

TOROWHITE FOG 20

Food-Grade Calcium Coagulant for Tofu & Plant-Based Cheese — Summary of Advantages

FOG 20 is a highly purified, **natural food-grade calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, E516)**, milled from exceptionally pure natural calcium sulfate. Unlike magnesium chloride (nigari), which floods the system with Mg^{2+} ions instantly and forces chaotic protein precipitation, FOG 20 **releases Ca^{2+} progressively**. This controlled gelation gives soy, pea, faba and lentil proteins time to build an ordered, fine-pored “egg-box” network — producing a firmer, sliceable curd with better water retention, higher yield and no protein shock, while fortifying the finished product with dietary calcium.

Property	FOG 20
Ingredient	Natural calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)
Regulatory status	E516 — food-grade; GRAS; organic-approved
Purity	> 99% CaSO_4 ; 100% naturally sourced (Spain)
Appearance	Bright white, $L^* > 95$; neutral taste & odour
Recommended dosage	0.40% (4.0 kg per tonne of plant extract)
Trial range	0.33–0.40% (bracket to target firmness)
Protein bases	Soy, pea, faba, lentil (and hydrocolloid systems)
Certifications	Food & pharma grade; GRAS, EU, CODEX, organic

One ingredient, several jobs

FOG 20 replaces what would otherwise take multiple additives and grades:

- **One coagulant across every protein base** — the same ingredient sets soy, pea, faba and lentil extractions, so a single specification covers a full plant-protein portfolio instead of one coagulant per system.
- **Coagulation and calcium fortification in one** — it builds the curd and simultaneously delivers bioavailable dietary calcium (absorbed comparably to milk), unlocking “source of calcium” / “high in calcium” claims that nigari and GDL simply cannot support.
- **Works beyond protein curds** — in plant-based cheese analogues the same Ca^{2+} also activates calcium-dependent hydrocolloids (alginate, low-methoxyl pectin, κ -carrageenan) — three functions from one ingredient.

Controlled gelation — no protein shock, higher yield

Instant-acting chloride systems (nigari, CaCl_2) release ions in one burst, causing uneven texture, syneresis and inconsistent batch-to-batch yield. Because calcium sulfate is only sparingly soluble, FOG 20 sets **slowly and uniformly**, giving a continuous gel matrix and a wide, forgiving processing window. Independent trials (Kao et al., 2003) show water-holding, yield, and solid- and protein-recovery all peak at the recommended 0.40% dosage — water-retention ability of **77% and ~253 g tofu per 100 g soybean**, with a firmer curd than acid-set (GDL) tofu.

- **Firm, cohesive, sliceable curd** that holds under pressing, with strong water retention and minimal syneresis.
- **Higher, more consistent yield** batch to batch, thanks to the ordered egg-box network that traps water and lipids uniformly.
- **Clean, neutral flavour** — preserves the natural sweetness of the base without the bitterness or mineral notes of overdosed nigari.

- **Robust and forgiving process** — a wide dosing window (0.33–0.40%) that tolerates protein and dry-matter variation.

Natural, clean-label and worldwide-recognised

FOG 20 is a **natural mineral — mined, not synthesised**. It is declarable simply as “calcium sulfate” or “mineral salt”, and organic standards (USDA NOP, IFOAM) permit only this non-synthetic, mined form — so it fits clean-label and “natural” positioning that synthetic or chloride alternatives struggle to match. Its food-additive status (E516) is recognised across the EU, US (GRAS), CODEX, Japan and Australia/NZ, giving manufacturers a regulator-recognised point of difference in a crowded plant-protein category, plus a genuine nutritional calcium claim in the same ingredient.

Simple to adopt

FOG 20 drops into existing lines with **no new equipment**: disperse in 5–10 parts lukewarm water, add to plant extract at 80–90 °C (target 85 °C), mix low-shear for 10–30 seconds, then leave undisturbed 15–20 minutes. A clean side-by-side comparison against a nigari baseline can be run in one week, with full optimisation typically in four. Because FOG 20 forms a more cohesive curd, **use pressing as the primary firmness lever** rather than raising dosage — and bracket 0.33–0.40% on any new protein extract before fixing a process dose. (Note: do not convert a nigari dose 1:1 by weight.)

Bottom line: FOG 20 turns the coagulant from a blunt precipitant into a protein-network engineering ingredient — one natural, food-grade mineral that sets soy, pea, faba and lentil bases into a firmer, higher-yield, cleaner-tasting curd while fortifying it with calcium and keeping the label clean and natural.

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