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Lavender & Geranium Soap VEGAN • GENTLE • FLORAL The pairing of lavender and geranium is a classic combo for a facial soap. This floral soap is colored a bluish purple using alkanet root and indigo root powders.	Apple Cider Vinegar Soap VEGAN • FLORAL • CITRUS Apple cider vinegar is popular as a natural health tonic. In soap, it neutralizes a bit of the lye, leaving you with a super-moisturizing bar that helps ease troublesome skin.	Garden Herb Soap VEGAN • EXFOLIATING • FLORAL • MINTY • HERBAL This beautiful layered soap includes crushed dried peppermint to make it exfoliating. Use this soap after a day in the garden to scrub away the dirt from your hands.	Rose Clay Soap VEGAN • BODY • FACE • FLORAL • CITRUS This rosy pink concoction makes a lovely face soap, and features geranium essential oil, known to reduce wrinkles and repair skin.	

Student Manual

- The Complete Guide to Natural Soap Making: Create 65 All-Natural Cold-Process, Hot-Process, Liquid, Melt-and-Pour, and Hand-Milled Soaps
- Amanda Gail Aaron
- March 2019
- ISBN-10: 1641521546

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Processes

- **Cold-process:** most common technique for advanced designs. 24h saponification process using sodium hydroxide (lye), minimum of 6 weeks to cure.
- **Hot-process:** the saponification process is forced by adding heat from a slow cooker resulting in a few hours with a paste to spoon into molds to harden. 2 weeks curing.
- **Liquid soap:** hot-process using potassium hydroxide, the paste is immediately diluted with water to be used in liquid form right away
- **Melt-and-pour soap:** no lye to manipulate. A base is purchased and melted. You add scents, additives and colors, pour and once hardened, ready to use.
- **Hand-milling soap:** no lye to manipulate. Get unscented basic soap (purchased or from previous cold/hot-process batches), shred, warm until it softens, add fragrance, additives and dyes, spoon and mold. Once hardened, ready to use.



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Processes

- This Training teaches Cold Process soap recipes only.
- Once the proper quantities of lye and oils are combined, you get soap 24 hours later.
- You may be doing many trials until reaching a satisfactory level. All these trials, how bad you believe they end up, do all still produce soap with all its cosmetic properties... You may end up with years of perfectly usable soap ☺ Experimentation is welcome: nothing is wasted!
- Feel free to offer your botched realization to friends and family: a natural home-made bad looking soap is always better than a manufactured nicely looking soap packed with cheap chemicals.
- Soap you don't like may be reused thru hand-milling technique



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Terminology

Term	Definition
Acid	Substance whose pH < 7. Base oils are acid
Base, alkali	Substance whose pH > 7. NaOH and KOH are bases
Cure	The drying period of the soapmaking process
Emulsion	The point when lye and base oils are mixed and do not separate
Fatty acids	The basic chemical components of base oils. Eg: lauric, myristic, oleic, stearic, ...
Gel phase	The heating phase of saponification. The soap turns translucent as it heats up (exothermic reaction) and saponifies
Lye	Base used in soapmaking. Sodium hydroxide NaOH and potassium hydroxide KOH
Lye calculator	A calculator which determines the precise amount of lye needed to turn the base oils into soap
Saponification	The exothermic chemical reaction which occurs when the lye and oils turn into soap
Superfat	Excess base oils which are not saponified by lye
Trace	When the soap emulsifies and is thick enough to leave a mark when you drizzle raw soap
Zap test, tongue test	When you touch the soap with the tip of the tongue to test for active lye

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Designing the Soap

- Purpose
- Cosmetic properties
- Colors (dyes)
- Additives
- Scents, fragrances
- Shape



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Purpose

Purpose/properties	moisturizing	consistency	cleaning
Floors	No	Liquid	Yes
Clothes	No	Liquid, Solid	Yes
Hands	yes	Liquid, Solid	Yes
Face	yes	Liquid, Solid	Mild
Shampoo	yes	Liquid	Mild

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What is saponification

Saponification is the chemical process which transforms a specific combination of fats and lye into soap.

How long the chemical transformation takes?

- About 24 hours for cold process
- About 1 hour for hot process

Is it dangerous?

Yes. Safety precautions have to be observed at all time!

Poisons and caustic chemicals will be manipulated.

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Forms of fats

- Liquid oils
 - Canola
 - Olive (virgin, pomace)
- Solid oils
 - Coconut (76, 92)
- Butters
 - Cocoa
 - Shea
- Waxes
 - Beeswax
- Animal
 - Pork lard
 - Beef tallow



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Fatty acids

- Every fat is composed of different amounts of fatty acids
- Common fatty acids:
 - Lauric
 - Linoleic
 - Linolenic
 - Myristic
 - Oleic
 - Palmitic
 - Ricinoleic
 - Stearic
- Less common (capric, caprylic, docosenoid, eicosenoic, erucic)

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Example of fatty acids in fats

Fat	Lauric	Linoleic	Linolenic	Myristic	Oleic	Palmitic	ricinoleic	stearic
Castor oil	0	4	0	0	4	0	90	0
Canola	0	21	9	0	61	4	0	2
Olive virgin	0	12	1	0	69	14	0	3
Coconut 76	48	2	0	19	8	9	0	3
Tallow beef	2	3	1	6	36	28	0	22
Japan wax	0	0	0	0	0	11	0	15
Cocoa butter	0	3	0	0	35	28	0	33
Argan	0	34	1	1	46	14	0	0

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Cosmetic Properties

The fatty acids have different cosmetic properties once saponified

- Bubbly : more or less bubbles - lathering
- Cleansing : more or less cleaning
- Condition : more or less moisturizing and soothing
- Hardness : soft or hard
- Longevity : how long the soap will last
- Stable : melts more or less in water
- Price

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Examples of properties

Fat	Bubbly	Cleansing	condition	hardness	Longevity	stability	Price (lb)*
Castor oil	90	0	98	0	0	90	\$2.94
Canola	0	0	91	6	6	6	\$2.80
Olive virgin	0	0	82	17	17	17	\$6.00
Coconut 76	100	100	0	100	0	0	\$3.00
Tallow beef	8	8	40	58	50	50	
Soy wax**	0	0	0	98	98	98	\$4.6
Cocoa butter	0	0	38	61	61	61	\$8.00
Argan	1	1	81	15	14	14	\$15.00

* Based on 8lbs bulk

** wax for candles

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Q&A

- Why using expensive fats?
 - For marketing purposes only to avoid false advertisement (eg: argan oil)
 - After the saponification process, all fatty acids are transformed the same way
- What is best between a butter or an oil?
 - Depends on the properties you're looking for
 - Once melted, they all end up liquid
- Can I use only olive oil?
 - Yes if designed as such for decoration or as a carrier for scents
 - The soap will be hard rock, not bubbling, no cleaning power, melts easy
- What is coconut oil 76 versus Coconut oil 92
 - Solid oil. Exists in 2 varieties. Becomes liquid at 76F or 92F. Similar compositions.

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Q&A

- Can I use the canola oil or virgin olive oil from the kitchen
 - Yes – these oils are more expensive because they are food grade
- The oils for soap making are cheaper, can I use them for cooking
 - No – they are cosmetic grade, NOT food grade
- Where can I find pork lard or beef tallow
 - At Costco. Ask your local butcher
- Where can I buy oils for soap making?
 - Amazon, Etsy
 - Specialized sites: <https://www.bulkaapothecary.com>
- Are these fats safe?
 - They are NOT food grade.
 - Some are poisons (like castor oil). Do not touch with bare skin. Do not ingest.
- Can I use palm oil?
 - Yes. It has its own properties.
 - I do NOT use palm oil due to ecological reasons
- Are there any “go-to” basic fats?
 - Coconut oil (76/92): cleansing, bubbling and hardening properties
 - Castor oil: lathering properties
 - Oliver oil (virgin/pomace): moisturizing properties

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Summary

- Fats are solid or liquid oils, butter, wax, vegetal or animal
- Fats have different cosmetic properties based on their chemical composition
- The cosmetic properties are: lathering, cleansing, conditioning, hardness, longevity and stability
- Fats calculator coming soon...
- Safety precautions: nitrile gloves and safety goggles

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Lye

- Caustic chemical to turn oils and fats into soap
- Aka caustic soda
- Sodium Hydroxide (NaOH) – to cook solid soap
- Potassium Hydroxide (KOH) – to cook liquid soap
- Highly corrosive
- Burn the skin



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Safety Precautions

- Wear gloves, goggles, skin-covering garment
- Do not breathe the fumes (use the kitchen hood) and eventually a mask
- Once mixed up with water, a chemical reaction happens creating heat up to 200F, then the solutions cools down on its own – use appropriate container
- Solid lye or any lye-based solution shall not touch the skin
- If wooden utensils are used to stir the lye solution, the wood will be chemically burned
- After you measure the proper quantity of needed lye, close the main container and lock it away in a dry cool place
- Add the solid lye to water. Do NOT pour water on the solid lye.
- Exposed skin and contaminated utensils can be decontaminated with abundant fresh running water.
- Once the surfaces are wiped, white vinegar can be used to annihilate the remaining lye. NEVER use vinegar on the skin (only abundant running water)

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Q&A

- Can I use any lye such drain cleaner?
 - Only pure solid granulated lye shall be used
 - NaOH for solid soap, KOH for liquid soap

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Dyes, Colors,
Pigments

Natural mica

Natural clays

Oxides

Charcoal (black)

Spices, Herbs

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Oxides



Chemical reaction coming from oxidation:

- Red: iron oxide (aka rust)
- Blue: cobalt oxide
- White: titanium dioxide (controversial toxicity)
- White: zinc oxide (anti-bacterial, anti-UV, used in skin condition treatments)

Check the features from the manufacturer

Cosmetic Graded

Improper for cosmetic usage



ULTRAMARINE BLUE
\$8.50

- A Manufactured Pigment
- Excellent UV Stability
- Soluble for all mediums
- Not Cosmetic or Pharmaceutical Grade
- Low and Constant Color shade intensity

[VIEW TECHNICAL DATA](#)

Size: 500g

100g 500g 1 kilo 5 kilo

Quantity:

- 1 +

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Miscellaneous

- Charcoal (food grade)
- Herbs
 - Annatto seed
 - Parsley
 - Sage
 - Black walnut hulls
- Spices
 - Cinnamon
 - Turmeric
 - Paprika



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Carrier

- Mentioned natural dyes are in crystal solid form
- They need to be incorporated to a liquid
- A small quantity of **sweet almond oil** is used as a carrier to hydrate the dyes before incorporating the blend to the fats
- Remove all clumps thoroughly!!

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Q&A

- Can I use any dye?
 - No
 - Approved for cosmetics, food or soap making
 - Stable color once mixed with lye
- Is there other dyes?
 - Yes. Many are lab engineered
 - I prefer using natural neutral dyes
- Can I mix the dyes to create new colors?
 - Yes (check their properties from the manufacturer)
- Oxides sound chemical?
 - Yes. Some have good properties, other don't
 - I use zinc oxide for its skin soothing properties too



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Additives

Additive	Quantity per 900g of base oils	Property
Grinded coffee	1 tablespoon	exfoliant
Seeds	1 teaspoon	marketing
Grinded oatmeal	2 tablespoons	soothing
Dried crushed herbs	2 teaspoons	exfoliant
Milk powders	1 tablespoon	creamy lather
Dried flowers (calendula, rose, ...)	top of the soap	decoration
Sugar, honey, agave...	1 tablespoon	boost the lather
Salt	1 teaspoon	help hardening the soap

- with lye, the chemical properties will totally change
- Additives are added to the base oils. Granulated additives are dissolved in the lye solution.
- Flowers may have their color changed (lavender will look like mice droppings)
- More for marketing purposes than true cosmetic properties

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Q&A

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Water/Liquids

- Using distilled water is a recommended baseline

Fancy/marketing liquids:

- Any liquid additive (milks) is counted by weight as part of the liquids
- Herbal teas, infusions, juices can replace the water
- Cucumber puree is weighted as part of the liquids

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Fragrances

- Natural essential oils
- Extracted from plants
- Expensive
- Toxic, Poisons
- Creation:
 - Top note
 - Top-Middle note
 - Middle-Base note
 - Base note



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Notes

Use two or three notes to create a blend.

Note	Essential Oil	Properties
Top Note	Peppermint, corn mint, spearmint	Refreshing, stimulating, cooling. Fresh smell
	Orange, lemon, grapefruit (folded)	uplifting
Top-Middle Note	Litsea	Uplifting. Anchors citrus oils
	Lavender	Calming, relaxing, antiseptic
	Lime, bergamot	Citrusy, musky
	Clary sage	Sweet, herbaceous
Middle-Base Note	Clove bud, cinnamon leaf, cassia, nutmeg	Warm, spicy, musky. Invigorating, warming
Base Note	Patchouli	Spicy, musky, sweet.
	Cedarwood	Woody. Clean smelling. Calming, soothing

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Safety Precautions

- Use nitrile gloves, safety goggles and cover the skin
- Essential oils are toxic on their own or once combined
- Use a precision scale and disposable plastic pipettes
- Keep the essential oils in their original containers
- Poison Center: (800) 222-1222
- Check the safe usage of a blend using EOCALC:
 - <https://www.eocalc.com>
 - Product type: "cold process soap" (1% - 5% fragrances)

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Blend Example #1

My proposed blend for 1000g/35oz of soap:

Percentage	Essential Oil
30%	Lavender 40/42
40%	Lemon (Distilled)
15%	Bergamot (FCF)
15%	Nutmeg

Safety results from EOALC:

Essential Oil	Light (1% Usage)	2% Usage Rate	3% Usage Rate	4% Usage Rate	Strong (5% Usage)
Lavender 40/42	3 Grams	6 Grams	9 Grams	12 Grams	15 Grams
Lemon (Distilled)	4 Grams	8 Grams	12 Grams	16 Grams	20 Grams
Bergamot (FCF)	1.5 Grams	3 Grams	4.5 Grams	6 Grams	7.5 Grams
Nutmeg	1.5 Grams	3 Grams	4.5 Grams	6 Grams	7.5 Grams

UNSAFE

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Blend Example #2

My proposed blend for 1000g/35oz of soap:

Percentage	Essential Oil
30%	Lavender 40/42
40%	Lemon (Distilled)
19%	Bergamot (FCF)
2%	Nutmeg
9%	Cedarwood (Atlas)

Safety results from EOALC:

Essential Oil	Light (1% Usage)	2% Usage Rate	3% Usage Rate	4% Usage Rate	Strong (5% Usage)
Lavender 40/42	3 Grams	6 Grams	9 Grams	12 Grams	15 Grams
Lemon (Distilled)	4 Grams	8 Grams	12 Grams	16 Grams	20 Grams
Bergamot (FCF)	1.9 Grams	3.8 Grams	5.7 Grams	7.6 Grams	9.5 Grams
Nutmeg	0.2 Grams	0.4 Grams	0.6 Grams	0.8 Grams	1 Gram
Cedarwood (Atlas)	0.9 Grams	1.8 Grams	2.7 Grams	3.6 Grams	4.5 Grams

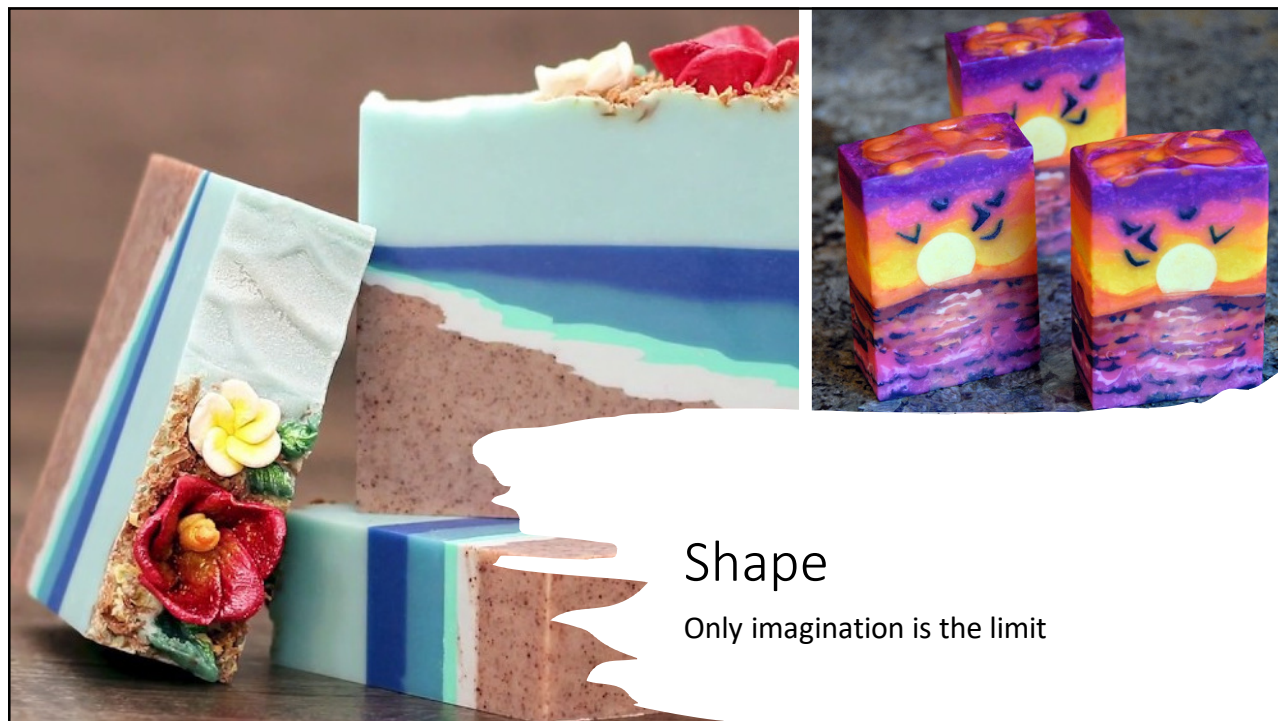
**SAFE
Up to 3%**

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Q&A

- Can I use the blend mentioned in the example?
 - No idea whether it's a good blend, it illustrate the importance to check the safety of a blend
- Are there any "go-to" essential oils:
 - Mints, citruses, lavender, cinnamon leaf and cedarwood
- Should I use a precise scale or approximations are ok?
 - Precise amounts shall be measured
- What % of fragrances to use?
 - Recommendation is 5%
 - I prefer mild subtle scents (2-3%)
- Can I use rose essential oils?
 - Yes. It really smells good.
 - Beware that flower-based essential oils have the tendency to freeze the dough making it very difficult to properly mold

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Shape

Only imagination is the limit

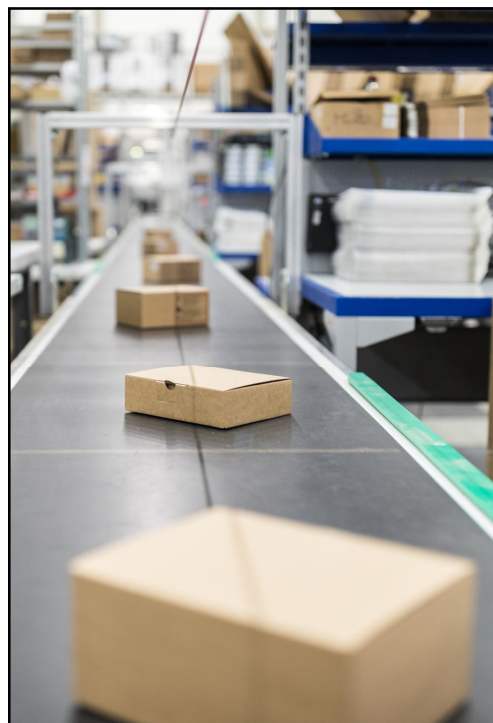
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Summary

- Lye: NaOH, KOH
- Water
- Natural Dyes: micas, clays, charcoal, zinc oxide
- Fragrances: essential oils & EOCALC safety calculator
- Additives: honey, milk, flowers, coffee, seeds...
- Shapes
- Safety precautions

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Supply

- Where to buy?
- Utensils
- Material
- Molds

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Where to buy?

The following web-sites sell oils, lye, essential oils, natural dyes:

- <https://www.bulkapothecary.com>
- <https://www.newdirectionsaromatics.com>
- <https://www.brambleberry.com>
- <https://www.amazon.com>
- <https://www.etsy.com>

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Material

- Safety:
 - nitrile gloves
 - goggles, safety glasses, face shield
 - apron, skin-covering garments
- Kitchen utensils
 - whisks
 - glass/metal bowls
 - Pyrex measuring cups
- Kitchen scale (for oils & lye)
- Precision scale (for essential oils and dyes)



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Material

- **Funnel pitchers** to pour the mix. Different colors in different pitchers (with a dedicated **whisk**)
- **Disposable plastic pipettes** for essential oils
- Disposable spatula / **tongue depressors** to mix and level
- **Milk frother** to remove the clumps
- **Infrared Thermometer** to measure the specific temperatures for the lye solution & base oils



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Material

Electric stick blender to mix (emulsify) the fats, fragrance, dyes and lye altogether



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Chemicals

Rubbing/isopropyl alcohol in spray:

- Used to have different layers of soap sticking together
- Used on the top of the freshly poured soap to avoid "ashing"

White vinegar in spray:

- To disactivate the potential remaining traces of lye on the surfaces
- NOT to be used on the skin



* air touching the surface of the soap resulting in a powdery white discoloration

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		Molds • Molds • For batches • Pre-divided • Silicon molds • Easy unmolding • Tubular molds • Fun shapes • Inclusions in other soaps • Stamps • Signature • Marketing • Soap cutter • Or sharp knife • Vegetable peeler

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Q&A

- Can I safely use my kitchen utensils that I also use to cook?
 - Yes
 - the lye once diluted with water is not potent anymore, the utensils can be washed as usual
 - The utensils covered with soap dough may remain untouched for 24 hours to have the saponification reaction happening. After 24 hours, these utensils are covered with soap... wash as usual
- What if I have some spills of lye or essential oils?
 - Handle the same way you'd handle spills of bleach or drain cleaner

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SOAPEE – the soap calculator

- How much lye?
- How much water?
- How much oils?
- What oils?
- How much fragrances?
- What lye/liquid ratio?

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Soap Calculator

- SOAPEE
 - <https://soapee.com/calculator>
- SOAPEE has a comprehensive database of oils with all their cosmetic and chemical properties
- You can create an account for free and save your recipes.
- You can access the recipes from other members.

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SOAPEE - Lye

1 - Liquid or Solid soap recipe?

☒ Solid Soap - using NaOH (Sodium Hydroxide)

☐ Liquid Soap - using KOH (Potassium Hydroxide)

☐ Hybrid Soap - using both KOH and NaOH

% NaOH Purity - recommended 100%

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SOAPEE – Measurement Units

2 - Select recipe measures and weights

By weight ☒ By Volume ☐

☒ Percentages ☐ Grams ☐ Kilograms ☐ Pounds ☐ Ounces

☒ Grams ☐ Kilograms ☐ Pounds ☐ Ounces

☒ Adjust oil weights to include water in Oils total

Less oil will be used as the lye calculator will adjust total oil weights to include water weight.

I use 1.2kg/42oz molds.

I need to make sure the total amount of soap dough does not exceed the mold capacity. Hence 1kg/35oz.

The measurements will be in percentage with automatic adjustments.

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SOAPEE - Water

3 - Amount of water in recipe

☒ % Water as a percent of oils - recommended 33%-38%

☐ % Lye Concentration

☐ : Water : Lye Ratio

% Water Discount

The more water, the longer it'll take for the soap to be unmolded (I don't mind waiting a few days)

The longer it takes, the longer you have to play with the liquid dough before it starts freezing.

Olive oil produce by nature a dough which takes longer to freeze.

Flower-based essential oils have the tendency to decrease the freezing time.

If you add other liquids like milk, it should be counted as part of the "water" percentage (no need to use the water discount feature).

You can add an infusion of whatever you want to be marketing (once combined with lye, not that much will remain in its initial chemical form).

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SOAPEE - superfat

4 - Oil superfat

% superfat of oils - recommended <5%

☐ Superfat after cook

Soaps to wash floors or clothes should not be superfat: 0%. You don't want the floor to be oily!

Soaps for skin should be superfat to moisturize the skin and prevent skin dryness. All my skin-related soaps are 5% superfat.

For hot-process, use superfat after cook.

We do here cold-process, hence no need to use after cook feature.

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SOAPEE - Fragrances

5 - Fragrances

☒ % oil weight - recommended 3%

☐ g/kg

0% - no fragrance. The unscented soap still has a fragrance.

2-3% - recommended.

5% - heavy fragrance.

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SOAPEE - fats

7 - Select Oils

Shea Butter

Shea Oil, fractionated

Recipe Oils

Olive Oil	40	✖
Coconut Oil, 76 deg	20	✖
Castor Oil	10	✖
	70 %	

Oil ratios must equal 100%

I select the different oils, and their percentages until I reach 100%

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SOAPEE - calculated recipe

Recipe		
Oil	%	Grams
Castor Oil	10	75.2
Coconut Oil, 76 deg	20	150.4
Olive Oil	50	375.9
Shea Butter	20	150.4
	100	751.9

Recipe Totals	
Oil weight accounts for water	
Total Water Weight	248.1 grams
Total NaOH Weight	101.9 grams
Total Oil Weight	751.9 grams
Fragrance Oil Weight	22.6 grams
Total Batch Weight	1,124.5 grams
Superfat	5%
Lye Concentration	29.1%
Water : Lye Ratio	2.434 : 1
Saturated : Unsaturated	33 : 67

Recipe Properties		
Property	%	Recommended
☑ Bubbly	22	14 - 46
☑ Cleansing	13	12 - 22
☑ Condition	64	44 - 69
☑ Hardness	33	29 - 54
☑ Longevity	20	25 - 50
☑ Stable	29	16 - 48
Iodine	65	41 - 70
Ins	137	136 - 165

Fatty Acids %	
☑ Lauric	10
☑ Linoleic	8
☑ Linolenic	1
☑ Myristic	4
☑ Oleic	46
☑ Palmitic	10
☑ Ricinoleic	9
☑ Stearic	10

The different weights of oils, lye, water and fragrance is calculated.

The soap properties are calculated (included a range of recommendation).

Keeping your soap properties in mind, feel free to play with the oils and their percentages until you reach the cosmetic properties you had in mind.

This blend is: low cleansing, moisturizing, soft with lathe... sounds to be a good soap to wash the face before going to bed. The fragrance should be soothing and mild (not uplifting or invigorating).

Note that the total batch weight is superior to 1000g while the total oils weight is inferior to 1000g.

Make sure the total batch weight does NOT exceed the total capacity of your mold

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SOAPEE/EOCALC – fragrances calculations

I created the following blend in EOALC for a baseline batch of 1000g of soap, based on 752g of oils computed (per SOAPEE calculations):

Percentage	Essential Oil
20%	Bergamot (FCF)
20%	Lemon (Distilled)
40%	Lavender 40/42
20%	Cedarwood (Atlas)

For usage in 752 Grams of Cold Process Soap (Category 9).

EOALC assessed the safety, creating the table below.

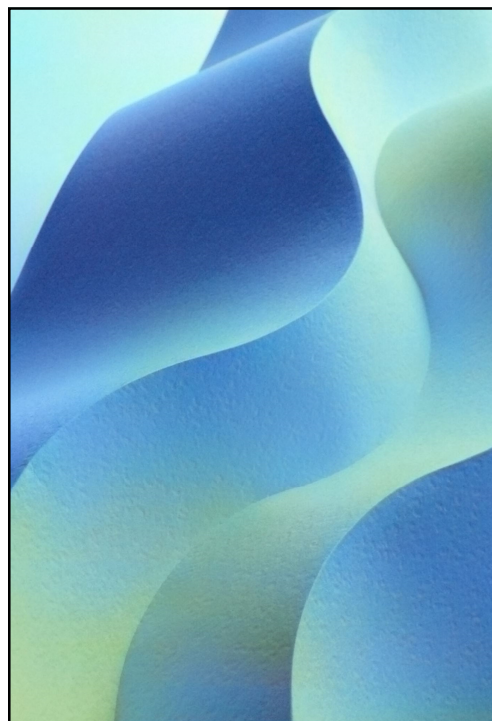
I chose 3% in the SOAPEE recipe, resulting in 22.6g per SOAPEE calculations.

Make sure the sums computed by EOALC and SOAPEE end up being the same!

Essential Oil	Light (1% Usage)	2% Usage Rate	3% Usage Rate	4% Usage Rate	Strong (5% Usage)
Bergamot (FCF)	1.504 Grams	3.008 Grams	4.512 Grams	6.016 Grams	7.52 Grams
Lemon (Distilled)	1.504 Grams	3.008 Grams	4.512 Grams	6.016 Grams	7.52 Grams
Lavender 40/42	3.008 Grams	6.016 Grams	9.024 Grams	12.032 Grams	15.04 Grams
Cedarwood (Atlas)	1.504 Grams	3.008 Grams	4.512 Grams	6.016 Grams	7.52 Grams

= 22.5g (close enough)

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Water/Lye Ratio

- A ratio ~3:1 is comfortable to work with the soap dough before it starts freezing. It'll take longer to unmold (1-3 days). May be better for more elaborated design which require more work such as multi layer landscapes
- A ratio 2:1 accelerate the curing process to unmold eventually the same day. A quicker work with the dough before it freezes is expected. Basic mono color soap "stir and pour" maybe good enough. A 2-color swirls may be ok.
- When using olive oil or other high oleic oils (sunflower, safflower, canola): -0.5 ratio of water/liquid

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Q&A

- Is it ok to swap an oil for another?
 - No, unless you recompute in SOAPEE the entire recipe. All oils have different chemical properties as seen above, hence need different amount of lye to saponify

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Let's bake that soap

After you design the batch of soap and get the SOAPEE/EOCALC recipe:

1. The lye solution
2. The fragrance
3. The base oils
4. The dyes
5. Mixing to trace
6. Molding
7. Unmolding & Cutting
8. Curing
9. Packaging



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Prepare the lye solution

Step 1: put a metal container on the scale, zero the scale, weigh the water/liquid

Step 2: put a lye container on the scale, zero, weigh the lye

- Once done, close the lye container and lock it up

Step 3: pour the lye into the water/liquid while stirring

- Do not breath the fumes
- It takes about 1 minute to have the granulated lye fully dissolved
- The solution will heat up (exothermic reaction) up to 200F

Step 4: using the infrared thermometer, wait until the temperature reaches 80-100F



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Prepare the fragrance

Step 1: put a glass container on the **precision scale**, zero the scale

Step 2: weigh each essential oil using different disposable pipettes

- Zero the precision scale before weighing each essential oils
- Or, measure each essential oil separately, then add to the main container
- A single drop from the pipette may be enough to reach the desired weight
- Pay attention! Don't rush!

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Prepare the Base Oils

Step 1: put a microwave-safe bowl on the scale, zero the scale

Step 2: add the oils/butters into the bowl

- Zero the scale before weighing each oil/butter
- Or, measure each oil/butter separately, then add to the bowl

Step 3: heat the bowl in the microwave until all oils/butters are completely melted

Step 4: add the essential oils fragrance to the base oils

Step 5: using the infrared thermometer, wait until the temperature reaches 80-100F



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Prepare the dye/s

Step 1

in a small container, or small containers if you plan to have different layers of colors, add 2 tablespoons for 900g of base oils

- Do your math!!
- You can add more or less according to the hue you want to achieve

Step 2

add a tablespoon of almond oil

Step 3

stir until the powder and clumps are fully dissolved in the oil

- You can use the milk frother which is small enough to fit in the container

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Mixing

Step 1: wait until both lye solution and base oils reach 80-110F

- Add the additive/s, if any, to the lye solution and/or the base oils

Step 2: pour the lye solution into the base oils bowl

Step 3: use the stick blender to emulsify the lye solution into the oils

- This is where all safety measures shall be observed at all time!
- Very easy to splatter lye-contaminated matter everywhere when the stick blender is on
- Use pulses and low speed, according to the ingredients high speed may move the soap to trace too quickly

Step 4: mix to full emulsification

- Solid in color, no oil streak => divide in separate container if you use different colors

Step 5: add the different dyes to each container, or a unique dye to the main container

Step 6: keep mixing to trace in each container separately

- The solution is a light dough which sticks to a spatula, or a drizzle of soap sits on the surface
- Thicker than custard



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Molding

Step 1: pour the trace solution into the mold

Step 2: creative phase to layer the different colors

- Pay attention that no bubble is trapped between the layers
- If you have some cured soap that you want to include inside the trace, spray alcohol on the entire surface of the cured soap to make it stick

Step 3: tap the container/s on the table to compact it

During this phase a lot of experimentation may happen. You may not be as successful as you wished, but the end result will be a perfectly usable soap with all its cosmetic properties and scent.



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Saponification phase

Step 1: preheat the oven to 170F

- We will be forcing the saponification process

Step 2: spray alcohol on the top of the soap to prevent ashing

Step 3: cover with a piece of cardboard or kitchen towel

Step 4: **turn off the oven**

Step 5: put the mold/s in the oven

Step 6: wait 24 hours

- The saponification process happens starting with the “gel phase”
- During the gel phase, the trace will warm up

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Unmolding & Cutting



Step 1: after 24 hours, if the sides of the mold are sticky, wait 24 more hours

Step 2: unmold, turn the mold over and push down

Step 3: slice the bar of soap into slices like a loaf of bread

- Use the stainless sharp knife or a soap cutting box
- Eventually try different widths

Step 4: eventually trim the edges of each slice with a vegetable peeler

Step 5: eventually stamp the slices

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Curing

Step 1: in cool and airy and dry place, leave the slice to cure for 4 weeks

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Packaging

Step 1: eventually package each slice

- Air flow still needed to breathe and keep curing

Step 2: store in a cardboard box

- Air flow still needed to breathe and keep curing

Step 3: eventually label the packages

- You may add the marketed ingredients



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Shazam... done

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Q&A

- How do I do the swirls?
 - Use a chopstick to create the swirls
- What happens if I mix the lye solution and base oils while too hot?
 - The gel phase will start too quickly for you to create your design
- Do the lye solution and the oils base need to be at the same temperature 80-110F?
 - No. They can be at different temperatures within the range 80-110F.
- Do I need to put in the oven?
 - No. However forcing the gel phase helps to accelerate the process
- When is the lye fully gone?
 - After 24 hours most of it ends up saponified, the product is deemed "safe"
 - The remaining traces of lye will be gone during the curing process
- Is it possible to still have some lye residues?
 - For superfat products which by nature have more oils than necessary to saponify, it's unlikely any trace of lye remain after the curing process
- What is the "zap test"?
 - That's a method to figure out if the lye is gone. Put the tip of the tongue on the soap, if the lye is gone, you will feel nothing. If some lye still remains, it will sting a bit as is you were touching your tongue to a 9V battery.
 - I'm not a fan of this test: I prefer keeping the tip of my tongue in my mouth away from any chemicals.

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Troubleshooting

Issue	Cause	Fix
Soap cracks, volcanoes	The soap overheats	Put in front of a fan or in the fridge for a bit
Soap has a layer of oil on the top	Overheating OR not mixing enough	Wait 24 hours to see if the oils were absorbed. If not, reprocess the batch with hot-process method
Soap is brittle or chalky	Lye in excess	Check your scale and the correct amount of lye Throw away the batch
Soap is sticky to the mold	Too much soft oils Too much water	Use harder oils/butter Add a water discount Add heat to force the gel phase Wait 24 more hours
Clumps appear when adding fragrances	Finicky essential oils like flower-based (rose...)	Check the fragrance is stable for cold process soap Stir at a lower speed, stop before trace
Soap has pockets of oil or lye	Not emulsified enough	Reprocess using the hand-milled method to finish it

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Example: the design

Soap designed for Muslim friends for the end of Ramadan'20

- Purpose: gentle cleaning
- Cosmetic Properties: bubbly, low cleansing, moisturizing, stable
- Lye: NaOH (solid soap)
- Water: Zamzam water from Mecca
- Base oils: olive, beeswax, coconut, cocoa butter, argan, from Muslim countries
- Fragrance: Mediterranean scents (orange, rosemary, tea tree)
- Additives: honey from baklava for the Eid
- Dye: shades of green, the color of Islam
- Shape: crescent of moon & a star, a symbol of Islam



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Example: the final product

Recipe Totals	
Total Water Weight	482.1 grams
Total NaOH Weight	192.8 grams
Total Oil Weight	1,400 grams
Fragrance Oil Weight	42 grams
Total Batch Weight	2,117 grams
Superfat	5%
Lye Concentration	28.6%
Water : Lye Ratio	2.5 : 1
Saturated : Unsaturated	33 : 67

Essential Oil	3% Usage Rate)
Orange (Sweet, Folded)	15.21 Grams
Rosemary (Spanish)	9.126 Grams
Tea Tree (Australian)	6.084 Grams

Halo of light irradiating around the moon and the star. Unexpected cool effect.

Shade of green (clay)

Crescent of moon & star

- Molded a few days prior
- Inclusion, isopropyl alcohol
- Zinc oxide (white color)

Oil	%	Grams
Argan Oil	3	42
Castor Oil	4	56
Cocoa Butter	10	140
Coconut Oil, 76 deg	20	280
Olive Oil	63	882
	100	1,400

Property	%	Recommended
Bubbly	17	14 - 46
Cleansing	13	12 - 22
Condition	64	44 - 69
Hardness	33	29 - 54
Longevity	20	25 - 50
Stable	23	16 - 48
Iodine	66	41 - 70
Ins	140	136 - 165

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Thank You

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