Revision Paper 2

For each question, choose the most suitable option and write the letter (**A**, **B**, **C** or **D**) in the brackets provided.

1. Which of the following is the **correct** ionic equation when aqueous potassium carbonate is added into dilute nitric acid?

   A $CO_3^{2-} + 2H^+ \longrightarrow CO_2 + H_2O$

   B $2K^+ + 2NO_3^- \longrightarrow 2KNO_3$

   C $K_2CO_3 + 2H^+ \longrightarrow 2K^+ + CO_2 + H_2O$

   D $K_2CO_3 + 2HNO_3 \longrightarrow 2KNO_3 + CO_2 + H_2O$ ( )

2. An oxide of iron has a mass of 58 g.

   What is the formula of the compound when 0.25 mol of the compound is present in 58 g?

   A FeO

   B FeO_2

   C Fe_2O_3

   D Fe_3O_4 ( )

O 3. In a reaction vessel, 1 g of hydrogen gas is exploded with 4 dm^3 of oxygen gas.

   What is the mass of water formed?

   A 3.00 g

   B 6.00 g

   C 9.00 g

   D 12.0 g ( )

Q 4. 10 cm^3 of methane gas is reacted with 50 cm^3 of oxygen gas to form carbon dioxide and water.

What are the volumes of gases left after the reaction? All volumes are measured at room temperature and pressure (r.t.p.).

	Volume of Methane Gas / cm^3	Volume of Oxygen Gas / cm^3	Volume of Carbon Dioxide Gas / cm^3	Volume of Water / cm^3
A	0	0	20	0
B	0	30	10	0
C	5	0	20	20
D	5	20	10	20

( )

5. Which of the following are **true** about hydrogen chloride gas and hydrochloric acid?

	Hydrogen Chloride Gas	Hydrochloric Acid
A	Cannot conduct electricity	Can conduct electricity
B	Does not change the colour of damp blue litmus paper	Turns damp blue litmus paper red
C	Does not react with aqueous sodium hydroxide	Reacts with aqueous sodium hydroxide
D	Does not react with copper metal	Reacts with copper metal

( )

6. How many of the oxides below will react with carbon dioxide?

Aluminium oxide Copper(II) oxide Magnesium oxide Phosphorus(V) oxide

A 1

B 2

C 3

D 4

( )

7. Element **B** burns in air to form substance **C** which can react with sodium hydroxide and sulfuric acid.

Which of the following statements about element **B** and substance **C** are **true**?

1 Element **B** could be zinc.

2 Element **B** could have a greater atomic mass as compared to magnesium.

3 Substance **C** could be an acidic oxide.

4 Substance **C** forms a gas when added to sulfuric acid.

A 1 and 2 only

B 1 and 3 only

C 2 and 4 only

D 3 and 4 only ( )

8. Four solids, zinc oxide, phosphorus(V) oxide, magnesium carbonate and copper were mixed.

Which of the following pairs of reagents can be used to extract copper from the mixture?

A Aqueous ammonia and sodium chloride

B Calcium carbonate and sodium hydroxide

C Nitric acid and potassium hydroxide

D Zinc chloride and silver nitrate ( )

O 9. Calcium ethanoate is formed when 30 cm^3 of 1.0 mol/dm^3 ethanoic acid is added to 20 cm^3 of 1.0 mol/dm^3 calcium hydroxide.

Which of the following statements about the reaction are **correct**?

1 Ethanoic acid is the limiting reagent.

2 The pH of the resultant mixture is 7.

3 The chemical formula of calcium ethanoate is CH_3COOCa.

4 When carbon dioxide is bubbled into the resultant mixture, a white precipitate is observed.

A 1 and 2 only

B 1 and 4 only

C 2 and 3 only

D 3 and 4 only ( )

Q 10. Sodium hydroxide was added to a solution containing ammonium ions.

What is the balanced ionic equation, with state symbols, for this reaction?

A $H^+(aq) + OH^-(aq) \longrightarrow H_2O(l)$

B $NH_4^+(aq) + OH^-(aq) \longrightarrow NH_3(g) + H_2O(l)$

C $NH_4^+(aq) + Na^+(aq) \longrightarrow NH_3(g) + H^+(aq) + Na^+(aq)$

D $NH_4^+(aq) + Na^+(aq) \longrightarrow NH_3(g) + H^+(aq) + Na(s)$

( )

Q 11. When excess aqueous ammonia was added into a solution, no precipitate was observed as it was added too quickly. However, it was observed that the colour of the solution became darker.

Which of the following could be the identity of the compound?

A Copper(II) nitrate

B Iron(II) chloride

C Iron(III) sulfate

D Potassium iodide

( )

Q 12. A student was tasked to identify three unknown substances. To do this, he conducted the following tests on each substance.

Test 1: Add dilute nitric acid.

Test 2: Add excess aqueous sodium hydroxide to the resultant solution in test 1.

Test 3: Add aluminium then gently heat the mixture to the resultant solution in test 2.

The three unknown substances were easily distinguished using the tests above.

Which of the following could be the identities of the three substances?

	Test 1	Test 2	Test 3
A	Aluminium	Copper	Zinc
B	Magnesium carbonate	Zinc chloride	Sodium nitrate
C	Magnesium nitrate	Zinc nitrate	Aluminium nitrate
D	Magnesium sulfate	Magnesium chloride	Copper

( )

Q 13. Chlorine in chlorate(VII) ion C/O_x^- has an oxidation state of +7.

Which of the following is the formula of manganese(IV) chlorate(VII)?

A MnC/O_3

B MnC/O_4

C $Mn(C/O_3)_4$

D $Mn(C/O_4)_4$

( )

14. Manganese can exist in different oxidation states. In a particular reaction, the manganese undergoes several stages of changes.

$$MnO_2 \longrightarrow MnO \longrightarrow MnO_2^{2+} \longrightarrow MnO_4^{-} \longrightarrow Mn$$

Which of the following is the **correct** change in oxidation state of manganese in each stage?

	$MnO_2 \longrightarrow MnO$	$MnO \longrightarrow MnO_2^{2+}$	$MnO_2^{2+} \longrightarrow MnO_4^{-}$	$MnO_4^{-} \longrightarrow Mn$
A	Decreases by 2	Increases by 4	Decreases by 1	Decreases by 4
B	Decreases by 2	Increases by 4	Increases by 1	Decreases by 7
C	Increases by 2	Decreases by 4	Decreases by 1	Increases by 6
D	Increases by 2	Decreases by 4	Increases by 1	Increases by 7

( )

15. Which of the following is **true** about Group 17 elements?

A Adding aqueous bromine to sodium chloride solution will cause chlorine gas to be produced.

B Astatine is a black gas.

C Bubbling chlorine gas into sodium iodide solution will cause the solution to turn brown.

D Fluorine is the least reactive element in Group 17. ( )

16. Group 2 elements have similar properties as those in Group 1 whereas Group 16 elements have similar properties as those in Group 17.

Which of the following are the **correct** trends for the boiling points and reactivity **going down** Groups 2 and 16?

	Boiling Point	Reactivity
A	Decreases for both groups	Increases for Group 2 but decreases for Group 16
B	Decreases for Group 2 but increases for Group 16	Increases for Group 2 but decreases for Group 16
C	Decreases for Group 2 but increases for Group 16	Decreases for both groups
D	Increases for Group 2 but decreases for Group 16	Decreases for Group 2 but increases for Group 16

( )

17. Some properties of elements **W**, **X** and **Y** are shown in Table 1.

Table 1

Element	W	X	Y
Melting Point / °C	113	98	–7.2
Appearance	Yellow solid	Grey solid	Red-brown liquid
Electrical Conductivity	Poor	Good	Poor
Density / g/cm³	2.07	0.968	3.10

Which of the following corresponds to the **correct** group of the elements stated above?

	W	X	Y
A	Group 1	Group 17	Group 16
B	Group 2	Group 14	Group 15
C	Group 16	Group 1	Group 17
D	Group 17	Group 13	Group 14

( )

18. Which of the following reactions would **not** occur?

A $2NH_3 + H_2SO_4 \longrightarrow (NH_3)_2SO_4$

B $Cu + ZnCl_2 \longrightarrow CuCl_2 + Zn$

C $2CH_3COOH + Mg \longrightarrow (C_2H_5COO)_2Mg + H_2$

D $Cl_2 + 2NaI \longrightarrow 2NaCl + I_2$ ( )

19. Magnesium is more reactive than iron because _____.

A iron can conduct electricity but magnesium cannot

B iron forms two different oxides while magnesium forms only one oxide

C magnesium corrodes more readily than iron

D magnesium loses electrons more readily than iron ( )

20. 1.3 g of metal **R** reacts completely with 40 cm³ of 1.0 mol/dm³ dilute hydrochloric acid to produce a salt, RCl_2.

Which of the following is **true** of metal **R**?

A Iron can be used to displace **R** from a solution of RCl_2.

B Metal **R** does not react with cold water but reacts readily with steam.

C Metal **R** reacts with oxygen to form a mixture of oxides, **R**O and R_2O_3.

D RCl_2 is a coloured solution. ( )

O 21. When solid ammonium chloride is added into aqueous sodium hydroxide, the temperature of the solution decreases by 5 °C, before increasing by 15 °C.

Which of the following is **not** a correct description of the reaction?

A A pungent gas is released which turns damp red litmus paper blue.

B The rate of reaction increases as the reaction proceeds, producing more energy.

C The reaction between ammonium chloride and aqueous sodium hydroxide is an exothermic reaction.

D When ammonium chloride is added, it first dissolves into the solution. ( )

O 22. A student reacted excess solid sodium carbonate with 20 cm^3 of 0.500 mol/dm^3 dilute nitric acid. Figure 1 shows the volume of gas produced against time.

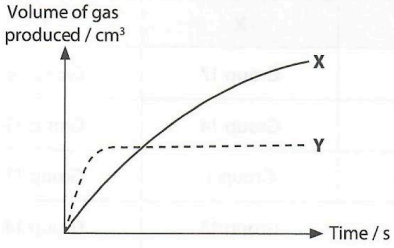

Figure 1

If the student's experiment is represented by **Y**, which of the following changes in conditions will produce **X**?

1 Changing the acid to 20 cm^3 of 0.250 mol/dm^3 dilute nitric acid

2 Changing the acid to 40 cm^3 of 0.500 mol/dm^3 dilute hydrochloric acid

3 Introducing an additional of 10 cm^3 of 0.400 mol/dm^3 dilute nitric acid into the original reaction mixture

4 Using 80 cm^3 of 0.250 mol/dm^3 dilute nitric acid instead

A 1 and 2 only

B 1 and 4 only

C 2 and 3 only

D 3 and 4 only ( )

O 23. In an experiment, 20 cm^3 of 0.8 mol/dm^3 sulfuric acid was added to 30 cm^3 of 1.0 mol/dm^3 aqueous sodium hydroxide.

Which of the following statements are **true** of the experiment?

1 Energy is released during the reaction.

2 Increasing the pressure of the reaction mixture would speed up the reaction.

3 The concentration of the excess reactant in the resultant mixture is 0.0200 mol/dm^3.

4 The progress of the reaction can be followed using a thermometer.

A 1 and 3 only

B 1, 3 and 4 only

C 2 and 3 only

D 2 and 4 only ( )

O 24. Figure 2 shows how the concentration of substances in a reaction varies over time.

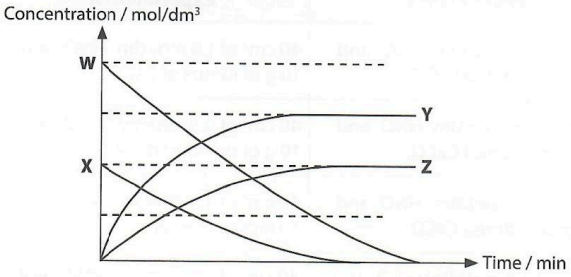

Figure 2

Determine the balanced chemical equation for the reaction.

A $W + X \longrightarrow Y + Z$

B $4W + 2X \longrightarrow 3Y + 2Z$

C $4W + X \longrightarrow 3Y + Z$

D $3Y + 2Z \longrightarrow 4W + 2X$ ( )

O 25. A student set up two different experiments to investigate the rate of reaction between nitric acid and sulfuric acid with calcium carbonate. Calcium nitrate is soluble in water whereas calcium sulfate is insoluble in water. He plotted the results of his experiments in Figure 3.

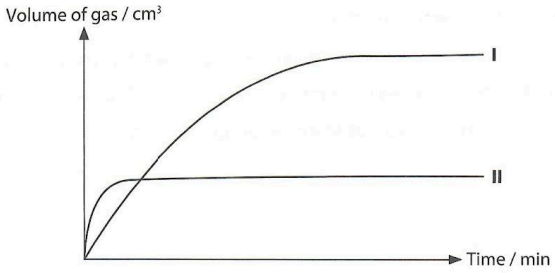

Figure 3

Which of the following could be the set of experiments the student used?

	Experiment I	Experiment II
A	40 cm^3 of 1.0 mol/dm^3 HNO_3 and 10 g of powdered $CaCO_3$	40 cm^3 of 1.0 mol/dm^3 HNO_3 and 10 g of lumps of $CaCO_3$
B	40 cm^3 of 1.0 mol/dm^3 HNO_3 and 10 g of powdered $CaCO_3$	40 cm^3 of 0.5 mol/dm^3 H_2SO_4 and 10 g of powdered $CaCO_3$
C	40 cm^3 of 1.0 mol/dm^3 HNO_3 and 10 g of powdered $CaCO_3$	40 cm^3 of 1.0 mol/dm^3 H_2SO_4 and 10 g of powdered $CaCO_3$
D	40 cm^3 of 1.0 mol/dm^3 H_2SO_4 and 10 g of powdered $CaCO_3$	40 cm^3 of 1.0 mol/dm^3 HNO_3 and 10 g of powdered $CaCO_3$

( )