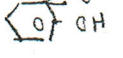
Test tube 2 was also an acid-base reaction between the carboxylic group of ~~aspirin~~ salicyclic acid and the bicarbonate ion of the $NaHCO_3$. This forms H_2CO_3 again, which breaks down to H_2O and CO_2.

salicyclic acid + $NaHCO_3$ →  + H_2O + CO_2.

Test tube 3:
This test tube contained no reaction between benzyl alcohol and $NaHCO_3$. This is the result because the hydrogen is difficult to remove from the alcohol due to the electron density of oxygen.

① Percent yield Discussion
A yield of 33.7 % was obtained. The reason why it is not 100% could have been due to the recrystallization process in which crystals of aspirin may have been lost. Crystals also may have been lost during the transferring process of transferring solutions to different beakers. Also, the vacuum apparatus may have caused the crystals to be stuck under the filter paper into the beaker (which contained a solution that was disposed of.

② Melting point Discussion
My melting point started at 124°C and the product completely melted at 126°C. This is lower than the theoretical/researched value of 135°C. This is due to the fact that my sample was not pure. Also, the use of excess heat during the formation of aspirin caused it to be in the form of salicyclic acid, which makes it impure.

Through various tests and experiments a percent yield of only 33.7°C and a melting point of 124°C - 126°C were obtained. Due to the fact that these results are inconsistent from what we would expect from a pure sample of aspirin, it can be concluded that the aspirin synthesized in this experiment was impure. This would imply that more of the sample was in the form of the starting material, salicyclic acid.