

COLD PROCESS SOAP

THE CHEMISTRY BEHIND A BAR OF SOAP

IS LESS FORGIVING THAN YOU THINK

Why cold process leaves almost no room for error

The reaction is irreversible

Once the phases meet, the correction window closes.



Triglyceride + alkali
→ soap + glycerin

NaOH for solid bars

KOH for liquid soap

- When lye solution meets oils and the batch moves toward trace, saponification is already underway.
- There is no simple in-process correction once saponification is underway; significant errors may require rework or disposal.
- Every decision has to be correct before the phases meet.

Every oil has its own lye requirement

SAP value is different for every oil and every oil blend.



OIL SWAP ≠ SAME LYE

If the oil blend changes, the alkali requirement changes with it.

The process will not flag the mistake until the batch is made.

Change the oils → recalculate the lye. Every time.

Use the calculator before scaling a formula:

cosmetechs.com/soap-calculator

Superfat is a safety margin, not a luxury

It deliberately leaves a small fraction of oil unsaponified.

- Improves feel and mildness of the finished bar.
- Absorbs small weighing and measurement errors.



Run superfat too low: safety risk.
Run it too high: performance + shelf-life trade-off.

Water is not a free variable

Water concentration changes the way the batch behaves.



- | | | |
|----|-----------|-----------------------------------|
| 01 | TRACE | how fast the batch thickens |
| 02 | GEL PHASE | how heat and structure develop |
| 03 | HARDENING | how quickly the bar unmoulds |
| 04 | CURE | how long the bar needs before use |

Reducing water is legitimate.
It is not neutral.

The fatty acid profile is the formula

Bar properties come from fatty acid distribution, not oil names.



Lauric + Myristic

Fast, bubbly lather
Can feel stripping at high levels

Palmitic + Stearic

Hardness
Creamy, stable lather

Oleic

Conditioning character
Softer bar, slower trace

Polyunsaturated

Skin feel + fluidity
Shorter shelf-life at high levels

**You are not choosing oils.
You are building a fatty acid profile.**

The batch is not finished when it is cut

Cure is a chemistry and performance stage, not just “drying time”.



Water leaves

bar becomes firmer



Lather improves

foam becomes more pleasant



Use becomes milder

finished product settles

**Appearance tells you very little.
Safety and completion are testing questions.**

Soap looks simple because the ingredient list is short.

Short ingredient lists are not the same as simple chemistry.

Get the alkali calculation right before anything else.

Everything downstream depends on it.

I work with brands and manufacturers on:

FORMULATION DEVELOPMENT

FORMULA AUDITS

TROUBLESHOOTING

cosmetechs.com

cosmetechs.com/soap-calculator