



GREENRIDGE SECONDARY SCHOOL
Mid-year Examination 2008
Pure Chemistry 5072
Paper 1
Secondary Four Express

Date : 6 May 2008

1 h

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Name: _____ ()

Class: **4E1**

Parent's signature & date: _____

INSTRUCTIONS TO CANDIDATES

Do **not** open this booklet until you are told to do so.

Write your name and index number on the answer sheet in the spaces provided.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, A, B, C and D. Choose the one you consider correct and record your choice in soft **2B** pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will **not** be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page **10**.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO

Name of Setter: Mr Victor Lee

This question paper consists of **10** printed pages including this cover page

1. Which particle contains the largest number of electrons?
A Cl^-
B K
C Ca^{2+}
D Mg^{2+}
2. What do both an atom and an ion of the isotope of sodium, ${}_{11}^{24}\text{Na}$, contain?
A 10 electrons
B 12 neutrons
C 11 protons
D 24 neutrons
3. In which of the following sets does all the compounds contain only ionic bonds?
A calcium oxide, magnesium oxide, copper (II) chloride
B calcium oxide, carbon dioxide, magnesium oxide
C ozone, zinc sulphate, sodium chloride
D copper (II) carbonate, ammonium chloride, magnesium oxide
4. A compound **X** contains chlorine and one other element. Which one of the following properties of **X** indicates most clearly that the other element is a metal?
I **X** is a crystalline solid at room temperature.
II **X** does not conduct electricity in solid state.
III **X** conducts electricity in molten state.
IV **X** is almost insoluble in water.
A I and III only
B II and III only
C III and IV only
D I, II and IV only
5. 0.2 dm^3 of gaseous hydrogen contain **k** molecules. How many molecules are there in 100 cm^3 of gaseous methane under the same conditions of temperature and pressure?
A $0.2k$
B $0.1k$
C $0.5k$
D $2k$
6. 20.0 cm^3 of 2.0 mol/dm^3 solution of sodium hydroxide is added to 25.0 cm^3 of 2.0 mol/dm^3 solution of sulphuric acid. What is the pH of the mixture?
A 1
B 5
C 7
D 12

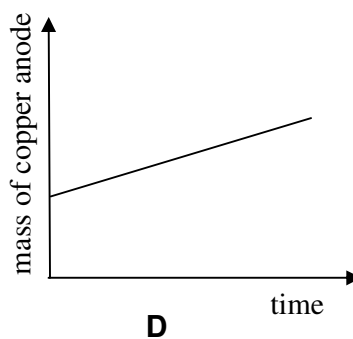
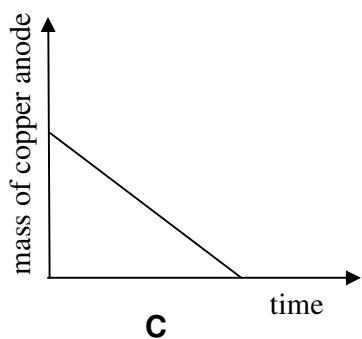
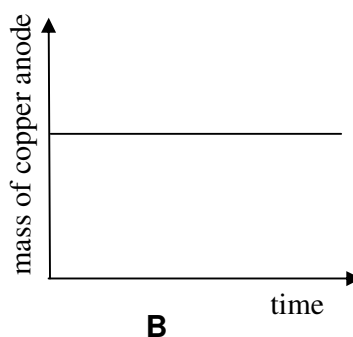
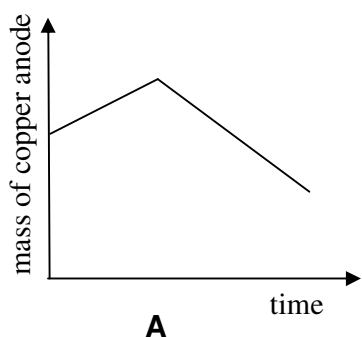
7. 20.0 cm^3 of a gaseous oxide of nitrogen were decomposed completely into 10.0 cm^3 of nitrogen and 20.0 cm^3 of oxygen at the same temperature and pressure. What is the formula of the oxide?
- A N_2O
 - B NO_2
 - C NO
 - D N_2O_2
8. The mass of one mole of a chloride formed by a metal **Y** is 74.5 g. The formula of the chloride could be
- A YCl .
 - B YCl_2 .
 - C Y_2Cl .
 - D Y_2Cl_2 .
9. 24.0 g of anhydrous magnesium sulphate combines with 25.2 g of water to form hydrated magnesium sulphate. What is the formula of the hydrated magnesium sulphate? [$\text{Mr}(\text{MgSO}_4) = 120$]
- A $\text{MgSO}_4 \cdot \text{H}_2\text{O}$
 - B $\text{MgSO}_4 \cdot 3\text{H}_2\text{O}$
 - C $\text{MgSO}_4 \cdot 5\text{H}_2\text{O}$
 - D $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
10. Why are metals good conductors of electricity?
- A They have mobile ions in solid state.
 - B They have mobile delocalized electrons.
 - C They have a stable octet electronic structure.
 - D Their regular layered structure allows electrons to flow easily.
11. Which element is extracted by electrolysis?
- A Carbon
 - B Sodium
 - C Iron
 - D Copper
12. Aluminium is higher up in the reactivity series than iron. However, iron rusts (reacts with air and water) but aluminium does **not**. What is the reason for this?
- A An inert oxide coating formed on aluminium.
 - B Aluminium oxide is amphoteric.
 - C Iron (II) oxide is water soluble.
 - D Iron (III) oxide is a basic oxide.
13. Which metal has the **least** tendency to form positive ions?
- A Aluminium
 - B Sodium
 - C Calcium
 - D Copper

14. A piece of magnesium ribbon does **not** react when put into a solution of hydrogen chloride in methylbenzene, an organic solvent. Which change will cause this reaction to occur?
- A Adding water and stirring.
 - B Adding more methylbenzene.
 - C Stirring the mixture vigorously.
 - D Boiling the mixture.
15. Which statement is true for all acids in aqueous solution?
- A They have pH values greater than 7.
 - B They react with all metals to liberate hydrogen.
 - C They react with any carbonate to liberate carbon dioxide.
 - D They turn moist red litmus paper blue.
16. Which compound neutralises the acidity of soil?
- A Ammonium chloride
 - B Calcium hydroxide
 - C Magnesium sulphate
 - D Potassium nitrate
17. Zinc oxide is amphoteric. Thus, solid zinc oxide
- A is reduced by carbon.
 - B is soluble in water.
 - C reacts with sodium hydroxide to form a salt.
 - D will conduct electricity.
18. To remove an oil stain from a shirt, baking powder was first rubbed onto the stain. The same oil stain was then rubbed with a detergent solution and a pungent smell of ammonia was produced. What substances were likely to be present in the baking powder and detergent respectively to cause this?
- A Sodium chloride and sodium hydroxide
 - B Ammonium carbonate and sodium chloride
 - C Ammonium carbonate and sodium hydroxide
 - D Calcium carbonate and magnesium sulphate
19. When a non-metal atom becomes an ion, it
- A gains electrons and is reduced.
 - B gains protons and is oxidised.
 - C loses electrons and is oxidised.
 - D loses protons and is reduced.
20. In which compound is nitrogen in its lowest oxidation state?
- A N_2O
 - B NO
 - C NO_2
 - D N_2O_2
21. Which element is **not** a reducing agent?
- A Carbon
 - B Fluorine
 - C Hydrogen
 - D Magnesium

22. Aqueous copper(II) sulphate is electrolysed using carbon electrodes. What would you expect to see during electrolysis?

- | | <u>At the cathode (-)</u> | <u>At the anode (+)</u> |
|----------|---------------------------|-------------------------|
| A | colourless gas forms | anode dissolves |
| B | pink solid forms | anode dissolves |
| C | colourless gas forms | pink solid forms |
| D | pink solid forms | colourless gas forms |

23. When a constant current is allowed to pass through aqueous copper(II) sulphate using copper electrodes, electrolysis of copper(II) sulphate takes place. Which of the following graphs correctly shows the mass of the copper anode during the process of electrolysis?



24. Which of the following products are formed respectively at the cathode and the anode during the electrolysis of concentrated aqueous calcium chloride between carbon electrodes?

- | | <u>Anode</u> | <u>Cathode</u> |
|----------|--------------|----------------|
| A | Chlorine | Calcium |
| B | Hydrogen | Oxygen |
| C | Chlorine | Hydrogen |
| D | Oxygen | Hydrogen |

25. During the electrolysis of dilute sodium chloride solution, hydrogen gas is released at the cathode and oxygen gas is released at the anode. Which of the following correctly represents the reactions that take place at both electrodes?

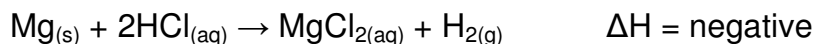
	<u>Cathode</u>	<u>Anode</u>
A	Reduction	Oxidation
B	Oxidation	Reduction
C	Reduction	Reduction
D	Oxidation	Oxidation

26. Which of the following does **not** yield hydrogen at the cathode and oxygen at the anode?

	<u>Electrolyte</u>	<u>Electrodes</u>
I	aqueous copper(II) sulphate	copper
II	aqueous copper(II) sulphate	platinum
III	concentrated sodium chloride solution	graphite

- A I and II only
B II and III only
C I, II and III
D III only

27. The equation below shows the reaction between magnesium and hydrochloric acid.



Which statement(s) about this exothermic reaction is **incorrect**?

- I Magnesium chloride is soluble in water.
II Magnesium is above hydrogen in the reactivity series.
III 24g of magnesium produces 24dm³ of hydrogen gas at r.t.p.
IV The total energy of the products is greater than that of the reactants.
- A I and II only
B II and III only
C I & IV only
D IV only

28. When steam is passed through hot coke, the temperature of the coke drops. What does this tell us about the reaction?

- A Coke is an excellent heat conductor.
B Coke is an oxidising reagent.
C The reaction is endothermic.
D The reaction is exothermic.

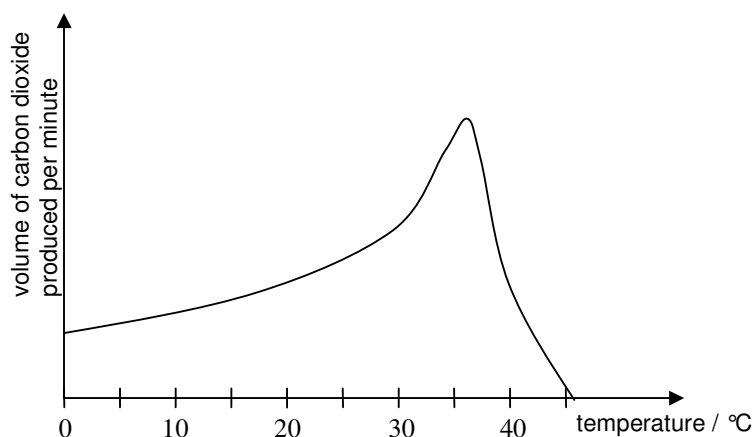
29. Which of the following reactions does **not** involve the release of energy?

- A The mixing of hydrochloric acid and sodium hydroxide.
B The mixing of concentrated sulphuric acid with water.
C Reacting sodium metal with water.
D Thermal decomposition of calcium carbonate to form calcium oxide and carbon dioxide.

30. A teacher would like to show the class the chemical reaction between a solid and an acid. However, the reaction is too explosive for safe use. Which set of changes is most likely to make the reaction safe for the teacher to carry out the demonstration?

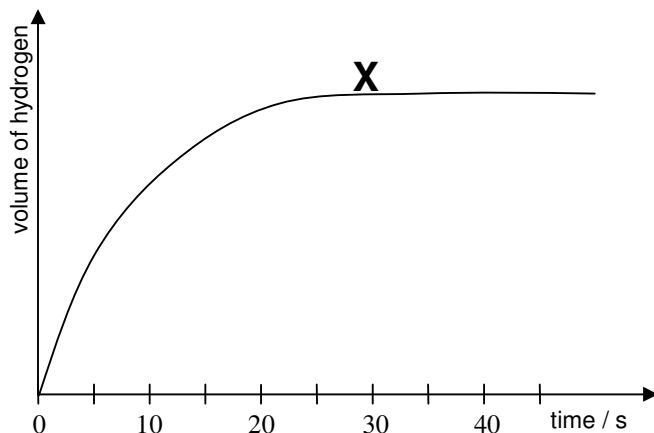
	<u>pieces of solid</u>	<u>acid</u>	<u>temperature</u>
A	larger	less concentrated	lower
B	larger	more concentrated	higher
C	smaller	less concentrated	lower
D	smaller	more concentrated	higher

31. Ethanol is produced by the fermentation of sugar. During the reaction carbon dioxide is given off. The graph shows how the volume of carbon dioxide produced per minute varies with temperature.



With reference to the graph above, which of the following statements is correct?

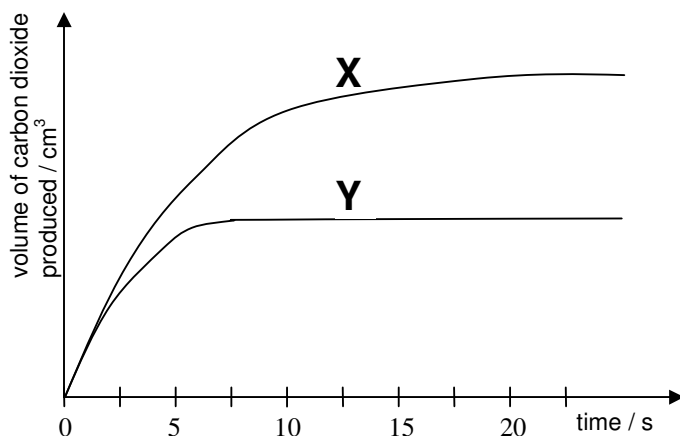
- A** The rate of reaction increases proportionally with temperature.
B The rate of reaction reaches a maximum at about 37°C.
C The reaction is slowest at 0°C.
D The reaction is completed at 46°C.
32. 6.5g of zinc was reacted with 100cm³ of 2.0mol/dm³ dilute sulphuric acid. The graph shows how the volume of hydrogen gas given off changed with time.



Why does the graph become horizontal at **X**?

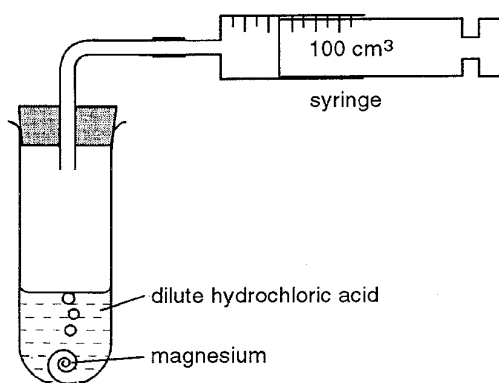
- A** All the sulphuric acid has reacted.
- B** All the zinc has reacted.
- C** Hydrogen is being produced at a constant rate.
- D** The heat produced during the reaction is at its maximum.

33. 20g of powdered sodium carbonate was added to an excess of sulphuric acid at 40°C. The volume of carbon dioxide produced was measured over a period of time. The results are shown in graph **X**. The experiment was repeated and graph **Y** was obtained.



What was changed to obtain the results shown in graph **Y**?

- A** Acid of half the original concentration was used.
 - B** A lower temperature of 20°C was used.
 - C** 12g of powdered sodium carbonate was used.
 - D** 20g of larger crystals of sodium carbonate was used.
34. An excess of hydrochloric acid is added to 6g of magnesium in the apparatus shown below.

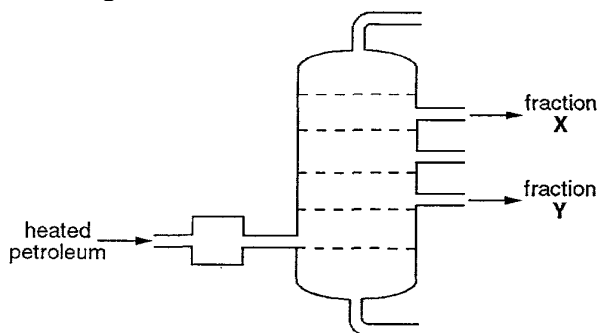


Why is it **impossible** to measure the total volume of hydrogen produced using this apparatus?

- A** Hydrogen is less dense than air.
- B** Hydrogen is soluble in water.
- C** The air in the tube will react with some hydrogen to form water.
- D** The volume of hydrogen formed is greater than 100 cm³.

35. Carbon monoxide is one of the pollutants produced by motor vehicles. In what way is carbon monoxide harmful to us?
- A It chokes the windpipe.
 - B It corrodes lung tissue.
 - C It forms oxyhaemoglobin in the blood.
 - D It forms a stable compound with haemoglobin in the blood.
36. Which gas is the main cause of damage to stonework on buildings?
- A Carbon dioxide
 - B Carbon monoxide
 - C Nitrogen monoxide
 - D Sulphur dioxide
37. Which gas **cannot** be removed from the exhaust gases of a petrol powered car by its catalytic converter?
- A Carbon dioxide
 - B Carbon monoxide
 - C Hydrocarbons
 - D Nitrogen dioxide

38. The diagram below shows the fractional distillation of petroleum.



Which of the followings correctly describes fractions **X** and **Y**?

	<u>X burns more easily than Y</u>	<u>X has a higher boiling point than Y</u>
A	yes	yes
B	no	yes
C	yes	no
D	no	no

39. Carbon dioxide and water are formed from hydrocarbon fuel by
- A reduction.
 - B combustion.
 - C fermentation.
 - D sublimation.
40. Which substance, on combustion, **never** forms soot?
- A Hydrogen
 - B Coal
 - C Diesel oil
 - D High quality petrol

~ The End ~

