crafting your own soap recipes

Having mastered the basics of soap making from the recipes it would be good to move on to formulate your own creations from scratch.

A little maths is necessary but it is very easy. Start with the end product in mind by deciding how the soap will look, feel and smell, for whom it is intended or for what occasion and the quantity you intend to make – just let your creative juices flow! Only bar and liquid soaps calculations are covered.

bar soaps

If, for example, you want to make a 3lb (1.36kg) batch of a mild moisturising, hard soap with rich creamy lather, you would need to include both saturated and unsaturated fats and oils in the recipe.

choosing your oils

The oils that fit the criteria for this example are as follows:
5 per cent castor oil
25 per cent coconut oil
50 per cent olive oil
20 per cent palm oil

The blend of oils you choose is really a matter of personal preference.

the caustic soda solution

Having chosen the oils and the percentage of the total you wish to assign to each, you now need to determine the amount of sodium hydroxide required to saponify each of your chosen oils. The amount of sodium hydroxide required is based on the saponification value of each of your chosen oils. Refer to the 'saponification values chart' provided, see page 152, for some common oils and fats. Simply multiply each oil amount by its saponification value and add the total amount of each together to give a grand total of sodium hydroxide (NaOH).

The calculation is based on 3lb or 48oz (1360g) oil

5 per cent castor oil	= 2.4oz (68g)	x 0.128	= 0.31oz (9g)
25 per cent coconut oil	= 12oz (340g)	x 0.190	= 2.28oz (65g)
50 per cent olive oil	= 24oz (680g)	x 0.134	= 3.22oz (91g)
20 per cent palm oil	= 9.6oz (272g)	x 0.141	= 1.35oz (39g)
100 per cent	48oz (1360g)		7.16oz (204g)

determine discount percentage
For a mild, creamy, moisturising soap a proportion of the oils should be left unsaponified. A 6 per cent discount is a good base with which to work.

the amount of sodium hydroxide required for the recipe
In view of the 6 per cent discount you are using in this recipe the quantity of the sodium hydroxide is reduced by the same amount.

Calculate 6 per cent of 7.16 (204) = 0.429 (12) then subtract this figure from the 7.16 (204) to get the final amount for the formulation.
7.16 - 0.429 = 6.73 (204 - 12 = 192)

determine the quantity of water
To calculate the amount of water required, multiply the weight of the base oils by 33.3 per cent. In this example you are using 48oz (1360g) of base oils, therefore:
33.3 per cent of 48 (1360) = 16 (454g)

liquid soaps

If, for example, you want to make a 3.5lb or 56oz (1588g) batch of a mild, moisturising, liquid soap with rich creamy lather, you would need to include both saturated and unsaturated fats and oils in the recipe to provide these characteristics.

choosing your oils
The oils that fit the criteria for the requirements in this example could be:
14 per cent castor oil
57 per cent coconut oil
29 per cent sunflower oil

the potassium hydroxide (caustic) solution
Having chosen the oils and the percentage of the total you wish to assign to each, you now need to determine the amount of potassium hydroxide required to saponify each of your chosen oils. The amount of potassium

hydroxide is based on the saponification value of each oil. Refer to the 'saponification values chart' provided, see page 152, for some common oils and fats. Simply multiply each oil amount by its saponification value and add the total amount of each together to give a grand total of potassium hydroxide.

The calculation is based on a 3.5lb or 56oz (1588g) oil blend

14 per cent castor oil	= 8oz (227g)	x	0.179	= 1.43oz (41g)
57 per cent coconut oil	= 32oz (907g)	x	0.266	= 8.5oz (241g)
29 per cent sunflower oil	= 16oz (454g)	x	0.190	= 3.04oz (86g)
100 per cent	48oz(1588g)			12.97oz (368g)

determine an excess percentage
For a clear soap solution, a 10 per cent excess potassium hydroxide is a good base with which to work.

In view of the 10 per cent excess you are using in this recipe the quantity of the potassium hydroxide has to be increased by this amount.
Calculate 10 per cent of 12.97 = 1.297 (368 = 36.8) then add this to the 12.97 (368g) to get the final amount for the formulation.
12.97 + 1.297 = 14oz (368 + 37 = 405g)

determine the quantity of water
To calculate the water amount multiply the amount of potassium hydroxide by 3. In this example you are using 14oz (405g) of potassium hydroxide, therefore:
14 x 3 = 42oz (405 x 3 = 1215g)

neutralisation
A 10 per cent excess potassium hydroxide needs ¾oz (21g) of a 20 per cent boric or citric acid solution, or ¾oz (21g) of a 33 per cent borax solution per 1lb (454g) of soap. Please see page 108 for instructions on how to make up the solutions.

saponification values chart of some common oils and fats

NaOH is sodium hydroxide
KOH is potassium hydroxide

fats, oils and waxes	saponification values NaOH	KOH
almond oil (*Prunus amygdalus dulcis*)	0.136	0.192
avocado oil (*Persea americana*)	0.133	0.187
beeswax (*Cera alba*)	0.069	0.098
castor oil (*Ricinus communis*)	0.128	0.179
cocoa butter (*Theobroma cocoa*)	0.137	0.193
coconut oil (*Cocos nucifera*)	0.192	0.266
corn oil (*Zea mays*)	0.136	0.192
jojoba oil (*Simmondsia chinensis*)	0.069	0.098
lard	0.139	0.195
lanolin	0.076	0.106
olive oil (*Olea europaea*)	0.134	0.190
palm oil (*Elaeis guineensis*)	0.141	0.199
palm kernel (*Elaeis guineensis*)	0.157	0.220
peanut oil *(Arachis hypogeal)*	0.137	0.192
rosin (*Pix graeca)*	0.130	0.182
shea butter (*Butyrospermum parkii*)	0.128	0.180
soyabean oil (*Glycine max*)	0.135	0.190
stearic acid	0.140	0.196
sunflower oil (*Helianthus annuus*)	0.134	0.190
tallow	0.141	0.196