

***Physical Pharmacy -Lab. 2-
Solubilization of Aspirin***

Done by:

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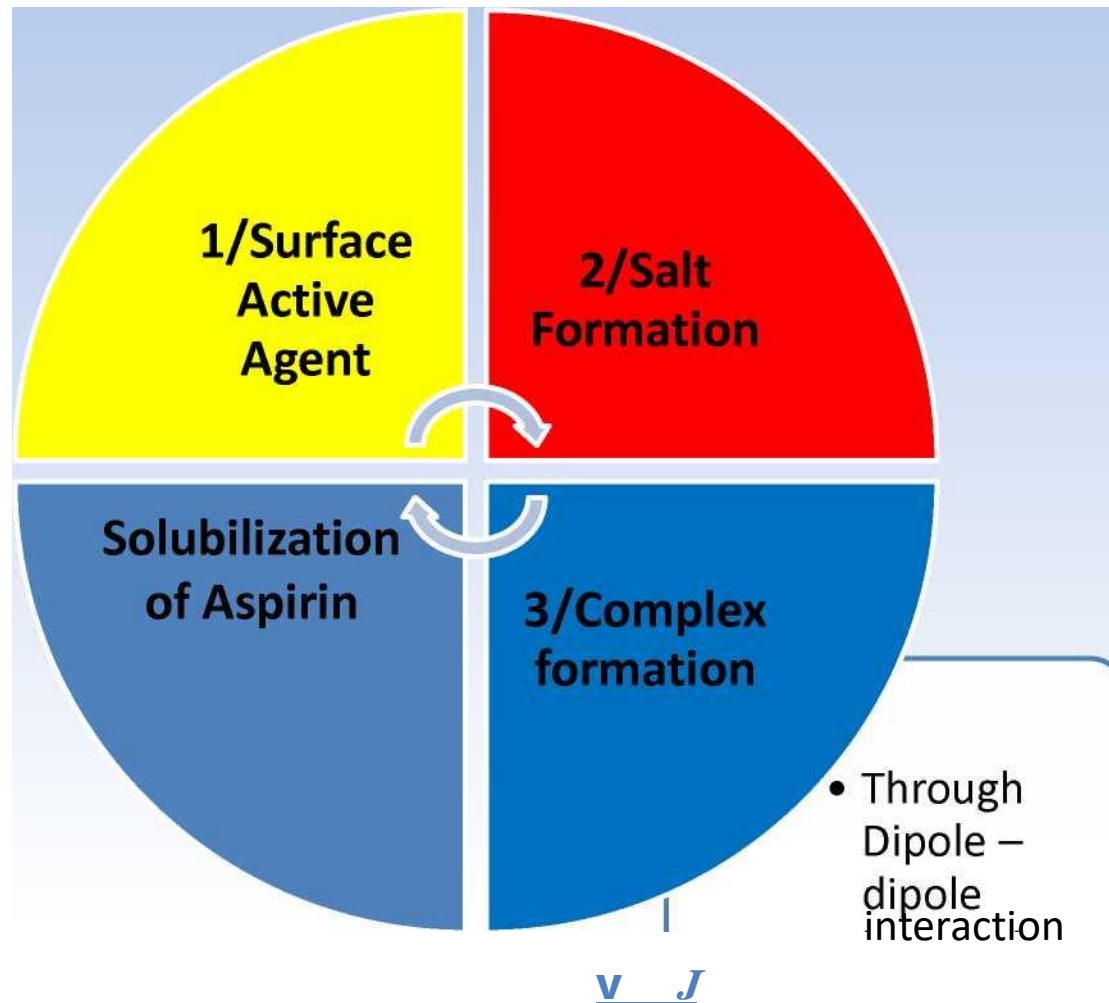
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I. Introduction

- Acetylsalicylic acid is the scientific name of the aspirin, yet currently explored by various companies for commercial benefits has analgesic and antipyretic activity.
- Soluble formulations of aspirin are currently available on the market. Basically, it is slightly soluble in water; hence, aspirin needs enhancements to be solubilized .

Enhancement of aspirin solubilization



- For instance, **Aspro Clear** is soluble, effervescent tablet containing aspirin. The effervescence and favorable pH condition required for solubility of aspirin are facilitated by:

incorporating sodium bicarbonate and citric acid in the formulation.

- Aspro Clear reported to provide faster relief of pain than plain aspirin tablets. Another method is by forming dipole-dipole interaction.

II. Kinds of forces

Generally, there are two kinds of forces, or attractions, which operate in a molecule:

Intra**m**olecular and inter**m**olecular.

Intramolecular forces are the forces that hold atoms together within a molecule.

Intermolecular forces are forces that exist between molecules (Figure: 1).

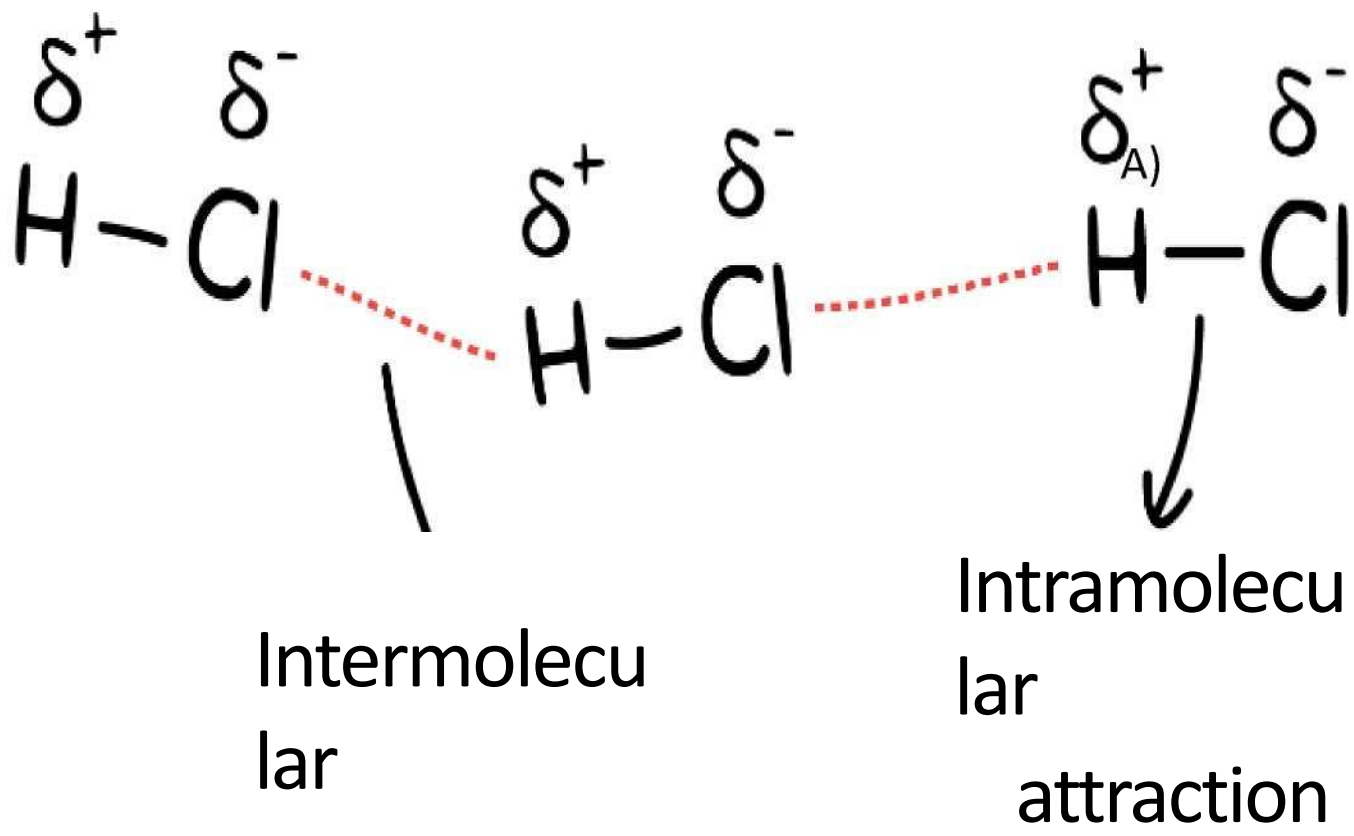
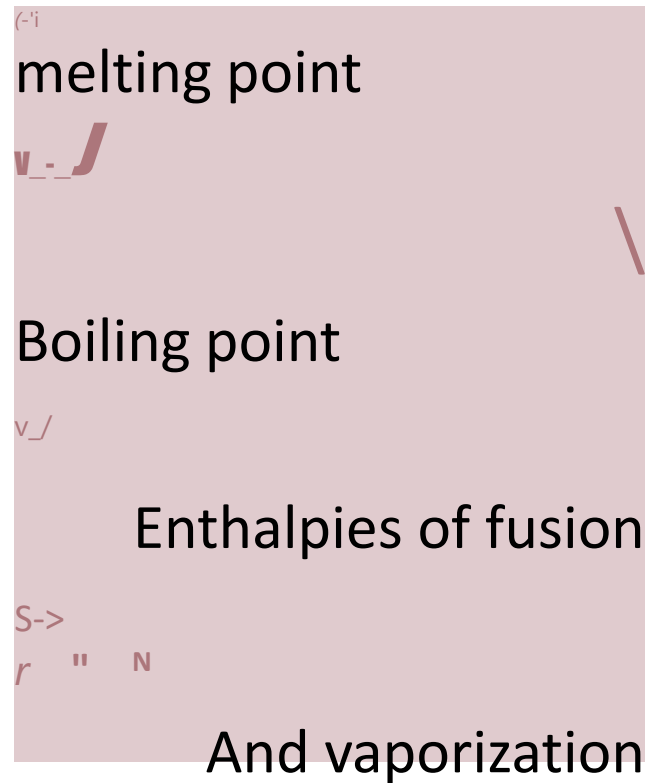


Figure: 1 attraction

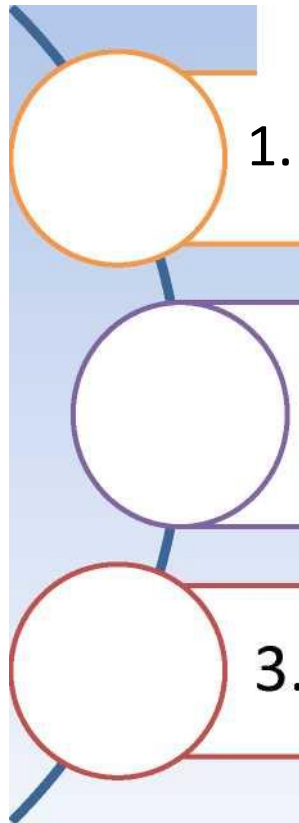
- Intermolecular forces are much weaker than the intramolecular forces of attraction but are important because they determine the physical properties of molecules like

Physical properties



S,

Therefore, the intermolecular force:



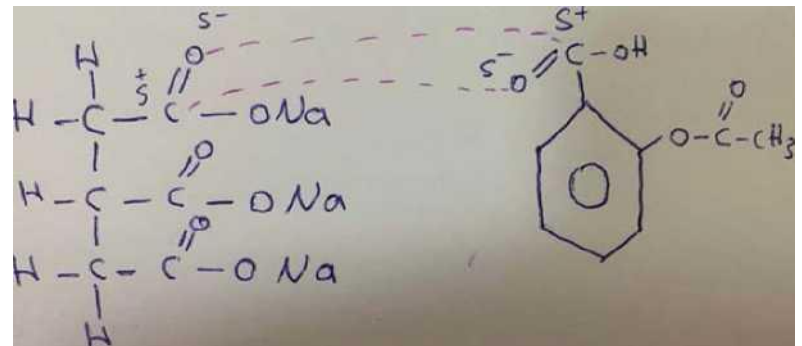
1. Hydrogen bond.

2. London dispersion forces, under the category of van der Waal forces

3. Dipole-dipole Interactions

Dipole -Dipole interaction

- These forces occur when the partially positively charged part of a molecule interacts with the partially negatively charged part of the neighboring molecule .
- Dipole-dipole interactions are the **strongest intermolecular force of attraction.**



(Trisodium Citrate)

(Aspirin)

III. Experimental Work

- Part I:
- **MATERIALS** :Acetyl salicylic acid , tri-sodium citrate, distilled water, phenol red , sodium hydroxide and filter paper
- **GLASS WARE and EQUIPMENTS** : conical flasks, graduated pipettes, funnel, burette. In addition to electrical balance.
- **Aim of Experiment:** to calculate the minimum amount of tri sodium citrate required to solubilize 1g of Asprin.

Part II: Experimental method

- 1. Add 1 g of Aspirin to the following flasks then :

	Weight of tri-
Conical flask	sodium citrate
1	0 g
2	1 g
3	2 g
4	3 g
5	4 g

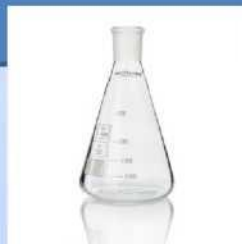
- 2. Add 50 mL of distilled water to each flask.
- 3. Shake the flasks for 10 min., then apply filtration step.
- 4. Take 10 mL of the filtrate solution and titrate with NaOH (0.1N) using phenol red as an indicator.
- 5. Record the end point taking into account the end point appears when the color changes from yellow to pink.
- 6. Finally, plot percent of aspirin dissolved versus grams tri-sodium citrate used

Steps of the experiment

Weigh 1 g
Asprin+1g of
Tri Sodium
Citrate



Put in dry conical
flask



Add 50ml of water
Then Shake for 10
minute



Change Color
from
Yellow to pink



Take 10ml of
filtrate ,2drops of
phenol red ,titrate
with(0.1N)NaOH

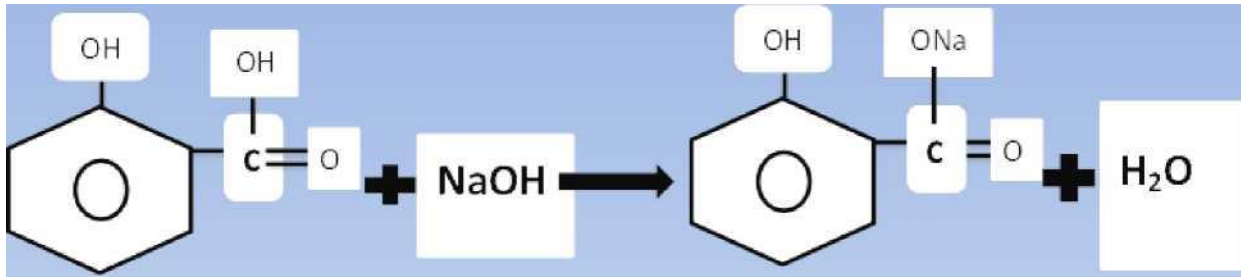


Filtration



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- When the amount of tri-sodium citrate is higher than that required for dissolving aspirin, the excess will dissociate to citrate ion and sodium ion, the later will form with water NaOH which results in the reaching the end point faster, and less than the real end point.



The chemical factor will be:

1 M.wt Aspirin = 1 M.wt NaOH
 180 g = 1L of 1N NaOH
 $180/1000$ g = 1ml of 1N NaOH
 $180/1000 * 0.1 = 1\text{ml of } 0.1\text{N NaOH}$
 Each 1ml of 0.1N NaOH = 0.018 g Aspirin

End point * chemical factor = g aspirin dissolve in 10ml
 Multiply the results by 10 = g%.

Tabulate the results

Conical Flask	Amount of Aspirin	Amount of Trisodium citrate
1	1g	0g
2	1g	1g
3	1g	2g
4	1g	3g
5	1g	4g

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End point	gram of aspirin dissolved In 10ml	%gram of aspirin dissolved

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- Plot percent of aspirin versus grams of tri sodium citrate used.

