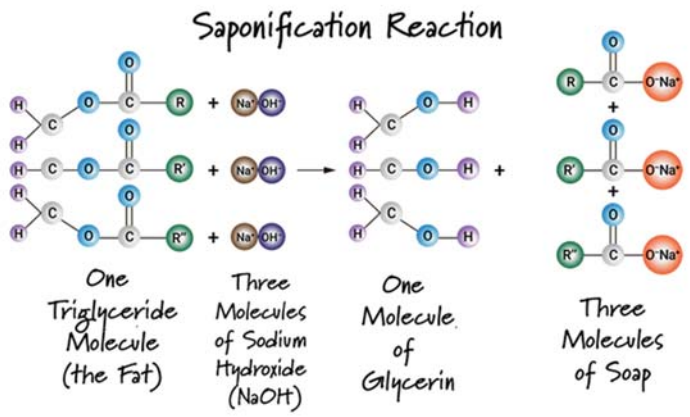
Lipids lab (making tallow soap)

The soap reaction is called “Saponification”, or “Alkaline hydrolysis of triglycerides”.

Soap making involves the reaction of a base (like NaOH) with a fat or oil (like tallow, stearic acid, veggie oil) to produce soap (fatty acid salts) and glycerol. The base provides hydroxide ions (OH^-) that react with the ester bonds in the triglyceride.



Recipe:

1) Put on safety glasses and lab coats. Wear leather gloves if you are working with a burner.
2) Pre-heat a large pan of water to 50^{o}C.
3) Measure 25 g tallow, 1/2 tsp stearic acid, and 5 g vegetable oil (optional) into 250 ml beaker. The amounts are not “precise”, and you can experiment with different fats, oils, and waxes. Vegetable oil makes it THIN and stearic acid or paraffin makes it THICK.
4) Melt the fats together: Insert the 250 ml beaker (above) into a 500 ml beaker which is ¼-full with the 50^{o}C water. Stir until combined. Replenish the hot water as needed.
5) Add 25 ml of 25% NaOH. (Notes: 25% NaOH = 6M. This is 32 g of 25% NaOH, or 0.16 mol of pure NaOH using a density of 1.2 g/ml for the 6M solution. This equates to 9 g or 0.16 mol of pure KOH granules since they both dissociate completely, but KOH makes softer soap!)
6) Continue heating and stirring SLOWLY for 5 minutes to let the reaction run its course. STIR SLOWLY! You should have a slightly-thickened paste now.
7) Cool it down to form the curds. Add 1 ice cube directly to the paste. Push the ice cube around to thicken the soap curds.
8) Rinse the curds 2-3 times with cold water. Move the curds GENTLY, like making butter.
9) Pour the soap into a mold. Cover with cheese cloth to keep away insects. Dry for several days.
10) Test your soap using grease, oil, etc.