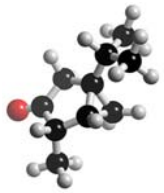
1.2 – AMOUNT OF SUBSTANCE – PPQ2



Name …….. Form ……

2) a) Ammonium sulphate reacts with aqueous sodium hydroxide as shown by the equation below.

$$(NH_4)_2SO_4 + 2\ NaOH \rightarrow 2\ NH_3 + Na_2SO_4 + 2\ H_2O$$

A sample of ammonium sulphate was heated with 100 cm^3 of 0.500 mol dm^{-3} aqueous sodium hydroxide. To ensure that all the ammonium sulphate reacted, an excess of sodium hydroxide was used. Heating was continued until all of the ammonia had been driven off as a gas. The unreacted sodium hydroxide remaining in the solution required 27.3 cm^3 of 0.600 mol dm^{-3} hydrochloric acid for neutralisation.

i) Calculate the original number of moles of NaOH in 100 cm^3 of 0.500 mol dm^{-3} aqueous sodium hydroxide.

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ii) Calculate the number of moles of HCl in 27.3 cm^3 of 0.600 mol dm^{-3} hydrochloric acid.

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iii) Deduce the number of moles of the unreacted NaOH neutralised by the hydrochloric acid.

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iv) Use your answers from parts (a) (i) and (a) (iii) to calculate the number of moles of NaOH which reacted with the ammonium sulphate.

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v) Use your answer in part (a) (iv) to calculate the number of moles and the mass of ammonium sulphate in the sample.(If you have been unable to obtain an answer to part (a) (iv), you may assume that the number of moles of NaOH which reacted with ammonium sulphate equals 2.78×10^{-2} mol. This is not the correct answer.)

Moles of ammonium sulphate .....

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Mass of ammonium sulphate .....

..... (7)

b) A 0.143g gaseous sample of ammonia occupied a volume of 2.86×10^{-4} m^3 at a temperature ***T*** and a pressure of 100 kPa. State the ideal gas equation, calculate the number of moles of ammonia present and deduce the value of the temperature ***T***. (The gas constant R = 8.31 J K^{-1} mol^{-1})

Ideal gas equation .....

Moles of ammonia .....

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*Value of **T*** .....

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…… (4)

(CHM01 Winter 2005)