Quantitative Chemistry

GCSE Science • **Combined and Triple** • Grades 4–7

Name: _____ Class: _____ Total: _____ / 59

Show all your working. Marks are given for correct method as well as the final answer.

1. State the law of conservation of mass. **[2 marks]**

Answer: _____

2. 12 g of carbon reacts with 32 g of oxygen. Work out the mass of carbon dioxide formed. **[2 marks]**

Answer: _____ **g**

3. Explain why the mass appears to decrease when a metal carbonate is heated in an open container. **[3 marks]**

Answer: _____

4. Work out the relative formula mass of H_2O. A_r: H = 1, O = 16. **[2 marks]**

Answer: _____

5. Work out the relative formula mass of $CaCO_3$. A_r: Ca = 40, C = 12, O = 16. **[2 marks]**

Answer: _____

6. Work out the relative formula mass of $Ca(OH)_2$. A_r: Ca = 40, O = 16, H = 1. **[3 marks]**

Answer: _____

7. Write down the equation linking mass, moles and relative formula mass. **[1 mark]**

Answer: _____

8. Work out the number of moles in 36 g of water ($M_r = 18$). **[2 marks]**

Answer: _____ **mol**

9. Work out the mass of 0.5 mol of calcium carbonate ($M_r = 100$). **[2 marks]**

Answer: _____ **g**

10. Work out the number of moles in 8 g of magnesium ($A_r = 24$). **[3 marks]**

Answer: _____ **mol**

11. $CaCO_3 \rightarrow CaO + CO_2$. Work out the mass of calcium oxide from 50 g of calcium carbonate. M_r: $CaCO_3 = 100$, $CaO = 56$. **[4 marks]**

Answer: _____ **g**

12. Using the same equation, work out the mass of carbon dioxide released. M_r of $CO_2 = 44$. **[3 marks]**

Answer: _____ **g**

13. $2Mg + O_2 \rightarrow 2MgO$. Work out the mass of magnesium oxide from 4.8 g of magnesium. A_r: $Mg = 24$, $O = 16$. **[4 marks]**

Answer: _____ **g**

14. Write down the equation linking concentration, mass and volume. **[1 mark]**

Answer: _____

15. 20 g of salt is dissolved in 0.5 dm^3 of water. Work out the concentration. **[2 marks]**

Answer: _____ **g/dm^3**

16. Convert 250 cm^3 into dm^3. **[2 marks]**

Answer: _____ **dm^3**

17. Write down the equation for percentage yield. **[1 mark]**

Answer: _____

18. A reaction should give 25 g but gives 20 g. Work out the percentage yield. **[2 marks]**

Answer: _____ **%**

19. Give two reasons why a yield is never 100%.

(a) Give two reasons. **[2 marks]**

(b) Explain why a high atom economy matters to industry. **[3 marks]**

Answer: _____

20. $N_2 + 3H_2 \rightarrow 2NH_3$. A_r: N = 14, H = 1.

(a) Work out the relative formula mass of ammonia. **[2 marks]**

(b) Work out the atom economy for making ammonia. **[4 marks]**

Answer: _____

21. A student heats 10 g of copper carbonate. $CuCO_3 \rightarrow CuO + CO_2$. M_r: $CuCO_3 = 124$, $CuO = 80$.

(a) Work out the theoretical mass of copper oxide, to 1 d.p. **[4 marks]**

(b) Only 5.2 g is made. Work out the percentage yield, to 1 d.p. **[3 marks]**

Answer: _____

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