Worksheet: Atoms and Molecules

IGCSE · Class 9 · Science · 15 questions · 40 marks

Name: _____	Date: _____	Score: _____ / 40

Q1. 5.3 g of sodium carbonate reacts with 6 g of acetic acid. The products are 8.2 g of sodium acetate, 2.2 g of CO,and 0.9 g of water. Verify the law of conservation of mass. *[1 mark]*

Q2. Compute the molecular mass of CO, *[1 mark]*

Q3. Write the chemical formula of calcium chloride. *[1 mark]*

Q4. Give the atomicity of: (a) O, (b) P, (c) HSO, (d) Argon. *[1 mark]*

Q5. How many moles are in 36 g of water? (M(HO) = 18 g/mol) *[2 marks]*

Q6. How many oxygen atoms are present in 9 g of water? (M(HO) = 18 g/mol, N = 6.022 × 10) *[2 marks]*

Q7. Calculate the mass of 0.2 mole of glucose (CHO). (Atomic masses: C = 12, H = 1, O = 16) *[2 marks]*

Q8. Calculate the percentage by mass of nitrogen in urea, $CO(NH_2)_2$. (Atomic masses: C = 12, O = 16, N = 14, H = 1) *[3 marks]*

Q9. Write the chemical formulas for: (a) aluminium nitrate, (b) ammonium sulphate, (c) magnesium hydroxide. *[3 marks]*

Q10. In an experiment, 1.375 g of cupric oxide on reduction yields 1.097 g of copper. In another, 1.179 g of copper, on dissolving in nitric acid and then heating, gave 1.476 g of cupric oxide. Show that the law of constant proportions is obeyed. *[3 marks]*

Q11. 12 g of magnesium reacts with oxygen to form magnesium oxide. (a) How many moles of Mg is this? (b) How many moles of MgO are formed? (c) What is the mass of MgO produced? (M(Mg) = 24, M(O) = 16) *[4 marks]*

Q12. Find the number of (a) molecules and (b) atoms in 1.7 g of NH_3. ($M(NH_3)$ = 17 g/mol, $N_A = 6.022 \times 10^{23}$) *[4 marks]*

Q13. An oxide of nitrogen contains 30.4 % nitrogen and 69.6 % oxygen by mass. Find its empirical formula. (N = 14, O = 16) *[4 marks]*

Q14. (a) Calculate the molar mass of ZnO. (b) A mineral sample of zinc oxide has mass 100 g. How many zinc atoms does it contain? (c) Comment on whether this is a small or large number. (Zn = 65, O = 16) *[4 marks]*

Q15. Convert 23 g of sodium into (a) moles of Na, (b) moles of Na^+ ions, (c) number of Na^+ ions, (d) total charge in coulombs (charge per ion = 1.6×10^{-19} C). ($M(Na) = 23$ g/mol, $N_A = 6.022 \times 10^{23}$) *[5 marks]*