APISARA

ADDITIVES IN SOAPMAKING

Understand, choose, dose and control them without turning a formula into a “magic recipe”

PURPOSE OF THIS GUIDE

> To understand why an additive is used, what it can genuinely change, how to incorporate it, which side effects to watch for, and how to document its use. This guide mainly concerns lye-based soaps made by cold process and hot process.

Audience: beginners, artisans, professionals, trainers and self-learners.

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Eric Bertrand for Apisara

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DISCLAIMER

> This guide is an educational resource. It does not replace laboratory analysis, a Safety Data Sheet (SDS), supplier specifications, a cosmetic safety assessment, or the regulatory requirements applicable to the product and the country concerned.

1. What is an additive?

In soapmaking, an additive is an ingredient added to obtain a technological, sensory, aesthetic or preservation-related effect without itself forming the basic soap system. Oils and fats, water and alkali belong to the fundamental formulation; sugar, salt, clay, a chelator or botanical powder are additives.

An additive does not automatically correct a poor formula. It may alter hardness, lather, batter fluidity, colour, skin feel, setting speed, susceptibility to oxidation or behaviour in hard water. These effects also depend on the oils, lye concentration, temperature, process and cure.

APISARA RULE

An additive should serve a specific function. If you cannot explain why it is being added and how its effect will be evaluated, it is usually better to start without it.

2. Before adding anything: think by function

Desired function	Possible families	Question to ask
Modify lather	Sugars, sugary materials	Does the base formula already produce suitable lather?
Harden / unmould	Sodium lactate, salt depending on soap type	Do you need early firmness or genuine longevity in use?
Reduce soap scum	Citrate, gluconate, other chelators	How hard is the water in which the soap will be used?
Modify texture / slip	Clays, starches, powders	What feel and solid loading are wanted?
Appearance / ingredient story	Plants, milk, honey, powders	Can the claimed effect be demonstrated in a rinse-off soap?
Limit oxidation	Suitable antioxidants	Is the issue fragile oils, storage, or trace metals?

Good practice is to change one variable at a time in a small batch, then compare it with a control batch without the additive.

3. Sugars, honey and sugary materials

Sugars are mainly used to support lather. They are highly water-soluble, but they also increase the organic load of the soap batter and may intensify heating. Honey contains sugars plus other constituents, so its behaviour is less predictable than pure sucrose.

Possible effects: more abundant or easier-to-develop lather; hotter batter; deeper colour; increased risk of overheating, especially when honey, milk or other sugary ingredients are combined.

SAFETY

> Do not treat honey as if it were merely a fragrance. Adding it directly to concentrated lye solution can cause intense heating and rapid foaming or boiling. Prefer controlled incorporation using a tested procedure.

Starting point for trials: for plain sugar, an exploratory range of about 0.5-2% of oil weight is often sufficient for comparison. With honey, start low and monitor heat. These are experimental starting points, not universal standards.

Common mistakes: combining sugar + honey + milk without managing thermal risk; heavily insulating a mould when the batter is already heating; assuming that more lather automatically means a milder soap.

4. Salt and technical salts

Sodium chloride can strongly modify the structure of sodium soap. At low levels it can help firm certain formulas. At high levels it creates specific salt soaps that require adapted formulation and should not be treated as ordinary soap with a simple extra ingredient.

Too much salt in a formula not designed for it may make the bar brittle, suppress lather or accelerate setting.

DO NOT CONFUSE

Firmness at unmoulding, hardness after cure and longevity in water are not synonymous. An additive that firms a bar quickly does not replace a balanced formula or an adequate cure.

For a firmness trial, work at a low level and compare with a control. Heavily salted soaps are a distinct formulation category with their own fatty-acid balance and process.

5. Sodium lactate

Sodium lactate is the sodium salt of lactic acid. In soapmaking it is mainly used to improve the initial firmness of solid bars, make unmoulding easier and, in hot-process soap, improve the workability of the paste. It is also used in some liquid-soap processes to assist dilution.

It is sold both as a powder and as aqueous solutions. Dosage must therefore always take account of the actual concentration of the commercial product.

TECHNICAL POINT

Sodium lactate is not the standard chelator for controlling soap scum or trace metals. Citrate, gluconate, GLDA or EDTA may be selected for that purpose depending on the formulation brief.

Incorporate it homogeneously according to supplier data and record its concentration in the batch sheet. Excessive amounts can produce undesirable texture or processing behaviour.

6. Citrate, citric acid and chelators

Chelators bind certain metal ions. In soap, one of their main benefits is reducing insoluble deposits in hard water and, depending on the system, limiting some reactions catalysed by trace metals.

Sodium citrate: it can be added directly and does not then consume additional NaOH. Practical published ranges for solid soap are around 1.3-3.9% of oil weight, to be adjusted for water hardness and formulation.

Citric acid: it reacts with sodium hydroxide to form sodium citrate and therefore consumes part of the lye. The formulation must compensate for this neutralisation; otherwise the real superfat will be higher than calculated.

CALCULATION NOT TO FORGET

Adding an acid is not equivalent to adding its salt. When citric acid is used, the NaOH amount must be recalculated. When preformed sodium citrate is used, extra NaOH is not added to “compensate”.

Other chelators include sodium gluconate, GLDA, EDTA and others. Selection depends on the formulation brief, regulations, supplier data, process and required performance. Do not transfer the dosage of one chelator directly to another.

7. Clays, mineral powders and starches

Clays and mineral powders may colour, opacify, alter feel and slip, absorb some surface oils or influence batter rheology. Their composition and particle size can vary considerably by origin and supplier.

Family	Main purpose	Points to watch
Kaolin / clays	Feel, opacity, colour, slip	Dispersion, high loading, raw-material quality
Starches	Powdery feel, absorption, texture	Lumps, variable behaviour
Charcoal / mineral powders	Colour, appearance	Colour strength, dust, suitability

Pre-dispersing powders in a small suitable portion of liquid or oil can reduce clumping. Minimise airborne dust from fine powders and consult the SDS where available.

8. Botanical powders, exfoliants and insoluble materials

Botanical powders are often selected for colour, texture or botanical identity. In the strongly alkaline soap environment, many plant pigments change colour; some materials brown or become dull. A useful property of the fresh plant cannot automatically be transferred to the finished soap.

Exfoliants should be assessed for particle size, shape, hardness and concentration. Material that is too coarse or angular may feel unpleasant or abrasive.

CLAIM ≠ INGREDIENT

The presence of a plant, honey or milk does not by itself demonstrate a particular cosmetic benefit in the finished soap. Claims must remain compatible with available evidence and the regulations of the target market.

Sieve when appropriate, disperse properly, test several low levels and assess not only the fresh bar but also the cured bar and performance after repeated wet-dry cycles.

9. Milks and liquids rich in sugars/proteins

Milks provide water, sugars, proteins, minerals and fats, so they do not behave like pure water. Contact with concentrated alkali can cause strong heating, temporary odour and browning.

Several approaches are possible: full or partial water replacement, adding milk to the batter, or using reconstituted/dispersed milk powder. The chosen method should be documented and tested because it changes thermal management and total liquid.

THERMAL MANAGEMENT

With milk, honey or sugars, monitor the temperature of the batter and mould. Do not automatically use the same insulation procedure as for a simple formula.

For reproducibility, specify the form used: liquid or powder, solids content where relevant, supplier and batch.

10. Antioxidants: what they do - and do not do

> An antioxidant slows certain oxidation reactions. It is not synonymous with an antimicrobial preservative and does not replace a chelator. This distinction is essential.

Family	Main target	Does not replace
Antioxidant	Oxidation of fats and oils	Antimicrobial preservative
Chelator	Metal ions, soap scum, metal-catalysed reactions	Antioxidant in the strict sense
Preservative	Micro-organisms in products that require preservation	Antioxidant / chelator

In a properly made and sufficiently dry solid soap, microbiological considerations are not the same as in a cosmetic emulsion. Diluted, liquid, paste-like or high-water products require product-specific preservation assessment.

11. Incorporation methods

Method	Suitable for	Advantage	Risk / control
Dissolve in water	Sugar, citrate, some salts	Even distribution	Total water and solubility
Add to cooled lye solution	Some compatible salts	Simple	Do not improvise with reactive or sugary ingredients
Disperse in oil	Clays, powders, suitable pigments	Reduces lumps	Account for oil taken from the formula
Add at emulsion / light trace	Diluted honey, dispersed powders	Visual control	Acceleration / poor dispersion
Add in hot process	Selected late-stage additives	Late incorporation	Temperature, homogeneity, dosage

The correct incorporation point depends on the chemistry, solubility, heat sensitivity and intended function of the additive. A reproducible procedure is better than a blanket rule such as “always add at trace”.

12. Summary table and starting ranges

The figures below are starting ranges for trials, not universal dosages. Adapt them to purity, commercial concentration, soap type and supplier information.

Additive	Main function	Trial starting point	Watch for
Sugar	Support lather	~0.5-2% of oils	Heating, colour
Honey	Lather / ingredient identity	Start low	Overheating, browning
NaCl, low level	Firmness / texture	Low level, comparative trial	Lather, brittleness if excessive
Sodium lactate	Unmoulding / firmness / HP	By concentration and supplier data	Record solution strength

Additive	Main function	Trial starting point	Watch for
Sodium citrate	Chelation / hard water	~1.3-3.9% of oils	Possible crystallisation if excessive
Citric acid	Citrate precursor	Often ~0.1-3% depending on purpose	Recalculate lye
Clays	Feel / colour / slip	Start low	Dispersion, dust
Botanical powders	Appearance / texture	Low level	Colour stability, abrasiveness

IMPORTANT For a commercial solution (lactate, chelator, extract, etc.), distinguish the amount of product as supplied from the amount of active material. Supplier technical data take priority.

13. Defects, diagnosis and corrections

Observation	Possible additive-related causes	Checks / corrections
Batter heats or swells strongly	Sugar, honey, milk; excessive insulation	Cool process, reduce sugars, revise insulation
Brittle / crumbly soap	Too much salt or mineral loading	Reduce additive; adapt formula and cutting time
Poor lather	High salt, base formula, hard water	Compare control, test chelator, review fatty acids
Specks / lumps	Poorly dispersed powder	Pre-disperse / dissolve / sieve
Crystalline deposit	Excess or crystallisation of some salts	Reduce level; check solubility
Unexpected colour	Plant pigment unstable to pH / heat	Run stability tests after cure
DOS / rancid odour	Oxidised oils, storage, trace metals	Check raw materials, packaging, antioxidant/chelator system

Diagnosis should remain multifactorial. Temperature, water content, fragrance, oil quality and process can interact with an additive.

14. Professional testing method and traceability

To turn an artisan trial into a controlled formulation: 1. Define a measurable objective. 2. Prepare a control batch without the additive. 3. Prepare a small batch with only one change. 4. Record amount, concentration, supplier, batch number, temperature and incorporation point. 5. Compare at day 1, unmoulding, after cure and in use. 6. Then change only one parameter at a time.

PROFESSIONAL APPLICATION

The master formula should describe each ingredient and each step precisely enough for another trained person to reproduce the product. Raw materials should have defined acceptance criteria.

A “natural” additive is not inherently more reproducible. Clay, honey or botanical powder may vary more than a chemically defined ingredient, making documentation even more important.

15. Safety, labelling and regulation

Adding an ingredient changes the formula and may change documentation obligations. For products intended for sale, verify ingredient suitability, quality, declaration in the ingredient list and any applicable restrictions.

Fine powders may present an inhalation risk; acids and alkalis require rigorous chemical handling; food-grade ingredients are not automatically suitable for professional cosmetic use. SDSs, technical data sheets and supplier specifications should be part of the documentation system.

INGREDIENT DECLARATION

An added ingredient does not automatically disappear from the declaration simply because it serves a processing function. Rules depend on the market and product status. Document the real formula and verify applicable requirements before sale.

In the European Union, soap presented as a cosmetic product falls within the applicable cosmetics framework: safety assessment, product information file, notification, good manufacturing practice, labelling and substantiation of claims must be addressed for the finished product.

16. Key points

Additives are formulation tools, not universal solutions. They are useful when they address a defined problem and are tested methodically.

- Sugar can support lather but increases thermal risk. • Salt and sodium lactate can alter firmness but do not replace sound formulation or curing. • Citrate and other chelators are especially useful in hard water. • Citric acid consumes lye: the calculation must be corrected. • Clays, powders and botanicals require control of dispersion and variability.
- Antioxidant, chelator and preservative are three different functions. • Every professional additive should be traceable, specified and evaluated in the finished product.

THE BETTER QUESTION

Do not begin with: “What additive can I put in my soap?” Ask instead: “What specific problem am I trying to solve, and how will I objectively know whether the additive solved it?”

References and resources

- Handcrafted Soap & Cosmetic Guild (HSCG) - technical resources, terminology, production documentation and raw-material specifications. • DeeAnna Alton / Classic Bells - Soapy Stuff - technical material on citrate, citric acid, lactate, chelators, water and formulation. • Supplier technical data and SDSs: consult them for each raw material and commercial concentration. • Cosmetic regulations applicable in the market where the product is sold: always verify the current version.

APISARA RESOURCES

In addition to the saponification calculator, Apisara provides technical guides and reference sheets as well as educational articles published on Facebook and Substack. The collection is designed for self-learning, training and professional practice.

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