Theoretical mass of ethyl-p amino benzoic acid

The yield obtained through this experiment is 39% of the theoretical mass of ethyl-p amino benzoic acid. There are few events that could be improved in order to issue the amount of yield obtained. Firstly, the quality of reagent used is relatively small to acquire a good percentage of the product. In order for a greater percentage yield in this experiment, a great amount of reagent should be used. In order to obtain more white foam, the sulfuric acid should be added drop wise to a solution of p-amino benzoic acid and ethanol. Based on adding sulfuric acid slowly, a large amount of white precipitate can be formed. Besides, that the product is transferred into too many containers repeatedly. This causes a lost in product between the transfers. Therefore, fewer transfer of product should be done in this experiment to obtain higher percentage of yield. Moreover,. Even though it was only a small portion, it is still decrease the amount of purified yield obtained. Furthermore, more precautions should be taken while performing recrystallization such as adding as little methanol as possible. The yield can be improved by maximizing the formation of crystals. More crystals can be formed by scratching the bottom of the Erlenmeyer flask with a glass rod and adding a crystals seed into the solution. To add on, it should be given enough time for crystals to be found while the flask is placed in the ice water bath. Through this, more yields can be acquired.

What is the advantage of using absolute ethanol rather than 95% ethanol in this experiment?

If the 95% ethanol was used, the little amount of water present in the diluted ethanol can prevent the ester formation. This is because the presence of water will lead the reaction to the left. This means instead of acids becoming esters from the Alkyl group, the esters can become acids because of the

hydrogen from the water. Therefore, absolute ethanol is chosen for this reaction which will lead the reaction to right (Forward reaction), rather than using any forms of diluted ethanol that could only negatively influence reaction for ester formation.

Why is it important to add the sulfuric acid drop wise to the ethanolic solution of p-amino benzoic acid?

Sulfuric acid is the most efficient catalyst for esterification. Water is a by-product of the esterification reaction and increasing the quantity of water would reverse reaction and decrease the yield of the reaction. when the reaction is performed in the presence of a concentrated sulfuric acid (hydrophilic), it will perform as a dehydration agent that will absorb the water molecules by produced from the reaction. So in the presence of a sulfuric acid catalyst, the reaction will be driven towards the right side, which is preferable to yield more ester.

The reason for adding this concentrated sulfuric acid in drop wise is mainly to avoid the extreme reaction of the acid with the water. Because, if excessive water was produced from the ethanolic solution of p-aminobenzoic acid, the sudden addition of large quantity of concentrated sulfuric acid would lead to extreme reaction with this excessive water, and result to a large amount of heat(exothermic). This is not safe and it is harmful due to the use of concentrated sulphuric acid. In contrast, if acid was added drops wise, the reaction will be still happening in the solution though will be limited only to a smaller extent. Therefore such procedure is preferable to maintain better control.

Another advantage of using drop wise adding acid would permit us to control the acidity of the final resultant. Because, if the acid content is increased in the final solution the subsequent neutralization process happens in the presence of an alkaline would lead to an extreme reaction. Therefore adding drop wise acid is essential to control the acidity of the solution, so the stability of the reaction can be maintained throughout the reaction.

Why is it important that all of the solids dissolve during the reflux period for you to obtain a good yield of product?

The solid precipitate after cooling down could be unreached benzoic acid. During the reaction, not all the solvents are participated in the reaction to produce Benzocaine. This could happen if the amount of the ethanol is too low. But most of chances this will be mainly due to the lack reaction between the available methanol. This can be avoided by stirring the mixture to swift the reaction. Thus, in order to get good yield of ester, all the precipitants of the mixture have to be dissolved in the first place. However, this is not possible in most of the occasions.

Why is it important to neutralize the reaction mixture during the work-up?

When acid is added to the reaction mixture after refluxing, the amino group is protonated and making it soluble in water. When the Na2CO3 is added, the proton is removed and makes the benzocaine is no longer soluble. Thus it begins to precipitate out of solution when the reaction mixture is neutralized. Thus it is important neutralize the moisture in order to filter out the ester from the mixture, which otherwise will be in a dissolved state and will not be recoverable.

Assuming it was necessary to add an additional portion of concentrated sulfuric acid, calculate about how much 10% aqueous sodium carbonate would be required to neutralize the reaction mixture.

During the experiment, 28. 6 mL of sodium carbonate need to neutralized the 18M sulfuric acid.

Volume of sulfuric acid = 1. 5 mL

# of moles of sulfuric acid = 18 X 0. 001 = 0. 018 mol

Mass of Na2CO3 = 10 g

# of moles of Na2CO3 = 10 / 105. 99 mol

= 0. 0943 mol

Concentration of Na2CO3 = 0. 0943/0. 1 = 0. 943M

C1 x V1 = C2 x V2

18 M x 1. 5 mL = 0. 943 M x V2

V2 = 28. 6 mL

Therefore, volume of Na2CO3, V2 = 29 mL

What is the gas that is evolved during the neutralization?

In presence of sulfuric acid, p-amino benzoic acid reacts with ethanol to form ethyl p-aminobenzoate. The reaction medium contains sulfuric acid and it was neutralized with sodium bicarbonate. Thus the gas evolved during the reaction between the acid and base is carbon dioxide (CO2).