

Exercise 1.62 – Theoretical and actual yield

Q162-01 6.5g zinc metal reacts with 50cm³ of 1M copper sulphate solution, CuSO₄. After filtering and drying 3g of copper metal was obtained. Calculate the percentage yield of copper. [Zn=65, Cu=63.5, S=32, O=16]

Q162-02 5g of solid calcium hydroxide, Ca(OH)₂, reacts with 10g of solid ammonium chloride NH₄Cl on heating to produce solid calcium chloride, steam and 1.2dm³ of ammonia gas, NH₃, was collected at STP. Calculate the percentage yield of ammonia. [N=14, H=1, Ca=40, Cl=35.5, O=16] [molar volume of a gas at STP = 22.4 dm³]

Q162-03 When 14.8g of magnesium nitrate, Mg(NO₃)₂, was heated in a dry tube magnesium oxide, nitrogen dioxide gas NO₂, and oxygen were produced. When the nitrogen dioxide was cooled it liquified and 2.0 g were collected. Calculate the percentage yield of nitrogen dioxide. [N=14, H=1, Mg=24, O=16]

Q162-04 Solid manganese IV oxide (4.0 g) MnO₂, oxidised 50cm³ of 4M hydrochloric acid on heating producing chlorine gas, water and manganese II chloride solution. If 0.8 dm³ of chlorine were produced calculate the percentage yield of chlorine. [Mn=55, H=1, Cl=35.5, O=16]

Q162-05 In an experiment a solution containing 3.31 g of lead (II) nitrate reacts with a solution containing 2.00 g of sodium chloride. 2.30 g of lead (II) chloride solid was collected after filtering and drying. What is the percentage yield of lead II chloride? [N=14, Pb=208, Cl=35.5, O=16]

Q162-06 1.00 g of CaCO₃ reacts with 15cm³ of 2M HNO₃. 1.12 g of Ca(NO₃)₂, was obtained after crystallisation. Calculate the percentage yield of Ca(NO₃)₂. [Ca=40, H=1, N=14, O=16]

Q162-07 In an experiment a solution containing 5.85 g of sodium chloride reacted with a solution containing 12.75 g of silver nitrate. 8.2 g of silver chloride was obtained after filtering and drying. Calculate the percentage yield of silver chloride. [Ag=108, Cl=35.5, N=14, O=16]

Q162-08 300dm³ of nitrogen were reacted over a catalyst with 300dm³ of hydrogen and 30dm³ of ammonia was obtained (all gases measured at the same temperature and pressure). Calculate the percentage yield of ammonia. [N=14, H=1]

Q162-09 In the contact process for manufacture of sulphuric acid, 24.0 g of sulphur VI oxide was obtained from 40 g of sulphur IV oxide and 100 g of oxygen. Calculate the percentage yield of sulphur (VI) oxide. [S=32, O=16]

Q162-10 In an organic ester synthesis, 5.0 g of ethyl ethanoate (CH₃COOC₂H₅) was obtained from 10.0 g of ethanol (C₂H₅OH) and 10g of ethanoic acid (CH₃COOH). Calculate the percentage yield of the ester. [C=12, H=1, O=16]
