



Gazi University Faculty of Engineering
Department of Chemical Engineering
CHE 392 Chemical Engineering Laboratory I

2A : SOLVENT-LIQUID SOLUBILITY AND DISSOLUTION HEAT

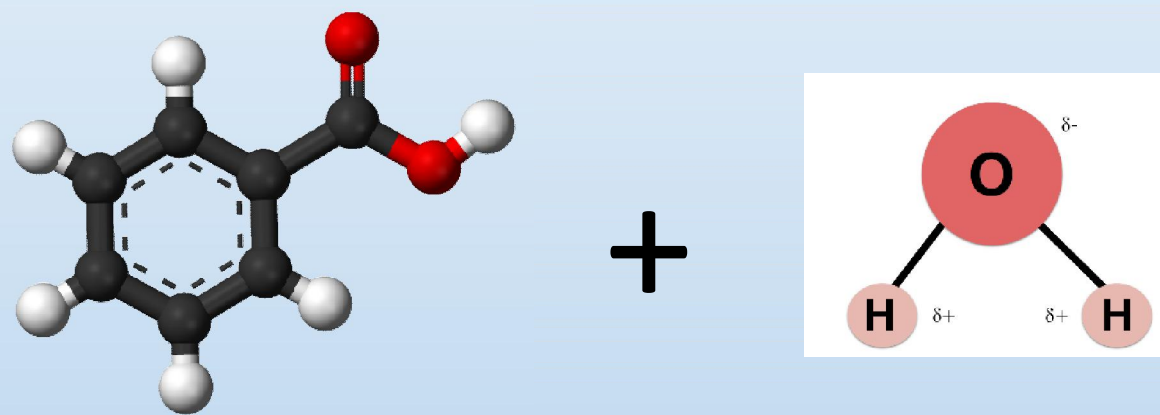
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AIM

- To determine the solubility and dissolution heat of benzoic acid-water solution at different temperatures

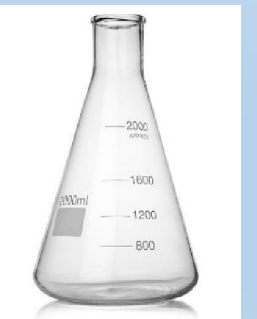
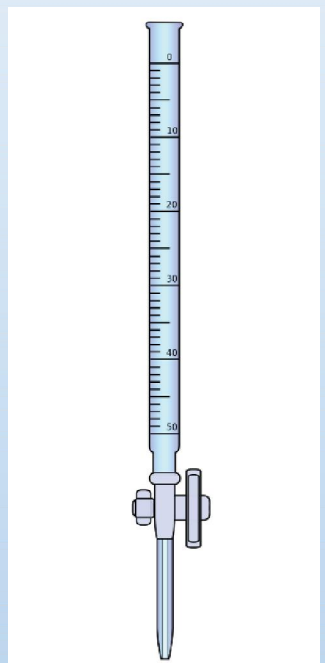


RECOMMENDATION

- Please read the laboratory manual prior to experiment (<http://mf-km.gazi.edu.tr/posts/view/title/laboratuar-dersleri-30251>)

MATERIALS

- ❑ *Thermostat heater,*
- ❑ *Covered erlenmayer of 250 mL (6 pcs),*
- ❑ *Benzoic Acid,*
- ❑ *Phenolphthalein Indicator,*
- ❑ *0.1 M NaOH solution,*
- ❑ *Buret of 50 ml,*
- ❑ *Pipette of 50 and 10 ml,*
- ❑ *Distilled water.*



METHOD

1. Set the thermostat heaters to 3 different temperatures (20, 30 and 40 °C)



2. Weigh approximately 2 grams of Benzoic Acid and place it into covered erlenmayers. Add 50 ml of distilled water in a single erlenmayer. Repeat the same procedure for the other erlenmayers.



3. Place the erlenmayers containing benzoic acid-water solution separately into the thermostat heaters.



4. Leave the erlenmayers in thermostat heaters for 1 hour, which is the predetermined time for the solution to reach equilibrium.
5. When steady state is reached and the solutions come to equilibrium, pipette 25 ml of **non-solid particle containing** solution and insert it into new erlenmayers, which are already cleaned, dried and weighed, without taking the erlenmayers from the thermostat heater. Once the solution is added, reweigh the erlenmayers and record your findings.



6. Add a few drops of phenolphthalein indicator to the solutions in erlenmayers and titrate with 0.1 M NaOH until the color turns into bright pink.



7. Record the volume of spent NaOH for each trial.

Using the data given in the **Results** section :

- ✓ Calculate the moles and grams of dissolved Benzoic Acid at each temperature using the volume of spent NaOH solution.
- ✓ Calculate the amount of water in solution in grams.
- ✓ Determine the solubility in terms of **g Benzoic Acid/ 100 g water** at each temperature.
- ✓ Estimate the dissolution heat of benzoic acid by plotting a graph.
- ✓ Compare your results [solubility (g Benzoic Acid/ 100 g water) and heat of dissolution at each temperature] with the literature and interpret the differences, if there are any.

RESULTS

Given below in table are the experimental results and data that are to be calculated.

Temperature (°C)	20	30	40
Weight of the beaker (g)	251.2	249.5	249.8
Weight of the beaker + solution (g)	275.6	273.7	274.4
Amount of solution (g)	?	?	?
Volume of spent NaOH (ml)	6.04	8.3	11.5
Moles of Benzoic Acid	?	?	?
Amount of Benzoic Acid (g)	?	?	?
Amount of Water (g)	?	?	?
Solubility (g BA /100 g water)	?	?	?

ASKED REPORT FORMAT

In your reports it is asked you to answer all the preliminary questions in your lab manual, do all the necessary calculations listed above and compare your results with the literature.



DUE DATE of the reports is *2 weeks* after the experiment starts.

USEFUL LINKS

- <https://www.youtube.com/watch?v=OExU4B1bMRA>