APISARA

SOAP LATHER

Understanding, formulating and controlling it

Apisara technical and educational guide For hobbyists, artisans, professionals, trainers and learners.

> Core idea. Abundant lather is neither proof of greater cleansing power nor, by itself, a sufficient quality criterion. Lather is a complex use property: it depends on soap composition, concentration, water, temperature, rubbing method, additives and the presence of soils.

This guide examines lather quantity, bubble size, texture, stability and speed of formation, then uses these concepts to formulate methodically rather than simply seeking “as many bubbles as possible”.

Apisara resources

In addition to the saponification calculator, technical guides and reference sheets are available at apisara.org. Complementary educational articles are also published on Substack and Facebook.

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1. What is lather?

A foam is a dispersion of gas in a liquid phase: numerous air bubbles are separated by thin films containing water and surface-active molecules. In soap systems, fatty-acid ions organise at air-water interfaces and help form these films.

Forming a bubble is not enough: the film must also resist liquid drainage, bubble coalescence and rupture for long enough. This is why foam formation and foam stability are different properties.

Lather can therefore be fast but short-lived, low in volume but creamy and stable, or abundant yet poorly persistent.

2. Lather and cleansing power: do not confuse them

Cleansing mainly arises from the surface-active action of soap molecules: wetting, detachment of certain soils, dispersion and removal in water. Lather often accompanies this process, but its volume is not a direct measure of cleansing efficiency.

A formulation may therefore cleanse effectively while producing moderate lather. Conversely, spectacular foam does not by itself demonstrate better cleansing. Lather perception nevertheless matters to user experience and can be a useful practical indicator of product behaviour.

3. The role of the fatty-acid profile

A soap's lathering properties depend strongly on the fatty-acid salts formed. The trends below are useful for reasoning but should not be turned into absolute rules: final behaviour depends on the complete formula and conditions of use.

Fatty acid / family	Typical tendency in sodium soap	Practical consequence
Lauric / myristic	Relatively soluble soaps capable of rapidly producing bubbles and substantial foam volume.	Useful for boosting lather, but excess can affect mildness, solubility and longevity.
Palmitic / stearic	Contribute more to dense, fine and persistent lather than to rapid large bubbles.	Support creamy texture and stability while strengthening bar structure.
Oleic	May produce more restrained initial lather, often finer with time and use.	Should be assessed within the overall balance rather than judged solely by bubble volume.
Ricinoleic	Ricinoleate has strong affinity for water and can support dispersion and persistence of lather from other soaps.	Castor oil is generally a complementary lever, not a base intended to maximise lather on its own.

4. Why does coconut oil lather so readily?

Coconut and palm-kernel oils are rich in medium-chain fatty acids, especially lauric and myristic acids. Their sodium soaps are relatively soluble and can quickly reach sufficient concentration at interfaces to generate lather.

This explains their value in many formulations, especially where use water or oily soils suppress lather. Increasing their proportion, however, is not a limitless strategy: the formula must remain consistent with the desired mildness, superfat, longevity and intended use.

Formulating lather means seeking balance, not maximising the coconut-oil percentage.

5. The special case of castor oil

Castor oil is exceptionally rich in ricinoleic acid, an unusual hydroxylated fatty acid. In a balanced formula, ricinoleates can promote solubilisation and help support more stable or persistent lather.

This does not mean “more castor oil = more lather”. At high proportions, soap texture, hardness, user feel and drying behaviour can change. Castor oil is especially valuable as a co-formulant.

6. Large bubbles, creamy lather and stability

To describe lather properly, several criteria should be separated:

- Onset speed: time required to obtain perceptible lather.
- Volume: total amount produced under a defined protocol.
- Bubble size: large airy bubbles or tightly packed microbubbles.
- Creaminess: perception of dense, fine, lubricating foam.
- Stability: ability to persist without rapidly collapsing.
- Rinsability: ease with which film and foam are removed with water.

Two soaps can therefore produce similar volume while delivering very different experiences. In professional formulation, recording only “lots of lather / little lather” is insufficient.

7. Soap concentration in water

For foam to form, enough surfactant must be available in the water and at interfaces. Below a certain concentration, lather forms poorly. As concentration rises, molecules also organise into aggregates such as micelles.

During real use of a bar, this concentration is not fixed: it rises locally as the user wets and rubs the soap. The rate at which different soaps enter the water therefore strongly affects lather onset.

8. Hard water: calcium and magnesium change the picture

Calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions in hard water react with soap anions to form poorly soluble salts. Part of the soap then becomes unavailable for cleansing and lathering, and deposits may form.

Consequently, a soap may lather very well in soft water and much less in hard water. Serious prototype comparisons should therefore use the same water or water of known hardness.

Chelating agents such as citrate in some formulations can help complex part of the metal ions. They do not, however, turn conventional soap into a surfactant that is completely insensitive to hard water.

9. Salt, sugar and other additives

Lever	Possible effect on lather	Interpretation caution
Sugar / sugars	May promote more abundant lather in some formulations and conditions.	Dosage and process matter; excess, overheating or discolouration can become problematic.
Salt (NaCl)	Changes soap solubility and organisation; may reduce foam volume depending on formula and dosage.	High-salt soaps behave specifically; do not extrapolate directly from a conventional formula.
Citrate / chelators	May improve behaviour in hard water by limiting some Ca/Mg effects.	They do not directly create lather and must be correctly formulated.
Clays / powders	May modify slip, film viscosity and perceived lather.	Some materials adsorb compounds or increase friction; effects must be tested.

10. Superfat and lather

Unsaponified fats can interact with foam and interfaces. In practice, strongly increasing superfat can reduce how readily abundant lather develops, particularly when the formula already contains few rapidly soluble soaps.

It would nevertheless be wrong to infer a universal linear relationship. The result depends on fatty-acid profile, superfat level, water, process and mode of use. Superfat should be chosen for overall product balance, not solely for its presumed effect on lather.

11. Temperature and lather

Water temperature influences solubility, viscosity and interfacial dynamics. The same soap may therefore lather differently in cold and hot water. Prototype comparisons should preferably maintain the same temperature range.

In real life this variability is normal: a formulation test should seek reproducibility, while a use test should represent the conditions for which the product is actually intended.

12. Soils and oils suppress lather

Fats, sebum and other hydrophobic soils consume part of the surfactant capacity and disturb foam films. This is one reason a first application on an oily surface may lather poorly while a second application produces much more foam.

This illustrates why lather cannot be interpreted without knowing the test conditions. Soap tested on clean hands and soap tested after handling oil are not comparable.

13. How to test lather reproducibly

Laboratories have instrumental or standardised methods for studying foams. A workshop can nevertheless establish a simple comparative protocol, provided it is documented and the results are not presented as an official standard.

Comparative workshop protocol

- Use soaps of the same age stored under the same conditions.
- Use the same soap mass or surface area for every test.
- Use an identical water volume from the same source.
- Maintain a defined water temperature.
- Apply the same number of rubbing or agitation cycles for the same duration.
- Immediately measure foam volume or height in an identical vessel.
- Record foam after a fixed time to assess stability.
- Repeat each test several times and use an average rather than a single observation.

Important: the protocol must remain identical across formulations. Simultaneously changing water, temperature, motion or vessel destroys the comparative value of the test.

14. A more useful assessment grid than “it lathers”

Criterion	Observation question	Example internal scoring
Onset	Does lather appear quickly?	1 = slow; 5 = immediate
Volume	How much is obtained after a standard cycle?	Measure mL or height rather than relying on impression.
Texture	Large, medium or fine bubbles? Creamy foam?	Standardised description + photograph if useful.
Stability	What proportion remains after a defined time?	% of initial volume or residual height.
Slip / feel	Does the lather provide the intended behaviour?	Clearly defined internal sensory scale.

15. Formulate for the intended use

There is no single ideal lather profile for every soap. The right compromise depends on use:

- Toilet/body soap: balance between onset, pleasant texture, rinsing, perceived mildness and longevity.
- Hand soap: relatively rapid onset and robust behaviour despite frequent washing.
- Shaving soap: priority on dense, stable, lubricating lather capable of retaining water; this is a specific formulation brief.
- Household soap: perceived foam may be secondary to degreasing, rinsing and behaviour in the water used.

16. Diagnosing unsatisfactory lather

Observation	Causes to check	Work directions
Very little lather	Hard water, young or poorly soluble soap, high superfat, soils, weak friction.	Standardise the test before reformulating; then examine fatty-acid profile and use water.
Large bubbles but rapid collapse	Formula strongly oriented toward fast-lathering soaps, insufficient film structure, test conditions.	Seek a better balance with components supporting density and persistence.
Dense lather but slow onset	Few rapidly soluble soaps, cold/hard water, very dry bar or limited rubbing.	First decide whether this is truly a defect for the intended use; then change one variable at a time.
Good test lather, poor for some users	Water hardness, temperature, amount used, soils, habits.	Test several waters and realistic scenarios before changing the formula.

17. Common mistakes

- Believing that more lather means better cleansing.
- Confusing foam volume with foam stability.
- Changing several oils at once to “fix” lather.
- Assessing a fresh recipe against a well-cured soap.
- Ignoring the hardness of the test water.
- Automatically adding large amounts of coconut or castor oil without considering the rest of the formula.
- Judging only by appearance: texture, slip, rinsing and persistence also matter.
- Presenting an internal workshop test as a standardised measurement.

18. Formulation checklist

- What type of lather is actually required for the intended use?
- Does the fatty-acid profile balance onset, density and stability?
- Have longevity and mildness been considered alongside lather?
- Is the superfat level coherent with the whole formula?
- Is the use water hard or variable?
- Does each additive have a precise purpose?
- Are compared soaps the same age?
- Is the test protocol written and reproducible?
- Have I repeated trials rather than relying on one observation?
- Are sensory results separated from physical measurements?

19. Summary

Lather is a complex interfacial phenomenon, not simply a bubble count. Lauric and myristic soaps generally promote rapid onset and substantial volume; palmitic and stearic soaps contribute more to density and stability; ricinoleates can support the system; water, superfat, salts, temperature and soils strongly modify the result.

Good formulation therefore does not seek maximum lather. It seeks lather suited to the intended use, reproducible under expected conditions, and compatible with the soap's other objectives: mildness, longevity, stability, processing and cost.

20. References and further reading

These references provide further background on surfactancy, micellisation, foams and soap behaviour. Experimental systems do not always reproduce a complete handcrafted soap exactly.

Rosen, M.J. & Kunjappu, J.T. Surfactants and Interfacial Phenomena. Wiley. Reference work on surfactants, micelles, interfacial adsorption and foam phenomena.

Exerowa, D. & Kruglyakov, P.M. Foam and Foam Films: Theory, Experiment, Application. Elsevier. Reference on foam formation, drainage and film stability.

Holmberg, K. et al. Surfactants and Polymers in Aqueous Solution. Wiley. Physicochemical principles of surfactants in aqueous solution.

McBain, J.W. Classical work on soaps and their aggregates in solution, contributing to the foundations of modern understanding of surfactant micellisation.

ISO 696:1975. Surface active agents - Measurement of foaming power - Modified Ross-Miles method. Example of a standardised method for comparative measurement of surfactant foaming power.

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 country concerned.

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