

# SOAP AND DETERGENTS

## PART II

Reference: S.B. Srivastava. Soap Detergent and Perfume Industries. Delhi: Small Industry Research Institute

# Solid soap (bars) manufacturing

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- There are two basic ways to make solid bar soap; hot process and cold process. The difference include using external heat, the time it takes to saponify, curing time and the finish of the soap.



# Cold process

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## **Process and saponification time:**

- ❑ Cold process soaps uses the exothermic heat reaction that is created from the acid and base reaction of the fatty acids (soap making oils ) and the lye ( $\text{NaOH}$ ) solution.

## **Curing time:**

- ❑ Soaps made using the cold process method take about three to four weeks to cure.

# Cold process

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## Manufacturing:

- Measure the amount of oils that you want to use.
- Calculate the average molecular weight of fats or oils that you want to use.

$$\text{Mwt Fatty acid} = 56.1 \times 1000 / AV$$

- Calculate the amount of lye you required.

$$\text{NaOH} = [\text{Weight fatty acid} \times 40] / \text{Mwt Fatty acid}$$

- Excess unreacted lye in the soap will result in a very high pH and can burn or irritate skin; not enough lye leaves the soap greasy.
- You can use this recipe ( from experience)

**7 parts oil : 2 parts water: 1 part NaOH**

# Cold process

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- ❑ Slowly pour the lye into the water. Stir with wooden spoon until lye is dissolved.
- ❑ Let the lye solution to cool and reach room temperature.
- ❑ Check to make sure lye mixture and oil mixture are within five degrees of each other.
- ❑ Combine the sodium hydroxide solution and oils. Stir the mixture until it starts to harden (about 15-20 minutes). At this point (when it starts to harden) you can add any 'essential oil' ingredients to scent your soap.

# Cold process

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- ❑ Mix until soap traces. Soap reaches trace when it thickens sufficiently that you can turn off the blender and see ripples across the top of the soap.
- ❑ Pour the soap into the mold you have selected. ( silicon or wood molds).
- ❑ After 24 hrs, take your soap out of the molds.
- ❑ Once unmolded and sliced it can take from 4 weeks until the soap has "cured".

Soap trace



Final product

# Cold process

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- ❑ Different oil blends completely change the properties of the finished soap bar (bubbly vs. creamy lather or gentle versus a more cleansing bar).
- ❑ A natural by-product of cold process soap making is glycerin.
- ❑ Glycerin molecules are leftover when the fatty acids react and combine to the lye molecules.
- ❑ Cold process soap retains all of its natural glycerin, while in hot process glycerin could be removed from soaps and sold out for cosmetics and pharmaceutical products.

# Cold process

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## Recipes:

Recipe I	Recipe II	Recipe II	Recipe III
<b>Lye Water Solution</b> 12.18 oz. Lye 27.39 oz. Water <b>Oil Mixture</b> 30 oz. Olive oil 20 oz. Coconut oil 15 oz. Crisco 14 oz. Palm Oil 4 oz. Caster Oil	<b>Lye Water Solution</b> 4.02 oz. Lye 9.24 oz. Rosewater <b>Oil Mixture</b> 16 oz. Olive oil 5 oz. Palm oil 5 oz. Coconut oil 2 oz. Caster Oil <b>Essential Oil</b> 0.5 oz. Rose Essential Oil	<b>Lye Water Solution</b> 3.81 oz. Lye 8.91 oz. Water <b>Oil Mixture</b> 11 oz. Olive oil 6 oz. Coconut oil 6 oz. Palm oil 2 oz. Jojoba oil 2 oz. Caster oil <b>Essential Oil</b> 0.5 oz. Lavender essential oil	<b>Lye Water Solution</b> 100 g Lye 200 g Water <b>Oil Mixture</b> 700 g Olive oil

1 ounce (oz.) = 28.35 grams



# Hot process

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## **Process and saponification time:**

- With hot process soap making an external heat source is used to accelerate saponification. The external heat source can be a crock pot, a double boiler or the oven. Saponification will be complete in approximately 2 hours.

## **Curing time :**

- In hot process method one week of cure time is sufficient.

# Hot process

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## Manufacturing

- ❑ Melt the oils in the crockpot (water bath ).
- ❑ Once the fat is nearly all melted, carefully measure the lye.
- ❑ Carefully stir the lye into the measured water. ALWAYS add the lye to the water.
- ❑ Stir this lye/water mixture until it has dissolved and let it sit for a few minutes. There will be a chemical reaction between the lye and water, and the water will become very hot, so be careful handling the container.

# Hot process

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- Slowly stir the lye/water mixture with oils in the crockpot (water bath). It is recommend keep your oils and lye solution on *below*  $65^{\circ}\text{C}$ .
- Use the *immersion blender to mix the soap mixture*, and proceed to blend the fat, lye, and water until you reach trace.
- Trace is when the mixture turns to a pudding-like consistency and holds its shape when you drip a bit on top.

Soap trace



# Hot process

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- Allow it to cook for 45-60 minutes. It will bubble and froth, which is fine.
- Once the 50 minutes has passed, it's time to test the soap to make sure the lye has reacted with the oils completely and no longer remains in the mixture.
- You can test the soap by pH paper.
- If you want to add any fragrance or additives, you will let the soap cool down before adding them. If you add a fragrance to soap that it is too hot, it can vaporize and your soap won't have as much scent

# Hot process

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- ❑ Pour the soap into the mold you have selected.  
( silicon or wood molds).
- ❑ After 24 hrs, take your soap out of the molds.
- ❑ Once unmolded and sliced it can take from one weeks until the soap has "cured".

# Hot process

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## Recipes:

Recipe I	Recipe II
<b>Oil Mixture</b> 36 oz. olive oil 6 oz. coconut oil 3 oz. castor oil <b>Lye Water Solution</b> 6 oz. lye 12 oz. water 2-4 oz. essential oil ( Optional)	<b>Oil Mixture</b> 10 oz olive oil. 20 oz coconut oil.  <b>Lye Water Solution</b> 9 oz distilled water. 4.78 oz 100% pure lye. Essential oils (optional)

1 ounce (oz.) = 28.35 grams