QUALITY ANALYSIS RATING SCALES

Sensory Evaluations

Coffee Enterprise's sensory panel evaluates products without knowledge of physical attributes, product format, packaging, or supply chain details which may bias panelists and influence the test results. The scores are averaged, and sensory comments are aggregated from all sensory panelists. Flavor descriptions are based on basic food references and primary flavors.

Green Coffee Analysis (GCA) – Cupping:

We follow the Specialty Coffee Association (SCA) protocols and scoring system for coffee cupping. Coffee quality is scored for quality on a 10-point scale, using 0.25-point increments.

Coffee Quality Institute / Specialty Coffee Association quality rating scale:

Good	Very Good	Excellent	Outstanding		GCA Quality Classification	
6.00	7.00	8.00	9.00		90-100	Specialty – Outstanding
6.25	7.25	8.25	9.25		85–89.99	Specialty – Excellent
6.50	7.50	8.50	9.50		80-84.99	Specialty – Very Good
6.75	7.75	8.75	9.75		< 80.00	Below Specialty Quality

Identification of flavor defects - Our sensory panel must have consensus when reporting taints and faults.

> **SCA Taint Definition (SCAA Cupper's Handbook**) – "An off-flavor that is noticeable, but not overwhelming, usually found in the aromatic aspects."

> **SCA Fault Definition (SCAA Cupper's Handbook)** – "An off-flavor, usually found in the taste aspects, which is either overwhelming or renders the sample unpalatable."

Roasted Coffee Analysis (RCA) & Liquid Product Analysis (LPA) – Tasting:

Coffee Enterprises sensory scale for tasting coffee and liquid products is designed to evaluate retail coffee and foodservice beverages. Sensory attributes are scored for flavor quality and complexity with consideration for intensity on a 10-point scale, using 0.25-point increments.

Coffee Enterprises quality rating scale – beverage tasting:

RCA & LPA Quality Classification		
Total Score	**Quality Classification**	**Description**
76 +	Specialty Quality	Arabica Flavor – Premium to Excellent Quality
61-75	Usual Good Quality	Arabica Flavor – Good to Very Good Quality
51-60	Average Good Quality	Arabica & Robusta Flavor – Standard Quality
Below 50	Commercial Grade Coffee	Robusta & Arabica Flavor – Substandard / Poor Quality

Identification of flavor defects - Our sensory panel must have consensus when reporting taints and faults.

> **CE Coffee Taint** – Noticeable, undesirable sensory attributes or off-flavors that are perceptible and outside the expected. Taints may or may not be a reason for quality rejection.

CE Coffee Fault – Overwhelming, objectionable, severe defect or off-flavor in aroma or taste that distracts from the product's character–including, but not limited to phenolic, ferment, mold, chemical, and contamination. Faults are typically a reason for quality rejections.

RCA & LPA rating scale for intensity of flavor defects:
- 1 – Detectable
- 2 – Slight
- 3 – Moderate
- 4 – Pronounced
- 5 – Extreme

Tea Product Analysis (TPA) – Cupping and Tasting:

Tea sensory attributes are rated a 5-point scale for intensity. Cupping evaluation is based on the following categories: dry leaf appearance and aroma, infused leaf appearance and aroma, liquor appearance and aroma, liquor flavor, briskness, mouthfeel, and finish. Tasting evaluation of prepared beverages are based on the following categories: beverage color, aroma, briskness, flavor, mouthfeel, and finish. Taints, faults and staleness are scored. Tea liquor color is determined using a defined tea specific 15-point color reference scale.

Tea Taint – Noticeable, undesirable sensory attributes or off-flavors specific to tea types that are perceptible and outside the expected–including, but not limited to sour, grassy, earthy, fruity, vegetal, moldy, soapy, metallic, and woody. Taints may or may not be a reason for quality rejection.

Tea Fault – Overwhelming, severe defect or off-flavor or aroma that are specific to tea types that distracts from the product's character–including, but not limited to chemical, contamination, ferment, and oily. Faults are typically a reason for quality rejections.

TPA flavor intensity scale, and rating for intensity of flavor defects:
- 0 – Not Detected
- 1 – Detectable
- 2 – Slight
- 3 – Moderate
- 4 – Pronounced
- 5 – Extreme

Soluble Beverage Analysis (SBA) – Tasting:

Soluble coffee products are evaluated using the Roasted Coffee Analysis (RCA) scale and soluble tea products are evaluated using the Tea Product Analysis (TPA) tasting scale. Soluble mixed coffee-based and cocoa products are rated on intensity of aroma, sweetness, saltiness, mouthfeel, primary & overall flavor, and aftertaste characteristics on a 5-point intensity scale using whole numbers.

SBA flavor intensity scale and rating for intensity of flavor defects:
- 0 – Not Detected
- 1 – Detectable
- 2 – Slight
- 3 – Moderate
- 4 – Pronounced
- 5 – Extreme

Degree of Difference Sensory Rating Scale (DoD)

Identified by the variations in flavor and characteristics perceived during sensory evaluation.

Ratings defined by perceived difference in flavor descriptions:

0 – Similar:	Sensory profiles are not different
1 – Detectable:	Sensory profiles are similar with negligible differences
2 – Slight:	Sensory profiles are similar with minor differences
3 – Moderate:	Sensory profiles are different
4 – Pronounced:	Product flavors are different
5 – Extreme:	Product flavors are very different

Degree of Difference Scale is defined and rated by the perceived variations between two products. Flavor variations are referenced by the tier categories on the SCA Coffee Taster's Flavor Wheel.

0 - Similar: Products may have trace differences that may not be perceived by the consumer. Taste characteristics are similar. The relationship between quality and intensity of acidity and body is similar. Flavor variations at this level may be perceived but have no significant impact on coffee profile.

1 - Detectable: Products present negligible flavor variations that may not be perceived by the consumer. Taste characteristics are within the same tier 2 umbrella term, for example both are citrus fruit, both are nutty, or both are berry and may have similar tier 3 specific descriptors. The relationship between quality and intensity of acidity and body is maintained with little to no flavor differences relative to roast development. Flavor and intensity differences at this level may be perceived and articulated without significant impact on coffee profile.

2 - Slight: Products have minor differences that may be perceived by the consumer but are generally regarded as typical agricultural variations or from manufacturing. Taste characteristics are within the same tier 2 umbrella term, for example both are citrus fruit, both are nutty, or both are berry but may be different tier 3 specific descriptors. The relationship between acidity and body is maintained as well as overall sweetness, though there may be shifts in attribute quality and intensity.

3 - Moderate: Products are perceived as being similar with different flavor profiles. Variations may be detected by the consumer, including the relationship between acidity and body, differences in flavor characteristics, intensity, or overall sweetness, and/or the presence of a taints or fault. Flavor characteristics may not be within the same tier 2 umbrella terms, for example, one is citric fruit and the other is berry.

4 - Pronounced: Products are perceived to be different products and will likely be identified by the consumer. Perceived flavor differences may be due to variations in the country of origin or growing region, processing, roast development, coffee quality, or blending. Differences perceived by the sensory panelists may include a different relationship between the acidity and body, flavor characteristics that may not be within the same tier 1 general flavors category, significant disparity in quality and intensity of attributes, and/or the presence of a taint or fault.

5 - Extreme: Products are perceived and will be identified by the consumer as very different products. Additional flavor variations to those listed in 4 – Pronounced, include large differences in overall sweetness, roast development, and/or the presence of a taint or fault. Flavor characteristics are unlikely to be within the same tier 1 general flavor category.

Physical Analysis

Beverage Analysis:

Beverage Strength
Solubles Concentration (%)
The quantity of soluble flavoring materials extracted from the coffee and present in the beverage after brewing.
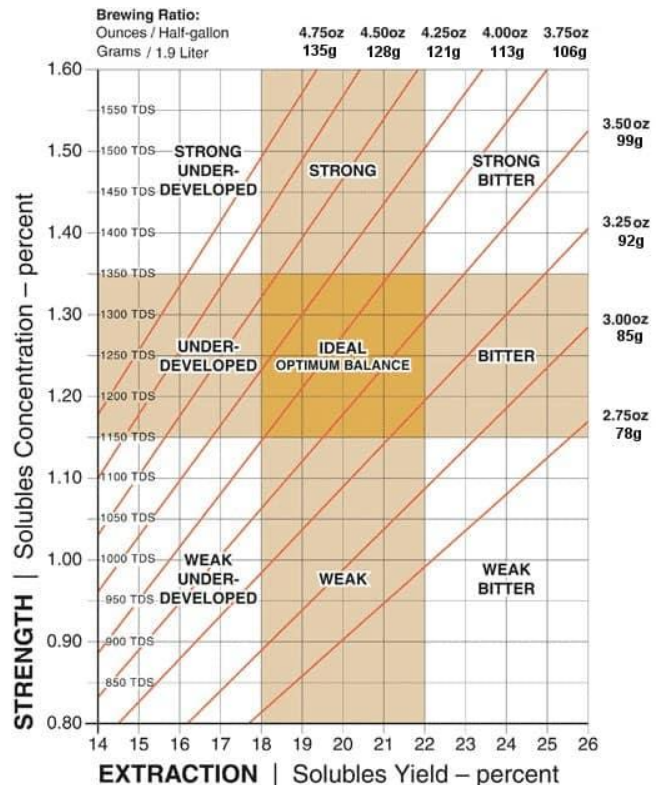
- SCAA Ideal: 1.15-1.35%
- SCAE Ideal: 1.20-1.45%

Coffee Extraction
Solubles Yield (%)
The quantity of soluble flavoring material removed from the coffee during the brewing process. Soluble compounds are removed from the ground coffee through chemical reactions which are dependent on time, temperature, grind particle size, and agitation.

- SCA Ideal: 18-22%

Solids in Coffee Measurements:

Evaporation Method

Liquid Product Analysis (LPA) - ready to drink coffee and tea products. Concentrates, extracts, and flavor ingredients are evaporated in the laboratory's forced air oven. The resulting measurement is **Total Solids**: dissolved and undissolved solids in the prepared beverage.

Roasted Coffee Analysis (RCA) - coffee products brewed in our laboratory are evaporated in the laboratory hot air oven. The resulting measurement is **Brew Solids**: total dissolved and undissolved solids not including the water solids data.

Refractometry Method

May be used for Liquid Product Analysis (LPA) and Roasted Coffee Analysis (RCA) using the VST (or other refractometers such as R2 Extract, Atago, or others). This method uses filtered liquid and measures how light bends (AKA refracts) as it moves between the air and liquid to determine the **Total Dissolved Solids (TDS)** in the prepared beverage.

Green Coffee Quality Designations:

Specialty Coffee Association (SCA)
Specialty Quality Classification: Zero (0) Category 1 "Primary" defects and ≤ five (5) Category 2 "Secondary" defects in a 350 gram sample, and zero (0) Quakers in a 100 gram roasted sample, and green coffee moisture between 10.0% and 12.0%, water activity less than 0.70 Aw, and a cupping score ≥ 80.0 following SCA protocols.

Not Specialty Quality / Standard Quality: if any of the above standards are not met.

Coffee Quality Institute (CQI)
Q Certified Arabica: Zero (0) Category 1 "Primary" and ≤ five (5) Category 2 "Secondary" defects in a 350 gram sample, and ≤ three (3) Quakers in a 100 gram roasted sample, and green coffee moisture between 10.0% and 12.0%, and a cupping score ≥ 80.0 following SCA protocols.

Not Q Certified Arabica: if any of the above standards are not met.

Intercontinental Exchange (ICE) – Green Coffee Association
Exchange Grade "Type": Basis defect count is eight (8) total defects in a 350 grams sample, or thirteen (13) defects for Colombian. No more than fifteen (15) imperfections below the basis, except for Colombian coffee which has a maximum number of full imperfections below the basis at ten (10), and the coffee is sound is free from all unwashed and aged flavored in the cup, and the coffee is of good roasting quality, and the coffee bean size is 50% above screen 15 and no more than 5% below screen 14, and the coffee is equal to or above greenish and free of foreign odors.

Below exchange grade "Type": if any of the above standards are not met.

Roast Development / Color:

Agtron Roast Development https://www.agtroninc.com/
Agtron roast analyzers employ spectroscopy, utilizing specific wavelengths of near-infrared energy outside the visible spectrum to evaluate changes to a group of compounds called quinones. The changes in quinones are quantifiable and relate directly to changes occurring to the volatiles associated with cup aromatics and flavors.

Agtron Commercial Scale – 0 to 100; dark to light.
Agtron Gourmet Scale – 0 to 133; dark to light.
SCA Roast Classification Scale – SCA color tiles use the Agtron Gourmet scale.

ColorTrack https://www.color-track.com/
ColorTrack uses laser reflectometry to determine the exact roast degree of the beans. The ColorTrack number represents the color of the roast —meaning how dark the bean is. Green coffee will read around 40, a light roast around 65, and a dark roast around 75.

**ColorTrack Scale** – 0 to 100; light to dark.

Color L*a*b* Analysis (CIELAB Scale):

The CIELAB space is three-dimensional and covers the entire range of human color perception. It is based on the opponent color model of human vision, where red and green form an opponent pair, and blue and yellow form an opponent pair.

CIE L*a*b* Scale - The lightness value, $L*$ defines black at 0 and white at 100. The $a*$ axis is relative to the green–red opponent colors, with negative values (-128) toward green and positive values (+127) toward red. The $b*$ axis represents the blue–yellow opponents, with negative numbers (-128) toward blue and positive (+127) toward yellow.

Particles Size – RO-TAP®:
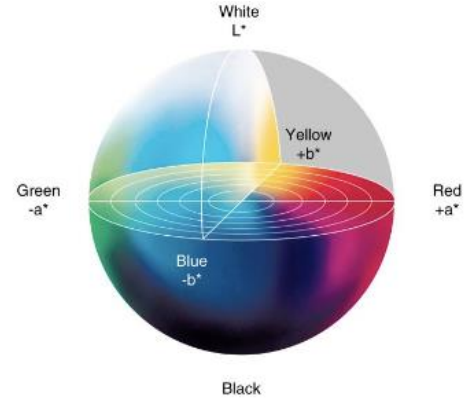
https://hub.wstyler.com/rotap

RO-TAP® is the coffee industry standard for test sieve shakers. It has a unique two-dimensional operation: A horizontal, circular motion and a vertical, tapping motion. This special action allows material particles to stratify and "seek" critical openings in the test sieves. This unit provides accurate and consistent particle analysis testing. Measurement is the retained weight in each sieve:

Standard Ground Coffee Column *

US Mesh #	Tyler Mesh #	Microns	Inches	Millimeters
Sieve #12	#10	1700	0.0661	1.700
Sieve #16	#14	1180	0.0469	1.180
Sieve #20	#20	850	0.0331	0.850
Sieve #30	#28	600	0.0234	0.600
PAN	PAN			

Standard Tea Column *

US Mesh #	Tyler Mesh #	Microns	Inches	Millimeters
Sieve #10	#9	2000	0.0787	2.000
Sieve #14	#12	1400	0.055	1.400
Sieve #18	#16	1000	0.0394	1.000
Sieve #25	#24	710	0.0278	0.710
Sieve #45	#42	355	0.0139	0.355
Sieve #60	#60	250	0.0098	0.250
Sieve #100	#100	150	0.0059	0.150
Sieve #200	#200	75	0.0029	0.075
PAN	PAN			

Green Coffee Bean Size – GrainMan:

https://www.grainman.com/product-page/grainman-screen-shaker-with-digital-timer

Mechanical screen shaker with a horizonal rocking motion. This unit provides accurate and consistent grain size analysis testing. Measurement is the retained weight in each screen.

Standard Green Coffee Column – Round Holes *

Screen #	Inches	Millimeters
18	18/64	7.144
17	17/64	6.747
16	16/64	6.350
15	15/64	5.963
14	14/64	5.556
PAN		

* Additional sieve and screen sizes are available for customized projects.

Chemical Analysis

Measurement Definitions:

Limit of Quantification (LOQ) is the lowest concentration at which the analyte can not only be reliably detected but at which some predefined goals for bias and imprecision are met. The LOQ may be equivalent to the Limit of Detection (LOD), or it could be at a much higher concentration.

Limit of Detection (LOD) is the lowest analyte concentration likely to be reliably distinguished from the Limit of Blank (LOB) and at which detection is feasible. LOD is determined by utilizing both the measured LOB and test replicates of a sample known to contain a low concentration of analyte.

Limit of Blank (LOB) is the highest *apparent* analyte concentration expected to be found when replicates of a blank sample containing no analyte are tested.

Source: National Institutes of Health: National Center for Biotechnology Information – National Library of Medicine

Update October 2, 2024