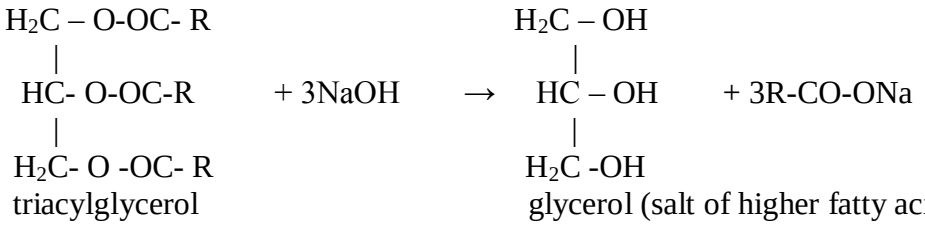
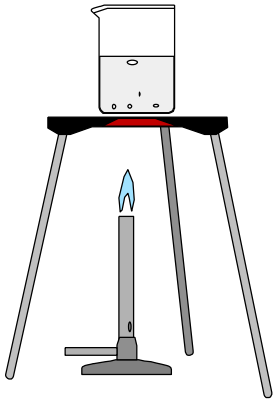
LABORATORY WORK NO. 29
PREPARATION OF SOAP AND ITS PROPERTIES

- **PRINCIPLE:** The hydrolysis of esters happens in the presence of basic or acidic catalysts – alcohols and acids arise. Saponification of esters (fats and oils) is a familiar reaction of this type. Salts of higher fatty acids (soaps) are generated during this reaction.



DRAWING OF THE APPARATUS:



TASK NO. 1: PREPARATION OF SOAP

- **CHEMICALS:** fat, 20% solution of NaOH, NaCl

- **AIDS:** beaker, porcelain dish, glass stirring rod, water bath, wash bottle, pipette, scales, weighing boat

- **PROCEDURE:** Heat up 4g of fat with 20ml of NaOH solution in the porcelain dish. Stir the mixture continually with the stirring rod and fill in the evaporated water with distilled water from the wash bottle.
Continue the warming as long as a drop of the mixture, carried over on the glass stirring rod into the beaker with hot distilled water, dissolves and does not make any fat circle of dissolved fat. Add 8 g of NaCl into the mixture, stir it and let it cool down.

Make two holes (on the opposite sides at the edge of the dish) in the generated layer of soap and use one of them to pour the solution out. Dissolve the prepared soap in double amount of hot distilled water and divide the generated solvent of soap into three testing tubes (preparation for the task no. 3).

- **CONCLUSION:** 1. Write down the observations.
  2. Give the reason for adding NaCl to the prepared solvent of soap.
  3. Use chemical equation to describe this chemical reaction:
  fat + NaOH → soap + glycerol

- **SECURITY**: Use protective glasses during work.

TASK NO. 2: PROPERTIES OF SOAP

- **CHEMICALS:** 10% solution of HCl, 10% solution of $CaCl_2$, distilled water, phenolphthalein

- **AIDS:** 3 test tubes (all with the solvent of soap prepared in the task No. 2), pipette

- **PROCEDURE:** Add 2 or 3 drops of phenolphthalein into the first tube . Dilute slowly the solution by H_2O and shake the mixture inside the tube. Observe the production of foam and the colour of the indicator.
  Add a half volume of HCl into the second test tube and shake the mixture. Observe how upper layer of excluded fatty acids separates from the mixture.
  Dilute the solution in the third tube by distilled water and shake it with 10ml of $CaCl_2$. Observe the formation of the precipitate of calcic salts of fatty acids.

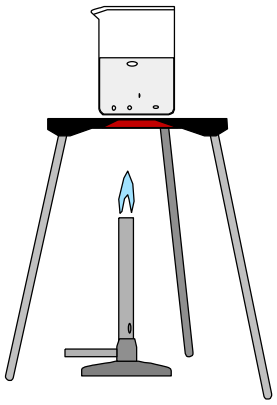
- **CONCLUSION:** 1. Explain the changes observed during experiments with soap.
  2. Use chemical equations to explain the following chemical reaction:
  soap + HCl → fatty acid + NaCl
  soap + $CaCl_2$ → calcic salt of fatty acid + NaCl

STUDENT´S SHEET No. 29
PREPARATION OF SOAP AND ITS PROPERTIES

1. Translate these vocabulary:

beaker
soap
dilute
wash bottle
drop
mixture
solution
dish
experiment
chemical reaction
alkalic
acidic
solvent
test tube
shake

2. **Mark the apparatus with these words: burner, beaker, solution, fat**



3. Are these sentences true or false - T / F?

You need 4 g of fat for production of soap.	T/F
When you do experiment with soap, there are two layers of soap.	T/F
You need pipette for production of soap.	T/F
You use water for experiment no. 2.	T/F
You need three tubes for experiment no. 2.	T/F
You observe production of foam in experiment no. 2.	T/F

4. Make sentences

of / a / soap / there / is / layer
……
tube / the / in / dilute / solution / third / the / water / by / distilled
……
three / new / solvent / divide / soap / tubes / the / of / into
……
reaction / describe / chemical / this
……
by / add / wash bottle / distilled / the / water
……
observe / indicator / production / of / of / colour / foam / the / and
……

5. Complete the text with these words:

solution colour drops separated add shake production

Add 2 or 3 _____ of phenolphthalein into the first tube. Dilute the solution by H_2O and _____ the mixture into the tube. Observe production of foam and the _____ of the indicator.
_____ a half volume of HCl and shake the mixture. Watch how the upper layer from the mixture is _____ from fatty acid.
Dilute the _____ in the third tube by distilled water and shake it with 10ml of $CaCl_2$.
Observe _____ of the precipitate calcic salts of fatty acids.

6. Translate these phrases:

přidej destilovanou vodu
……
zatřepej směsí
……
vysvětli změny
……
rozděl nový roztok
……
napiš pozorování
……