1 The equation shows the reaction between magnesium and sulfuric acid.
[A_r: H, 1; O, 16; Mg, 24; S, 32]

$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

In this reaction, which mass of magnesium sulfate is formed when 6 g of magnesium react with excess sulfuric acid?

A 8 **B** 24 **C** 30 **D** 60

2 Two atoms of magnesium, Mg, react with one molecule of oxygen, O_2.

What is the formula of the product?

A MgO **B** MgO_2 **C** Mg_2O **D** Mg_2O_2

3 Copper(II) oxide reacts with ammonia.

The left hand side of the balanced equation for this reaction is:

$$3CuO + 2NH_3 \rightarrow$$

What completes the equation?

A $3Cu + 2HNO_3$

B $3Cu + 2N + 3H_2O$

C $3Cu + N_2 + 3H_2O$

D $3Cu + 2NO + 3H_2O$

4 What is the relative formula mass, M_r, of $CaCO_3$?

A 50 **B** 68 **C** 100 **D** 204

5 A molecule, Z, contains two atoms of oxygen, six atoms of hydrogen and three atoms of carbon.

What is the formula of Z?

A CH_3CH_2CHO

B CH_3COCH_3

C $C_2H_5CO_2H$

D $C_3H_6CO_2H$

6 What are the electrode products when molten silver iodide is electrolysed between inert electrodes?

	cathode	anode
A	hydrogen	iodine
B	iodine	silver
C	silver	iodine
D	silver	oxygen

7 Iron forms an oxide with the formula Fe_2O_3.

What is the relative formula mass of this compound?

A 76 **B** 100 **C** 136 **D** 160

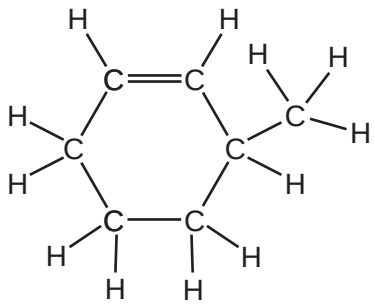
8 In athletics, banned drugs such as nandrolone have been taken illegally to improve performance. Nandrolone has the molecular formula $C_{18}H_{26}O_2$.

What is the relative molecular mass, M_r, of nandrolone?

(Relative atomic mass: H = 1; C = 12; O = 16)

A 46 **B** 150 **C** 274 **D** 306

9 The structure of an organic compound, X, is shown.



What is the molecular formula of X?

A C_6H_9 **B** C_6H_{12} **C** C_7H_{12} **D** C_7H_{14}

10 What is the relative molecular mass, M_r, of nitrogen dioxide?

A 15 **B** 23 **C** 30 **D** 46

11 A compound contains one atom of calcium, two atoms of hydrogen and two atoms of oxygen.

What is the correct chemical formula of the compound?

A CaO_2H_2 **B** HOCaOH **C** H_2CaO_2 **D** $Ca(OH)_2$

12 The formulae of compounds W, X and Y are shown.

W $CuSO_4.5H_2O$

X $MgSO_4.7H_2O$

Y $Cu(NO_3)_2.6H_2O$

Which statement is correct?

A W contains twice as many hydrogen atoms as oxygen atoms.

B X contains the most oxygen atoms.

C Y contains the most hydrogen atoms.

D Y contains the same number of hydrogen and oxygen atoms.

13 Which relative molecular mass, M_r, is **not** correct for the molecule given?

	molecule	M_r
A	ammonia, NH_3	17
B	carbon dioxide, CO_2	44
C	methane, CH_4	16
D	oxygen, O_2	16

14 A compound with the formula XF_2 has a relative formula mass of 78.

What is element X?

A argon

B calcium

C neon

D zirconium

15 What is the balanced chemical equation for the reaction between calcium and water?

A $Ca + H_2O \rightarrow CaOH + H_2$

B $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$

C $Ca + 2H_2O \rightarrow CaOH + H_2$

D $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

16 The equation shows the reaction between magnesium and sulfuric acid.

$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

(Mg = 24, H = 1, S = 32, O = 16)

In this reaction, what mass of magnesium sulfate will be formed when 6 g of magnesium reacts with excess sulfuric acid?

A 8 **B** 24 **C** 30 **D** 60

17 A compound has the formula CH_3CO_2H.

How should the relative molecular mass, M_r, of this compound be calculated?

A 12 + 1 + 16

B 3(12 + 1) + 2(12 + 16) + 1

C $(4 \times 12) + (2 \times 1) + 16$

D $(2 \times 12) + (4 \times 1) + (2 \times 16)$

18 The equation for the reaction between magnesium and dilute sulfuric acid is shown.

$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

M_r of $MgSO_4$ is 120

Which mass of magnesium sulfate will be formed if 12 g of magnesium are reacted with sulfuric acid?

A 5 g **B** 10 g **C** 60 g **D** 120 g

19 Methane, CH_4, burns in the air to form carbon dioxide and water.

What is the balanced equation for this reaction?

A $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

C $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$

D $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

20 The relative formula mass, M_r, of copper(II) sulfate, $CuSO_4$, is 160.

Which mass of sulfur is present in 160 g of copper(II) sulfate?

A 16 g **B** 32 g **C** 64 g **D** 128 g

21 What is the relative molecular mass (M_r) of HNO_3?

A 5 **B** 31 **C** 32 **D** 63

22 The chemical compositions of two substances, W and X, are given.

W $Na(\ l Si_3)O_8$

X $Ca(Al_2Si_2)O_8$

Which statements are correct?

1 W and X contain the same amount of oxygen.

2 W contains three times as much silicon as X.

3 X contains twice as much aluminium as W.

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 1, 2 and 3

23 Hydrogen and chlorine react as shown.

1 molecule of hydrogen + 1 molecule of chlorine → 2 molecules of hydrogen chloride

What is the equation for this reaction?

A $2H + 2Cl \rightarrow 2HCl$

B $2H + 2Cl \rightarrow H_2Cl_2$

C $H_2 + Cl_2 \rightarrow 2HCl$

D $H_2 + Cl_2 \rightarrow H_2Cl_2$

24 For each atom of carbon present in a molecule, there is an equal number of atoms of oxygen but twice as many atoms of hydrogen.

What is the formula of the molecule?

A $C_2H_2O_2$ **B** $C_2H_2O_4$ **C** $C_2H_4O_2$ **D** C_2H_6O

25 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.

What mass of oxygen combines with 2 g of hydrogen?

A 12 g **B** 16 g **C** 96 g **D** 144 g

26 Nitrogen and hydrogen react together to form ammonia.

$$N_2 + 3H_2 \rightarrow 2NH_3$$

When completely converted, 7 tonnes of nitrogen gives 8.5 tonnes of ammonia.

How much nitrogen will be needed to produce 34 tonnes of ammonia?

A 7 tonnes **B** 8.5 tonnes **C** 28 tonnes **D** 34 tonnes

27 Which relative molecular mass, M_r, is **not** correct for the molecule given?

	molecule	M_r
A	ammonia, NH_3	17
B	carbon dioxide, CO_2	44
C	methane, CH_4	16
D	oxygen, O_2	16