



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

Date : 8 May 2008

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Name: \_\_\_\_\_ (       )

Class: **3E1**

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 **11**.

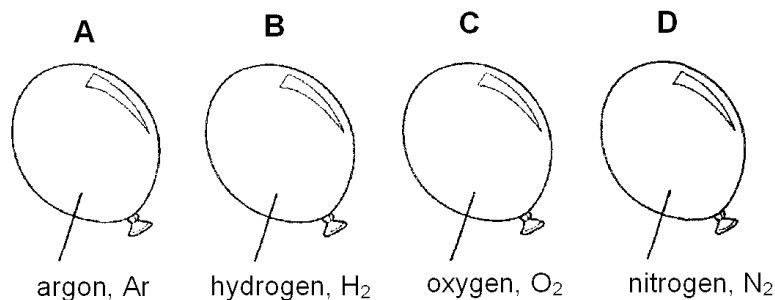
**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO**

*Name of Setter: Mr Victor Lee*

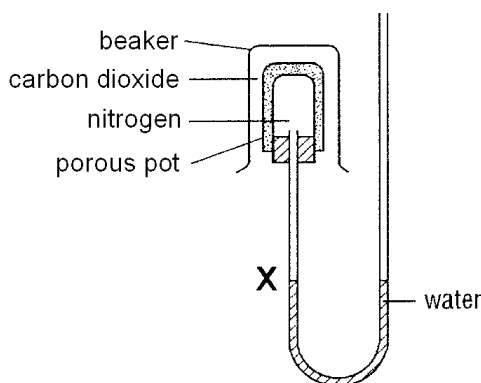
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This question paper consists of **11** printed pages including this cover page

1. An inflated balloon goes down because gas molecules can diffuse through the rubber. Four balloons are filled with different gases to different volume at the same temperature and pressure. After 24 hours, all the balloons have shrunk to the same volume. Which balloon has the smallest original volume?



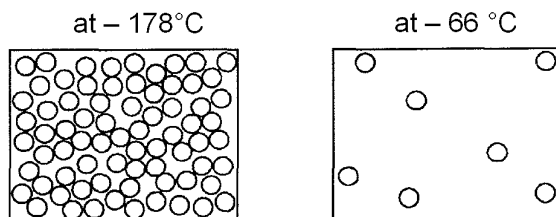
2. A beaker of carbon dioxide was inverted over a porous pot containing nitrogen as shown.



Which of the following statement is true?

- A** The water level at X will drop and then stay at that level.  
**B** The water level at X will drop and then slowly rise back to X again.  
**C** The water level at X will rise and then stay at that level.  
**D** The water level at X will rise and then slowly drop back to X again
3. You are asked to separate a suspension of sand in a solution of sodium chloride and iodine so as to obtain all three substances. To do this, the following processes can be used: dissolving in water, evaporation, filtration and sublimation. In which order should you carry out these operations?
- A** sublimation; dissolving in water; filtration; evaporation  
**B** sublimation; evaporation; dissolving in water; filtration  
**C** evaporation; sublimation; filtration; dissolving in water  
**D** dissolving in water; filtration; evaporation; sublimation
4. Which of the following correctly describes the particles in a dilute sugar solution at room temperature?
- |   |                                    |
|---|------------------------------------|
| <b>sugar molecules</b>                      | <b>water molecules</b>             |
| <b>A</b> widely separated, moving at random | close together, moving at random   |
| <b>B</b> widely separated, not moving       | close together, moving at random   |
| <b>C</b> widely separated, not moving       | close together, not moving         |
| <b>D</b> close together, moving at random   | widely separated, moving at random |

5. The diagrams show the spacing of molecules in a substance at a pressure of 1 atm but at two different temperatures.



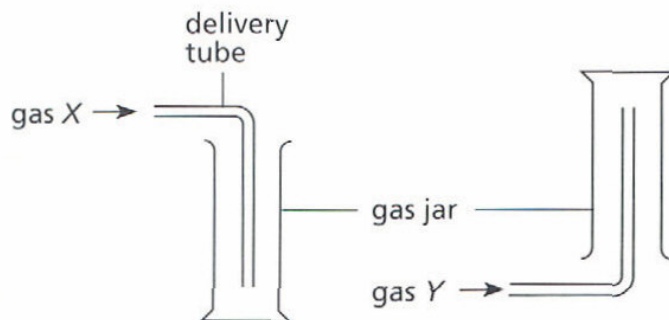
Which substance could the diagram represent?

<b>Substance</b>	<b>melting point / °C</b>	<b>boiling point / °C</b>
<b>A</b>	-120	-50
<b>B</b>	-150	-60
<b>C</b>	-180	-70
<b>D</b>	-190	-80

6. What would a student use to measure exactly 21.5 cm<sup>3</sup> of dilute hydrochloric acid?

- A** Burette
- B** Beaker
- C** Measuring cylinder
- D** Pipette

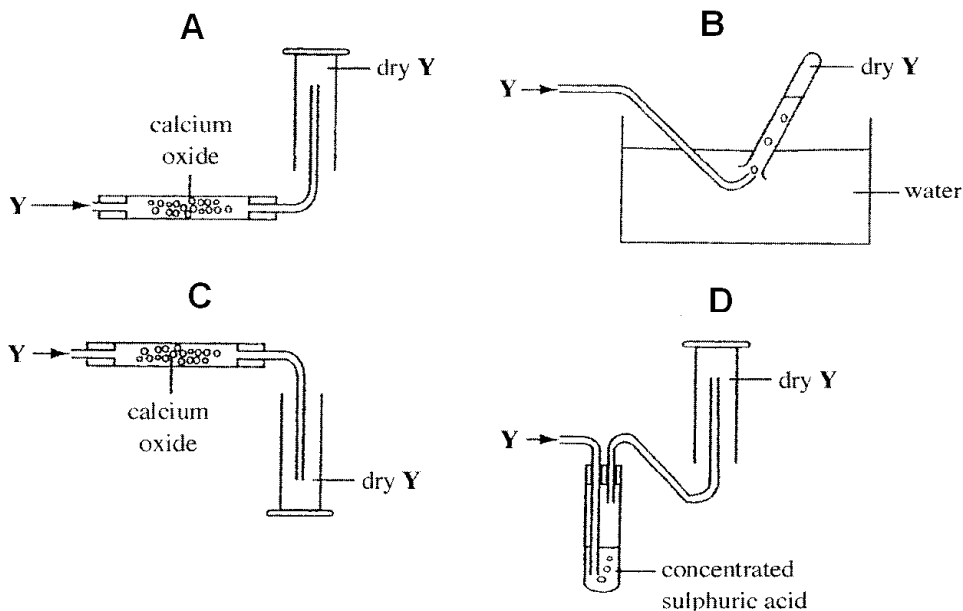
7. Gas **X** and gas **Y** can be collected using the apparatus shown below. What can you infer about **X** and **Y**?



- I Y is less dense than air.
- II Y is slightly soluble in water.
- III X is denser than Y.
- IV Y is less soluble in water than X.

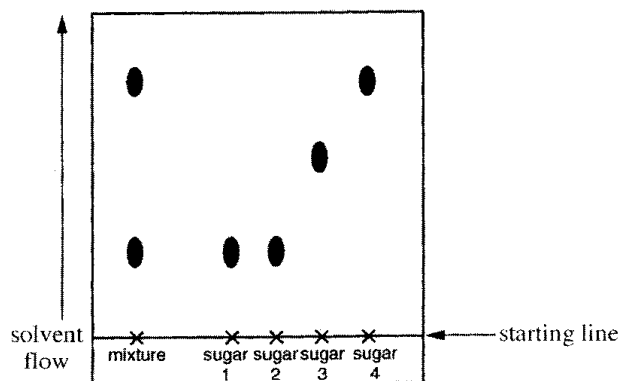
- A** I and II only
- B** I and III only
- C** II and III only
- D** II and IV only

8. A gas **Y**, is less dense than air, very soluble in water and is an alkali. Which method is used to collect a dry sample of the gas?



9. Which one of the following is the best method to separate a solid mixture of ammonium chloride and calcium chloride?
- Filtration
  - Evaporation
  - Sublimation
  - Chromatography
10. Which one of the following would be the most suitable method for separating a mixture of octane (melting point  $-57^{\circ}\text{C}$ , boiling point  $125^{\circ}\text{C}$ ) and undecane (melting point  $-25^{\circ}\text{C}$ , boiling point  $196^{\circ}\text{C}$ )?
- Crystallisation
  - Filtration
  - Evaporation
  - Fractional distillation
11. In order to diagnose illness, urine tests are often performed on patients to detect the presence of amino acids. Which one of the following methods is commonly used to separate and identify amino acids?
- Chromatography
  - Filtration
  - Distillation
  - Crystallisation

12. A mixture of two sugars was compared with four different sugars using chromatography. The results are shown in the diagram.



What can you deduce from the chromatogram?

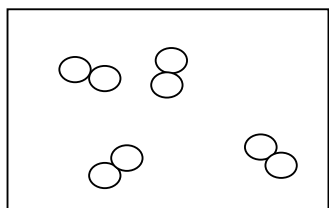
- I The mixture contains only sugar 1 and sugar 4.
  - II The mixture does not contain sugar 3.
  - III Sugar 1 and sugar 2 are identical.
- A** I only  
**B** I and II only.  
**C** II and III only.  
**D** I, II and III.
13. The boiling point of **X** is 148°C and that of **Y** is 150°C. **X** and **Y** are immiscible. How should **X** and **Y** be separated?
- A** Fractional distillation
  - B** Fractional crystallisation
  - C** Filtration
  - D** Using a separating funnel
14. Two dyes labelled **X** and **Y** were known to be present in an ink mixture. Which one of these properties should **X** and **Y** possess in order that they can be separated by chromatography? **X** and **Y** must
- A** have different colours.
  - B** be soluble in the same solvent.
  - C** have different density.
  - D** be volatile liquids.
15. Which one of the following(s) is/are a mixture?
- I Barium
  - II Carbon dioxide
  - III Bronze
  - IV Steel
- A** I and III only  
**B** II and IV only  
**C** I, III and IV only  
**D** III and IV only

16. Which one of the groups listed below consists of mixtures only?

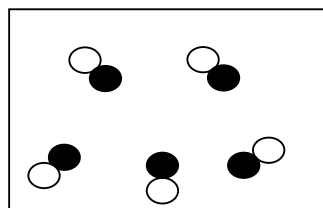
- A Air, petroleum and sea water.
- B Distilled water, dilute hydrochloric acid and ethanol.
- C Potassium chloride, rain water and beer.
- D Sugar, sand and copper

17. The following diagrams below can be used to illustrate the phrases (i) to (iv):

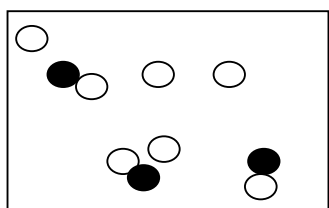
- (i) a mixture of elements and compounds
- (ii) a mixture of elements
- (iii) molecules of an element
- (iv) molecules of a compound



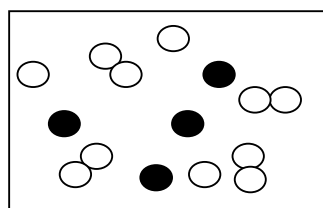
W



X



Y



Z

What is the correct order of the diagrams?

- |   | (i) | (ii) | (iii) | (iv) |
|---|-----|------|-------|------|
| A | W   | X    | Y     | Z    |
| B | X   | W    | Z     | Y    |
| C | Y   | Z    | W     | X    |
| D | Z   | Y    | X     | W    |

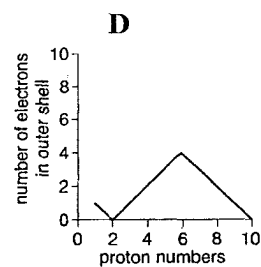
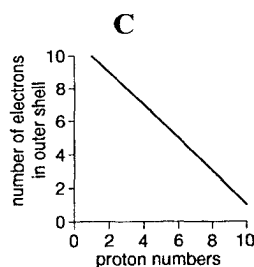
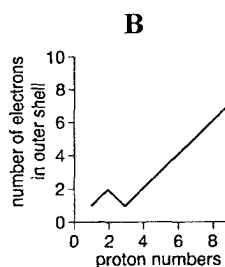
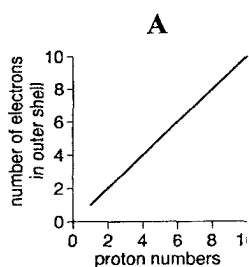
18. Element X reacts with element Y to form an ionic compound  $X_2Y_3$ . What is the electronic configuration of element X?

- A 2.8.1
- B 2.8.2
- C 2.8.3
- D 2.8.4

19. Element X has  $k$  protons and forms ions with a charge of  $-1$ . Element Y has  $(k + 2)$  protons. Element X reacts with element Y to form

- A an ionic compound XY.
- B an ionic compound  $X_2Y$
- C a covalent compound XY
- D a covalent compound  $XY_2$

20. What do both an atom and an ion of the isotope of calcium,  $^{40}_{20}\text{Ca}$ , contain?
- I 20 electrons
  - II 20 neutrons
  - III 20 protons
- A** I and II only  
**B** I and III only  
**C** II and III only  
**D** III only
21. In which of the following sets do all the compounds contain only ionic bonds?
- A** calcium oxide, sulphur dioxide, magnesium oxide
  - B** sodium oxide, magnesium oxide, zinc chloride
  - C** carbon dioxide, copper (II) sulphate, sodium chloride
  - D** copper (II) carbonate, hydrogen chloride, magnesium oxide
22. The ions of  $^{23}_{11}\text{Na}$  and  $^{24}_{12}\text{Mg}$  have the same
- I number of neutrons.
  - II number of electrons.
  - III number of protons.
- A** I and II only  
**B** II and III only  
**C** I and III only  
**D** I, II and III
23. An element **X** of proton number 16 reacts with another element **Y** of proton number 11. What is the formula and type of compound formed?
- |          | <u>Formula</u>   | <u>Type of compound</u> |
|----------|------------------|-------------------------|
| <b>A</b> | XY               | Covalent                |
| <b>B</b> | XY               | Ionic                   |
| <b>C</b> | X <sub>2</sub> Y | Ionic                   |
| <b>D</b> | XY <sub>2</sub>  | Ionic                   |
24. Which one of the following pairs of elements will form a compound by sharing their electrons?
- A** Sodium and bromine
  - B** Zinc and chlorine
  - C** Calcium and oxygen
  - D** Carbon and chlorine
25. Which graph shows the number of electrons in the outer shell of an atom, plotted against the proton (atomic) number for the first ten elements in the Periodic Table?

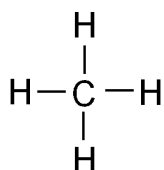


26. Which statement explains why magnesium oxide has a very high melting point?
- A Magnesium atoms and oxygen atoms are held by strong covalent bonds.
  - B Magnesium and oxygen have high melting points.
  - C The magnesium ions are strongly attracted to the oxide ions.
  - D The van der Waals' forces between magnesium and oxygen is very strong.

27. Which of the following, when added to water, makes a solution that is a good conductor of electricity?
- I Calcium carbonate
  - II Sodium
  - III Copper
  - IV Hydrogen chloride gas

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

28. Methane has the structure shown. How many of the electrons in a molecule of methane are **not** involved in bonding?



- A 0
- B 2
- C 4
- D 6

29. Which two statements about a covalent bond are correct?
- I It can be formed between two metal atoms.
  - II It can be formed between two non-metal atoms.
  - III It is formed by the transfer of electrons between atoms.
  - IV It is formed by sharing electrons between atoms.

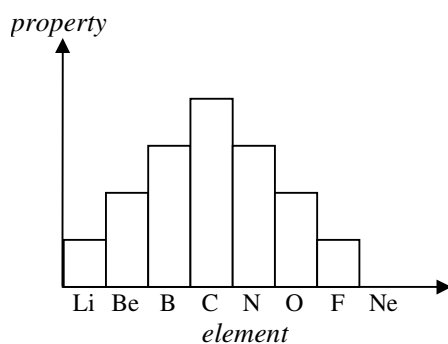
- A I and II only
- B II and III only
- C II and IV only
- D III and IV only

30. The table shows the properties of some substances. Which substance is a covalent compound?

	Melting point /°C	electrical conductivity	
		in solid state	in molten state
A	-38	conducts	conducts
B	-15	does not conduct	does not conduct
C	723	does not conduct	conducts
D	1450	conducts	conducts

31. Which of these liquids are correctly arranged in order of increasing pH?
- A Sodium hydroxide solution, salt water, vinegar
  - B Hydrochloric acid, vinegar, sugar solution
  - C Vinegar, limewater, distilled water.
  - D Sea water, sugar solution, vinegar.
32. Which one of the following properties shows that a certain substance **X** is alkaline?
- A A solution of **X** attacks copper metal.
  - B A solution of **X** tastes sour.
  - C **X** when warmed with ammonium chloride gives off ammonia gas.
  - D **X** reacts with hydrochloric acid to produce hydrogen gas.
33. Which of the following should **not** be used to prepare lead (II) sulphate?
- I lead (II) nitrate and sulphuric acid
  - II lead (II) nitrate and potassium sulphate
  - III lead metal and sulphuric acid
  - IV lead (II) chloride and magnesium sulphate
- A I and II only
  - B III and IV only
  - C I, II and III only
  - D II, III and IV only
34. The pH of an aqueous solution of hydrochloric acid is 1. What will be the pH of the acid after the addition of 20 g of sodium chloride?
- A 1
  - B 4
  - C 7
  - D 14
35. A mixture contains substance **X** and calcium carbonate. When dilute hydrochloric acid was added to the mixture, hydrogen and carbon dioxide were given off. What could substance **X** be?
- A carbon
  - B copper
  - C zinc
  - D calcium oxide

36. The bar chart shows the period of elements from lithium to neon. Which property of these elements is shown on the chart?



- A** The number of electrons used in bonding  
**B** The number of valence electrons  
**C** The (proton) atomic number  
**D** The relative atomic mass
37. Which of the following is a property of aqueous potassium bromide?  
**A** It does not conduct electricity.  
**B** It is decolourised by chlorine.  
**C** It reacts with iodine crystals to form bromine.  
**D** It reacts with aqueous chlorine to form bromine.
38. Which statement about groups in the Periodic Table is correct?  
**A** All groups contain both metals and non-metals.  
**B** Atoms of elements in the same group have the same total number of electrons.  
**C** In Group I, reactivity decreases with increasing proton (atomic) number.  
**D** In Group VII, the melting point of the elements increases with proton (atomic) number.
39. Astatine (At) is in Group VII of the Periodic Table. Which of the following is a property of astatine?  
**A** It forms a basic oxide.  
**B** It is a good conductor of electricity.  
**C** It is a black solid at room temperature.  
**D** It displaces iodine from aqueous potassium iodide.
40. The following statements give information of three elements **X**, **Y** and **Z** which are found in the same group of the Periodic Table.  
 I The reactivity of the three elements in acid decreases in the order **X**, **Y** and **Z**.  
 II The elements form ions with a single positive charge  
 III The elements react vigorously with cold water

Which of the following is **not** correct about these three elements?

- A** The elements are from Group I.  
**B** The elements are from Group VII.  
**C** Oxides of the elements are basic in nature.  
**D** The elements form ionic chlorides.

~ The End ~

# The Periodic Table of the Elements

I		II		Group										III	IV	V	VI	VII	0														
7 Li Lithium 3	9 Be Beryllium 4	23 Na Sodium 11	24 Mg Magnesium 12	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36												
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 47	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	133 Cs Caesium 55	137 Ba Barium 56	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
87 Fr Francium	88 Ra Radium	89 Ac Actinium																															

\* 58 – 71 Lanthanoid series  
+ 90 – 103 Actinoid series

**Key**

a	X
b	

a = relative atomic mass  
X = atomic symbol  
b = proton (atomic) number

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	
232 Th Thorium 90	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.)