Soap Calculator - Step-by-Step Explanation

Here's a simple breakdown of the mathematical steps used in the soap calculator, so anyone could do the same calculations by hand if needed. This includes both the forwards calculation (starting with oils) and the backwards calculation (starting with desired soap yield).

FORWARDS CALCULATION (Oils -> Soap Batch)

Goal: Figure out how much lye, water, and fragrance you need for a soap batch based on selected oils and their amounts.

Step 1: List Your Oils and Amounts
You select up to 3 oils (or fewer) and enter how much of each oil you want to use.
Example: 100g Olive Oil (SAP = 0.134), 50g Coconut Oil (SAP = 0.183), 50g Shea Butter (SAP = 0.128)

Step 2: Total Oil Weight
Add the weights of all oils: 100 + 50 + 50 = 200g

Step 3: Lye Required for Each Oil
Multiply the weight of each oil by its SAP value:
Olive: 100g x 0.134 = 13.4g
Coconut: 50g x 0.183 = 9.15g
Shea: 50g x 0.128 = 6.4g

Step 4: Total Lye Required (Before Superfatting)
Add all individual lye amounts: 13.4 + 9.15 + 6.4 = 28.95g

Step 5: Apply Superfatting
Final lye = Total lye x (1 - superfat/100) = 28.95 x 0.95 = 27.5g

Step 6: Calculate Water
Water = Final lye x 2.5 = 27.5 x 2.5 = 68.75g

Step 7: Estimate Total Soap Yield
Estimated yield = Total oils + Final lye + Water - 20g (evaporation loss) = 200 + 27.5 + 68.75 - 20 = 276.25g

Step 8: Add Fragrance (1%)
Fragrance = Estimated yield x 0.01 = 2.76g

BACKWARDS CALCULATION (Soap Yield -> Oils Needed)

Goal: Work out how much oil, lye, and water you need to produce a certain amount of finished soap.

Step 1: Choose Desired Soap Yield

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Example: 500g of soap

Step 2: Average SAP Calculation
Pick oils and their ratios. Calculate weighted average SAP.
Example: 50% Olive (0.134), 25% Coconut (0.183), 25% Castor (0.128)
Average SAP = (0.134 x 0.5) + (0.183 x 0.25) + (0.128 x 0.25) = 0.14475

Step 3: Adjust for Superfat and Water
Oils = (Desired yield + 20) / (1 + (Average SAP x (1 - SF%) x 3.5))
For 5% superfat:
Oils = 520 / (1 + 0.14475 x 0.95 x 3.5) = ~351g oils needed

Step 4: Lye and Water from Oil
Lye = Oil x SAP x (1 - SF%) = 351 x 0.14475 x 0.95 = ~48.2g
Water = Lye x 2.5 = 48.2 x 2.5 = ~120.5g

Step 5: Fragrance
Fragrance = 1% of desired yield = 500 x 0.01 = 5g

SUMMARY

Step	What You Do
1	Total oil weight
2	Multiply each oil by its SAP
3	Add up all lye values
4	Apply superfat %
5	Multiply final lye by 2.5 for water
6	Add oil + lye + water - 20 for soap yield
7	Add fragrance at 1%