Question acids and Bases
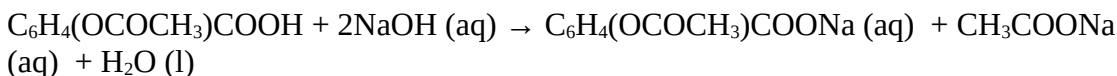
1.

Three medicine tablets, which were claimed by the pharmaceutical company to each, contain 300mg of aspirin $C_6H_4(OCOCH_3)COOH$, were heated in 50.00ml of a 0.5090 M NaOH. The aspirin reacted as per the following equation:

$C_6H_4(OCOCH_3)COOH + 2NaOH$ (aq) $\rightarrow C_6H_4(OCOCH_3)COONa$ (aq) $+ CH_3COONa$ (aq) $+ H_2O$ (l)

After cooling, the solution was transferred to a 100ml standard flask and the volume was made up to exactly the 100.0ml mark. Aliquots of 20.0 ml of this solution were then tirated against 0.1232 M HCl. The mean titre was 25.10 ml.
   a) What was the average mass of aspirin in the tablets?
   b) From your answer to a) comment on the pharmaceutical company's claim.
2.

To analyse some household ammonia, the following procedure was followed:
A 15.14 g sample of the cloudy ammonia mixture was weighed and transferred into a 250.0 mL flask. Then, 100.0 mL of 0.6342 M HCl was added to the flask and the mixture was thoroughly agitated. The volume was then made up to 250.0 mL using distilled water. 20.0 mL aliquots of this final mixture were titrated against 0.1098 M NaOH. The mean titre was 18.75 mL.
a) State the sequences of this procedure in the correct order.

b) Write the equations for each the reaction steps

c) Calculate the % of ammonia in the original commercial cloudy ammonia

d) If the student's final calculate % was less than the claimed by the company, does it conclusively mean that the company made a false statement?

3.

20.0 mL of dilute sulfuric acid was placed in a flask and 3.00 g of barium hydroxide added. The solution was stirred until the reaction was complete.

a) Write a balanced equation for the reaction.

b) The excess $Ba(OH)_2$ was back titrated with 0.100 mol L^{-1} HCl and 34.5 mL of the acid was required for neutralisation. Write a balanced equation for this reaction.

c) What indicator would be suitable for this reaction?

d) Calculate the original concentration of the sulfuric acid solution?

4.

In an experiment to determine the concentration of an HCl solution, 20.0 mL of 0.100 M Na_2CO_3 solution is placed in a conical flask and titrated to a methyl orange end point. The actual concentration of the HCl solution is 0.140 M, but several mistakes were observed during the experimental procedure. Four of these are listed below. For each mistake, state the correct procedure and, if the calculated concentration of the HCl would be **more, less or unaffected** by these mistakes.

a) Before filling up the burette, it was rinsed with distilled water.

b) The conical flask is rinse with distilled water before adding the Na_2CO_3 solution

c) The pipette used to deliver the Na_2CO_3 is rinsed with water

d) Phenolphthalein is used as the indicator, instead of methyl orange