as in many ports of shipment) tend to deteriorate quickly and become woody. All coffees can become woody if stored long enough.
10	Floral	The scent of flowers including honeysuckle, jasmine, dandelion and nettles.

		Mildly floral aromas are found in some coffees and are generally perceived along with fruity or herbal notes
11	Tobacco	The aroma and flavor of fresh tobacco in brewed coffee. A tobacco-like taste is not necessarily disagreeable and is found in various specialty coffees throughout the world. A tobaccoy taste or aroma should not be confused with characteristics of burnt tobacco (ash).
12	Ferment	A sour and oniony taste characteristic of over fermented coffee. After de-pulping coffee cherries, which removes the skin and some attached mucilage (pulp), the separated beans will still have a significant amount of pulp attached. The remaining pulp is often loosened by fermentation, allowing it to be washed away prior to drying. If fermentation is not stopped as soon as the remaining parchment (husk) is no longer slimy, and has a rough texture, the coffee may acquire a ferment flavor.
13	Earth	The aroma characteristic of fresh earth, wet soil, or raw potatoes. While not necessarily negative characteristic, earthiness may be caused by molds during the processing of harvested coffee cherries. Earthy notes, for example, are commonly found in semi-dry processed coffees from Indonesia

14	Onion	Flavor characteristic of onions, and often associated with the use stagnant water when processing coffee by the wet method. Oniony characteristics are often avoided by recycling the pulping water during processing.

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: choose the baste answer for following question(3 pt. for each)

1. What are the quality attributes of coffee are typically perceived in order?

A . Acidity

B. Odor/ fragrance

C. Texture

D. Body

E. Flavor F. all are answers

2. The aroma and taste of fruit. Many coffees have fruity notes, which is not surprising considering that coffee beans are seeds of a fruit .these is the Characteristics of----------?

A. ferment C. onion

B. ashy D. fruity/citrus

3. **----------** is a feeling of heaviness and richness on the mouth?

A. aroma C. Sweetness

B. flavor D. body/mouth feel

Information sheet 3	Recording Data

4.1 Introductions

Recording data through good manufacturing practices (GMP) is important and each food process should be documented properly to establish evidence the process, operated within pre-established

parameters to prove that the produced coffee and tea product meeting its pre-determined specifications and quality attributes. Batch/continues manufacturing record is a written document of the batch or continues. It contains actual data and step by step process for manufacturing each batch. Batch /continues manufacturing record is like a proof that batches were properly made and checked by quality control personnel. This ensures that proper coffee ingredients are added and each processing step is completed according to the standard operating procurer (SOP) and also ensures uniformity in grinding, roasting, blending tea in finished product in each batch.

4.2. **Good Batch Manufacturing Record Format Should Include Following Parts:**

1. Batch records: Batch records include master production and control records (MPCR) and batch production and control records (BPCR). MPCR includes:

- Name of the product
- Name and codes of API
- Batch formula
- Batch or code no.
- Identification of equipment, line and location used

- Start and finishing date with processing and packaging
- Dispensing activities
- Component weights
- Product output quantities, lot details
- Manufacturing nonconformance and quality sampling and test results all add to this batch history.

2. Bill of Material: Complete list of raw materials needed for manufacturing the finished product with required quantity and weight.

3. General instruction for manufacturing: Clear instructions related to safety and health of operators should be followed during the manufacturing process.

4. Equipment cleaning record: Checklist for the cleaning of all equipment used in the manufacturing of the batch with the previous product, batch and date of cleaning.

5. Yield: Yield of the batch should be calculated at the end of every stage to calculate the process loss. Final yield should be calculated at the end of the manufacturing that should not be less than 99.00%.

6. Abbreviations: List of the abbreviations used in the batch manufacturing records (BMR)should be made to understand easily.

7. History of Chances: At the last, list of all the changes occurred including the revision number and the date of change. Batch manufacturing record is like a back bone in the current good manufacturing practices (GM P), and very essential to stay compliance

4.3 **Recording include**

- Standard Operating Procedures (SOPs)
- Specifications

- P
  roduction schedules and instructions
- M
  anufacturers advice
- S
  tandard forms and reports

Self-check 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1. Explain briefly the Good Batch Manufacturing Record included?

Information sheet 4	Perform calculations on data

- Magnitude errors are seen for assessors who lack calibration training and scale
- Their ratings on too broad or too narrow an interval, thus incorrectly.
- Crossover errors are of high importance as they are often the reason for poor panel consistency.
- Accuracy: This is the measure of how close assessor data or panel mean data are to the true value.
- A true value is not always easy to identify; where possible, spiked samples and references can be used.
- Precision: This is a measure of how reproducible assessor or panel data are, i.e. how close are the replicate scores/judgments or mean data.
- Reliability/validity: This is a measure of how close an individual assessor's score/judgment is compared to the rest of the assessors and panel mean.

- s

  ignificant figures: also known as the significant digits or precision of a number written in positional notation are digits that carry meaningful contributions to its measurement resolution

- U

  ncertainty: Uncertainty refers to epistemic situations involving imperfect or unknown information. It applies to predictions of future events, to physical measurements that are already made, or to the unknown

- T

  raceability: measurement traceability is used to refer to an unbroken chain of comparisons relating an instrument's measurements to a known standard. Calibration to a traceable standard can be used to determine an instrument's bias, precision, and accuracy. traceability refers to the capability for tracing goods along the distribution chain on a batch number or series number basis

- s

  ources of error: Basically, the error can be defined as the difference between the measured value and the true value

Self-check 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: say True or false for following question(5 pt.)

1. A true value is always easy to identify; where possible, spiked samples and references can be used.
2. t raceability refers to the capability for tracing goods along the distribution chain on a batch number or series number basis.
3. U ncertainty refers to epistemic situations involving imperfect or unknown information

Information sheet 5	Identify and report typical results/ Out of specification

Table 5.1: Brewed coffee sensory attributes and their definitions.

Categories	Descriptors	Definitions
Appearance	Color	The intensity of color
	Opacity (cloudiness)	Nontransparent or cloudy status
	Oiliness	Greasy and coating appearance
Odor(orthonasal perception)/flavor	Overall coffee odor/flavor	Aromatics associated with common coffee aroma
	Brew-like	Aromatics associated with freshly brewed roasted coffee
	Roasty	Aromatics associated with freshly roasted coffee beans
	Fruity/aromatic	-Lightly sour and sweet aromatics associated with several fruits
	Burnt/smoky	- Aromatics associated with burnt rice or something scorched or burnt
	Woody	- Aromatics associated with wooden materials cut grass or hay during biting
	Earthy	-Aromatics associated with soil or clay freshly cut grass or hay during biting
	Hay-like(grassy)	- Aromatics associated with freshly cut grass or hay during biting

	Staleness	- Aromatics associated with moldy, old coffee
	Rancid	- Aromatics associated with oxidations processes of fat
Taste	Sweet	-A basic taste associated with sucrose solution
	Sour	-A basic taste associated with citric acid solution Bitter
	Bitterness	-A basic taste associated with caffeine solutions
Mouth feel	Viscosity	-Sticky characteristics to palate or mucosal surface in the oral cavity
	Astringent	-Feelings associated with dry sensation associated with immature permissions or black/green tea
After taste	Overall coffee	-Long-lasting overall impression 1 min after having swallowed the coffee beverage
	Bitter	-Long-lasting bitter taste 1 min after having swallowed the coffee beverage

5.2 Out of specification coffee results

Roasting affects coffee flavor profoundly. Heat causes chemical changes within the coffee bean, caramelizing the sugars and bringing out the flavors of the acids and other elements present. The same coffee will taste completely different at a light roast level than it does at a medium or dark roast level. In fact, roast makes such a difference that there are entire books devoted to proper roasting techniques, and many coffee roasters closely guard the precise roasting profiles for the beans they sell.

the brew method. In the case of espresso, they may even need to be tweaked to respond to ambient conditions like heat, humidity and altitude. Even in a simple manual brew method, changes in brewing variables can be the difference between a decent and a delicious cup.

Some important variables are:

- ✓ Brew ratio (water to coffee)
- ✓ Grind size (and uniformity)
- ✓ Extraction time
- ✓ Water temperature

- Green coffee beans can also contain physical defects and imperfections such as

  - ✓ hollow
  - ✓ deformed
  - ✓ chipped or beans
  - ✓ under ripe beans
  - ✓ overripe beans
  - ✓ black / rotten / moldy beans or Quakers
  - ✓ infested or eaten by insects and pests therefore, the above factors indicates that out of specification and not fulfilled coffee quality attributes

Self-check 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1. Write the typical coffee attribute and there characteristics of the result /
2. List coffee sample taste results?
3. Explain briefly Coffee out of specification?

Information sheet 6	Shut down equipment

6.1 I

ntroduction

Equipment Shut down through Operating procedures should be controlled documents, generally covered under the company's quality system and thus kept fully up to date. Any changes should be fully controlled and documented and should be subject to company change.

6.2 **P**

urpose of Equipment shut down

- Protection of personnel
- Protection of the environment
- Minimize loss of production and damage to plant assets
- Monitoring of an operational or equipment condition
- Automatic action in case of process hazardous conditions is exist by de-energizing electrical equipment, shutting down and/or isolating process equipment and, isolating and depressurizing the installation.
- Enabling manual initiation of equipment shut down actions through Emergency Shutdown System (ESD)push button all around the plant.
- Important for Monitoring the Fire & Gas conditions

6.3

Standard operating procedures may be revised for the following reasons

- Introduction of new equipment into the process
- Introduction of new chemicals into the process
- Significant change to process, task, personnel or equipment covered by the procedure
- Plant trials have been successful and need to be incorporated into standard operating procedures

Self-check 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1. What is the purpose of equipment shut down?
2. Write equipment shut down Procedures/
3. Mention reasons if slandered operating procedures may be revised ?

Operation sheet 1	Shut down Equipment

in Equipment Shut down through Operating procedures should be controlled documents, generally covered under the company's quality system and thus kept fully up to date. Any changes should be fully controlled and documented and should be subject to company change.

1. Identify the shutting down procedures
2. Start shutting down the process by following the appropriate shutting down procedures for electric oven, refrigerator.
3. Clean Equipments and workplace based on the procedure during coffee sensory analysis
4. Prepare the waste collecting Equipments and give a tag for each
5. Separate different types of waste to be recycle or dispose such as disposable water cup, aluminum foil.
6. Record the identified requirements as a recommendation
7. Report the required maintenance to the appropriate person

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2**hour. The project is expected from each student to do it.

Task-1: operate equipment shut down

LG #38	LO 4: Tea Quality parameters

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- *Evaluating tea quality through leaf appearance*
- *Making tea quality liquor and infusion*
- *Commenting and advising the quality heading*

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to

- *Determine tea quality through leaf appearance*
- *Comment and advise the quality heading*

Learning Instructions

1. *Read the specific objectives of this Learning Guide.*
2. *Follow the instructions described below.*
3. *Read the information written in the "Information Sheets". Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.*

4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If your performance is satisfactory proceed to the next learning guide

Information Sheet 1	Evaluating Tea Quality through Leaf Appearance

1.1 Introduction

In the tea industry, tea leaf grading is the process of evaluating products based on the quality and condition of the leaves themselves. When evaluating leaf quality, it is important to look at both the dry leaves and the steeped leaves. Each will provide clues to the overall quality of the tea. The **taste** of a coffee comes about from the interaction between the soluble chemical compounds in the brewed coffee and the taste receptors in the mouth.

1.2 Quality parameters of tea leaf

- **Hand Plucking or Mechanical Harvesting:** Mechanical or machine harvest tends to cause uneven harvest. Some young leaves and some younger leaves. Tea flushes and leaves can also be picked by machine, though there will be more broken leaves and partial flushes reducing the quality of the tea. However, it has also been shown that machine plucking in correctly timed harvesting periods can produce good leaves for the production of high quality teas.
- **Harvest timing:** Harvest timing also determines the quality. Spring harvest tends to be higher quality since cool whether slows hardening of the tender leaf. Even within spring harvest early harvest generally holds more delicate flavor compare to later harvest. Also, If the leaf harvests include young leaves and older leaves, the older leaves tend to express more substantial bitterness and astringency, which are generally not preferred for this type of harvest. but young leaves gives desired tea quality
- **Elevation:** High altitude tends to have higher quality than low land (sea level) because of lower temperature keeps the young succulent shoots from hardening although low land tea might grow faster because of higher temperature. Elevation too high can be problem due to frost damage.
- **Green tea processing :** Initial heating process is very crucial in setting aroma in green tea. Too little heating can create uneven heating thus partially oxidized leaves while too

much heating will lose the fresh green aroma and occasionally add burned taste. It is this subtle balance of initial heating that creates excellent aroma.

- **Rolling :** Rolling of tea leaf allows tea to gain deeper flavor. Although it sounds simple to roll the leaf, but it takes back breaking hard work. Knowing the exact timing of rolling and softness of the leaf requires some experience. Rolling also evenly distribute moisture content of the leaf and prevents premature partial drying of tea leaf which generally leads to burns and powders.
- **Drying:** Drying tea leaf is much more complex than just removing moisture out of leaf. It has different moisture levels at different areas of tea leaf and drying process has to remove the moisture evenly from the leaves. Uneven drying generally causes tea to taste like old rug or not fresh tasting.
- **Tea type:** Flavor of tea is often affected by what kind of environment the tea is grown, how farmers care for the tea, and the type of processing to make the tea, but the origin of plants themselves are also considered to be an important factor. Black and oolong tea varieties can be processed into green tea and makes good looking green tea .but high level of polyphenol in black tea varieties tend to create the strong residual impact in black tea, but when you try to make green tea, it becomes too much.
- **Tea leaf grading** : grading is the process of evaluating products based on the quality and condition of the **tea leaves** themselves. Top-quality pekoe grades consist of only the leaf buds, which are picked using the balls of the fingertips. Fingernails and mechanical tools are not used, to avoid bruising. the tea is referred to as "broken", as in "broken orange pekoe" (BOP). These lower grades include fanning and dust, which are tiny remnants created in the sorting and crushing processes.

Orange pekoe is referred to as "OP". The grading scheme also contains categories higher than OP, which are determined primarily by leaf wholeness and size. The grading system is based upon the size of processed and dried black tea leaves

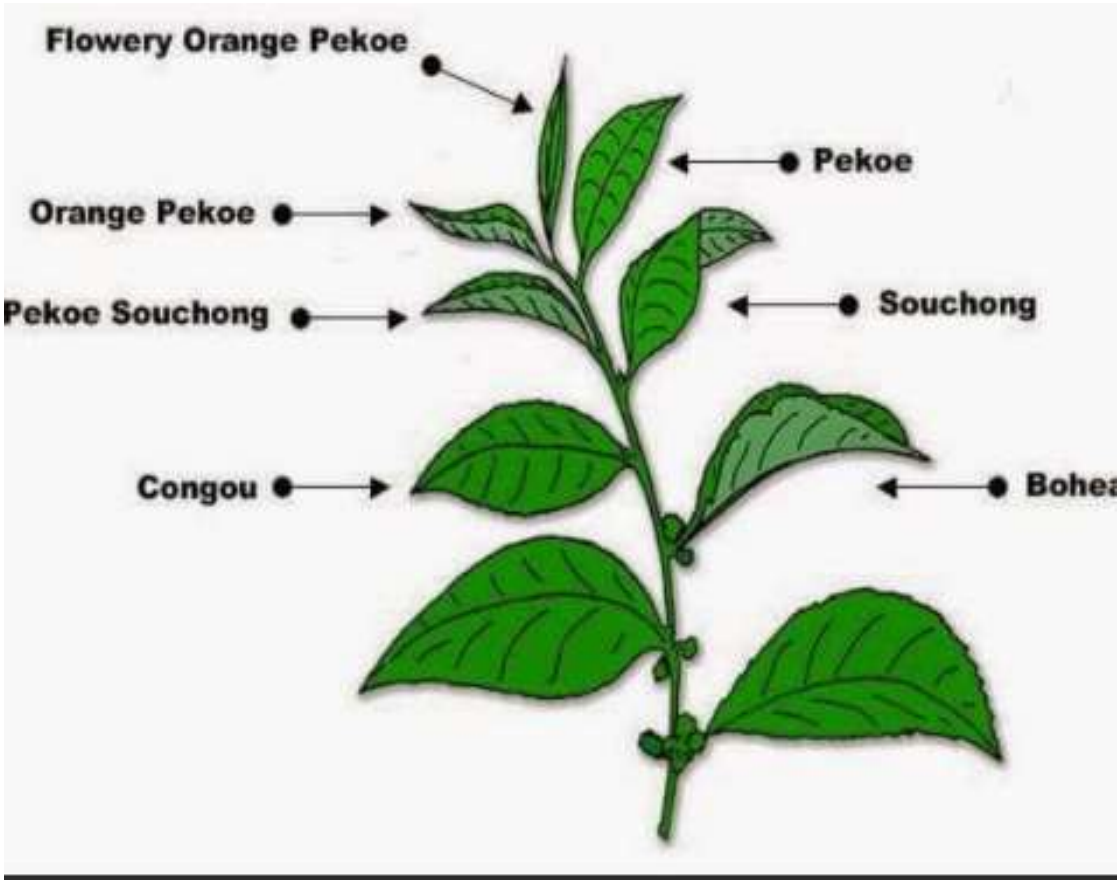


Figure 1 : tea leaf grading

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1. How to affect tea variety on quality of tea?
2. Write the difference between Hand Plucking or Mechanical Harvesting?

Information sheet 2	*Making tea quality liquor and infusion*

2.1. Tea Liquor

Tea Liquor, it means the resulting liquor or liquid produced after brewing tea. There are many kinds of teas and liquors of all Teas will be different. Liquor of the Tea depends on various factors like the quality of tea leaf, altitude of the tea plant, the manufacturing process, brewing of tea, etc.

- There are certain terms tea liquor
  · Bright – denotes a lively fresh tea with good keeping quality.
  · Empty – a liquor lacking fullness. No substance.
  · Full – a good combination of strength and colour.
  · Metallic – a sharp coppery taste.
  · Thick – liquor with good colour and strength.

· figure 2: tea liquor

The above would sound a little confusing or hard to grasp.

- Four principles that understand Tea and liquor:
  1) **Color and Strength –** This refers to the most basic and distinguishable character of Tea – The Color. Different Teas will have different colors. The color, as well as the depth of color together, define the amount of tannin that the tea has brought out. The same kind of Tea with a different color of liquor will tell a lot about Tea and its quality.
  2) **Aroma –** This perhaps is one of the most exquisite characters of the liquor. Be it the fragrance, after the tea is brewed or the aroma that travels up the nasal cavity as you

take a sip of the Tea Blend. This is one of the main aspects when choosing tea for our blends.

3) **Flavour –** All tea will differ from the other in terms of taste. TEA SENSE gives the main priority to this factor when choosing a particular lot for the blends. Taste in tea can be defined as sweet to woody, bitter to earthy, mild to strong, or smoky.

4) **Aftertaste –** All teas will have an aftertaste. The taste that you have at the back of the throat after you have consumed your teas. The sweet or bitter aftertaste that you experience differs with different teas and different grades. It is the cup of liquor that determines the character of the Tea. It takes years of practice and a lot of patience to learn the subtle art of tea tasting. The practice to identify every tone, every aroma, and every little detail that makes the tea perfect is an art in itself.

Figure 3: tea cups liquor

2.2. Tea Infusion

Infusion: is a drink made by placing a flavoring ingredient (such as tea or herbs) into a liquid (such as hot water). Infusions are the most popular method of preparing teas and tisanes.

The infusion method simply water is not continuously heated or boiled away as the plant matter steeps. This may result in a weaker beverage but is necessary for extracting the flavors from some ingredients.

- **Preparation tea infusion brewing typically involves:**

1. Pouring hot water over plant matter (such as dried leaves or berries).
2. Waiting for a period of time (called steeping).
3. Then removing the plant matter before drinking.

Figure 4: tea infusion

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1 What is the difference between tea infusion and liquor?

2 write Four principles of tea?

3 write step of tea infusion peroration?

Information sheet 3	Commenting and advising the quality heading

3.1 Tea quality parameter

The major quality parameters that are tested in made tea include The aflavins (TF), The arubigins (TR), high polymerized substance , Total liquor color (TLC) and Total soluble solids (Water extract). TF has a direct correlation with quality and price realization. TF contribute towards the briskness and brightness of tea liquor. During the course of fermentation, TF progressively increases till an optimum fermentation time, the period at which maximum quality is observed. In addition to having maximum value for TF , there has to be proper balancing of the liquor parameters .TR to be ten to twelve times as that of TF can be followed.

- ✓ T R are complex condensation products of oxidized catechins with TF. Together with HPS
- ✓ T R increases the color, mouth feel and body of the tea liquor.
- ✓ V ery high levels of TR indicate over fermentation Similarly, very high levels of HPS and TLC also imply over fermentation.
- ✓ L ow levels of TR indicate under fermentation and the liquor tastes harsh.
- ✓ P roperties of caffeine: Parameters such as caffeine and catech in play an important role on the quality of tea and require minimum stipulation. Caffeine is relatively a stable molecule and is a direct stimulant of the Central Nervous System. Together with TF it imparts briskness to the tea liquor. Caffeine level increases during

processing and high levels of caffeine indicate a good leaf standard (caffeine decreases with the maturity of the crop shoots).

- ✓ Water extract or TSS has a direct influence on the cupping.
- ✓ Higher values of TSS indicate a better quality of the raw material.

- **Briskness and color indices:** In addition to the above quality parameters briskness and color indices developed at UPASI TRI, correlate well with quality of made tea. Briskness index is given as percent ratio of TF to TF+CAF and the normal range for south Indian CTC tea is above 23. The color index is given as percent ratio of TF to TR+HPS and the normal range for south Indian CTC teas is from 5 to 11. Teas having maximum TF and a balanced TR/TF ratio (10 to 12) with optimum level of briskness and color indices will definitely have a better quality

Self-check 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

PART 1: write short answer for following question(5 pt.)

1. Write tea quality parameter?
2. Caffeine level increases during processing and high levels of caffeine indicate that?