

Coffee Extraction Thermodynamics & Solvency Field Guide

The Boiling Water Scorch Myth: Chlorogenic Acid Pyrolysis, CO2 Bloom Degassing, and The 198-202 deg F Sweet Spot

THERMAL SWEET SPOT 198 - 202 deg F (92-94 C)	BLOOM DEGASSING 45 - 60 Seconds	TDS EXTRACTION YIELD 18% - 22% Optimal	PYROLYSIS THRESHOLD 208+ deg F (Tannic Burn)
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THE CHLOROGENIC PYROLYSIS CRISIS:

Pouring boiling water (212 deg F / 100 deg C) straight from a bubbling kettle onto ground coffee does not extract deeper flavor—it causes localized thermal scorching. Excessive thermal energy rapidly hydrolyzes delicate chlorogenic acids into quinic acid and bitter phenolics, overwhelming volatile sweet aromatics with astringent, dry, mouth-puckering tannins.

1. Thermal Extraction Spectrum: Boiling Water vs. Calibrated Brewing

Brew Water Temperature	Chemical Extraction Kinetics	Flavor Profile in Cup
Boiling (212 deg F / 100 deg C)	Extreme thermal shock destroys delicate floral terpenes; over-extracts bitter lignin and heavy tannins.	Harsh, burnt rubber notes, dry astringency on sides of tongue, lingering bitter medicinal aftertaste.
Under-Temp (<185 deg F / 85 deg C)	Insufficient thermal solvency to dissolve lipid-bound aromatic oils and caramelization sugars.	Thin, grassy, excessively sour with weak body and hollow, underdeveloped finish.
Optimal (198 - 202 deg F)	Balances rapid dissolution of organic malic/citric acids with gentle extraction of lipids and sugars.	Lush sweetness, distinct stone-fruit or chocolate tasting notes, round velvety mouthfeel, clean finish.

2. The Physics of the CO2 Bloom: Why Pre-Wetting Governs Solvency

Bloom Phase	Thermodynamic Gas Dynamics	Brewing Imperative
1. Dry Coffee Bed	Roasted cell matrix is saturated with trapped carbon dioxide (CO2) gas from Maillard roasting reactions.	CO2 acts as a hydrophobic gas shield, pushing incoming water away from cellular pores.
2. Initial 2:1 Water Pour	Water contacts grounds, heating trapped CO2. Gas violently expands outward, foaming the surface.	Pour exactly 2x ground coffee weight (e.g. 60g water for 30g coffee); swirl to saturate all dry pockets.
3. 45-Second Degassing Pause	Gas bubbles escape completely, leaving hollow porous cellulose fibers ready to absorb liquid water.	Never pour main stream until bubbling completely stops; rushing causes severe water channeling.

3. The Barista Pour-Over Extraction Protocol

[]	Step 1: The 60-Second Kettle Rest After your gooseneck kettle reaches a rolling boil (212 deg F), remove it from heat and leave the lid open for 60 seconds to naturally cool to 200 deg F.
[]	Step 2: Rinse Paper Filters with Hot Water Flush your paper filter thoroughly with 150ml of hot water and discard the rinse liquid. This removes paper wood-pulp taste and preheats the brewer ceramic.
[]	Step 3: Maintain a 1:16 Brew Ratio Use a digital scale. Weigh 30 grams of freshly medium-ground coffee to 480 grams of water for balanced, textbook 20% extraction yield.
[]	Step 4: Execute the Gentle 3x Bloom Pour 60 to 75 grams of 200 deg F water gently in concentric spirals. Swirl the slurry twice and let it degas undisturbed for precisely 45 seconds.
[]	Step 5: Low-Agitation Continuous Spiral Pour Keep your kettle spout 1 to 2 inches above the bed. Pour in smooth, steady spirals without washing the outer filter paper wall to prevent unextracted bypass.
[]	Step 6: Target a 3:30 Total Drawdown Time If your brew finishes in under 2:30, your grind is too coarse (sour). If it drags past 4:15, your grind is too fine (bitter astringency).