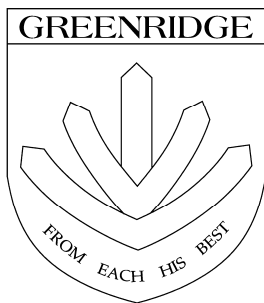


Name : _____ ()

Class : 3E1



Greenridge Secondary School

End-of-Year Examination 2007

Subject : Chemistry (5072)
Secondary Three Express
Paper 2

Date : 3 Oct 2007

Duration : 1 h 45 min

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READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces at the top of this page and on all separate answer paper used.

Write in dark blue or black pen.

You may use a pencil for any diagrams, graphs or rough working.

Section A

Answer **all** questions in the spaces provided.

Section B

Answer **all three** questions.

Write your answers on foolscap papers provided.

At the end of the examination, hand up the foolscap papers separately from the question paper.

The number of marks is given in brackets [] at the end of each question or part question.

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

Parent's Signature & Date

FOR EXAMINER'S USE	
Section A	/50
Section B	/30
Total	/80

Setter : Mr Victor Lee

*This paper consists **10** printed pages, including this page.*

Section A (50 marks)

Answer ALL questions from this Section.

1. The simplified Periodic Table below shows six elements represented by the letters **A, B, C, D, E** and **F**. (The letters are **not** the correct symbols for the elements concerned.)

I	II						III	IV	V	VI	VII	O
		C										
A										E		
								D			F	
	B											

Using only the given letters, give the formulae of the compounds formed between each of the following pairs of elements.

- (a) **A** and **C** _____
- (b) **C** and **D** _____
- (c) **B** and **E** _____
- (d) **B** and **F** _____
- (e) **F** and **F** _____

[5]

2. Complete the following table by filling in the blanks.

[4]

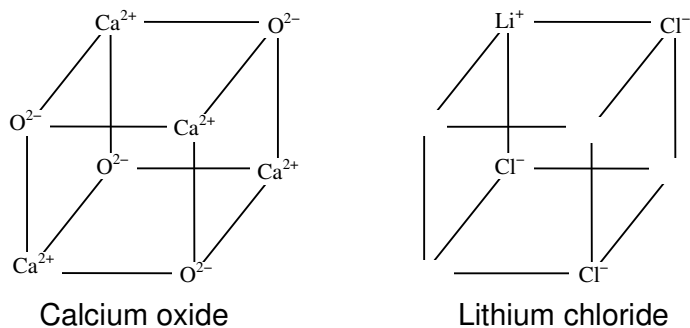
Particle	Mass Number	No. of protons	No. of neutrons	No. of electrons	Electronic configuration
Ca²⁺		20	22		2,8,8
Cl⁻			20	18	
	24	11			2,8,1

3. With reference to the Periodic Table on the last page, give the chemical symbol of a Periodic 3 element which is an _____ [4]

- (a) alkaline earth metal _____
- (b) halogen _____
- (c) noble gas _____
- (d) able to form oxides of the formula EO₂ _____

4. The ionic lattice structure of calcium oxide is shown below.

(a) **Complete** the diagram for the ionic lattice structure of lithium chloride. [1]



(b) Calcium oxide has a melting point of 2572°C while lithium chloride has a melting point of 605°C. Suggest why the melting point of calcium oxide is much higher than that of lithium chloride. [3]

(c) Explain why lithium chloride conducts electricity in molten or aqueous state but does **not** conduct electricity in solid state. [2]

(d) Draw the electronic structure of calcium oxide, showing only outer shell electrons. [3]

5. The table below shows the melting points and boiling points of four gases.

	Chlorine	fluorine	Chlorine monoxide	Sulphur dioxide	Sulphur trioxide
Melting point (°C)	-101	-223	-20	-72	16
Boiling point (°C)	-35	-188	3	-10	45

(a) Which substance would liquefy if placed in melting ice? Explain. **[2]**

(b) What would happen if a sample of chlorine gas was placed in a beaker of ice? Explain. **[2]**

(c) Which substances are solids at -100 °C? **[1]**

(d) Which substance would turn into a solid if it was placed in liquid chlorine?**[1]**

6. Explain by giving a reason to the following statements:

(a) The litmus paper must be moistened with water before using it to test for ammonia. **[2]**

- (b) Addition of aqueous ammonia **cannot** be used to distinguish aluminium ions, Al^{3+} from lead (II) ions, Pb^{2+} . **[2]**

- (c) When testing for a chloride, the solution should be acidified with dilute nitric acid before adding aqueous silver nitrate solution. **[2]**

7. (a) Explain why
(i) aluminium is more durable material than iron for window frames. **[2]**
(hint: durable means it last longer)

- (ii) aluminium is more expensive than iron although aluminium is the most abundant metal in the Earth's crust. **[2]**

- (b) Give **three** factors in which the availability of a metal depends mainly on. **[3]**

(c) Give **two** reasons why metals should be recycled. [2]

8. (a) State **three differences** between ammonia and a mixture of hydrogen and nitrogen. [3]

(b) Ammonia is manufactured by the direct combination of its elements in the Haber Process. The mixture of hydrogen and nitrogen gases are heated to a high temperature in the presence of finely divided iron as a catalyst at a high pressure. The conversion of the gases to ammonia is **not** complete and the ammonia formed is separated from the unreacted gases. The unreacted gases are then re-circulated to the catalyst chamber.

(i) What would be the ratio by volume in which the nitrogen and hydrogen gases are mixed? [1]

$N_2: H_2 = \text{ ______ } : \text{ ______ }$

(ii) State the temperature and pressure used in Haber Process. [2]

Temperature : _____

Pressure : _____

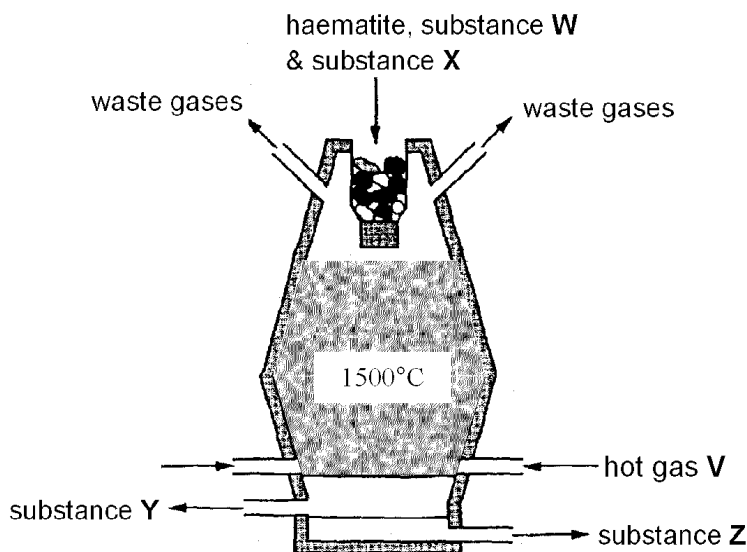
(iii) The conversion of hydrogen and nitrogen to ammonia is **not** complete. Suggest one way of separating the ammonia formed from the rest of the unreacted gases. [1]

Section B (30 marks)

Answer ALL **THREE** questions on foolscap papers provided.
Each question is allocated **TEN** marks

- B9.** (a) Describe what changes you would see (if any), when dilute sulphuric acid reacts with:
- (i) magnesium metal, [2]
 - (ii) copper(II) carbonate, [2]
 - (iii) sodium hydroxide solution, [1]
 - (iv) blue litmus paper. [1]
- (b) Explain clearly how you would obtain pure crystals of copper(II) sulphate from a sample of copper(II) sulphate crystals contaminated with copper(II) oxide. [4]

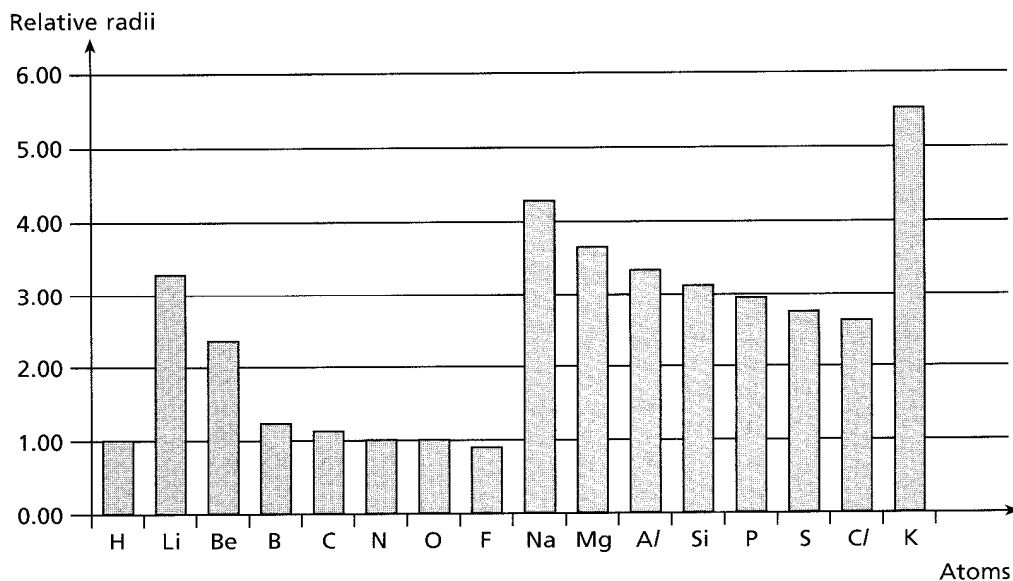
B10. The diagram shows the Blast Furnace.



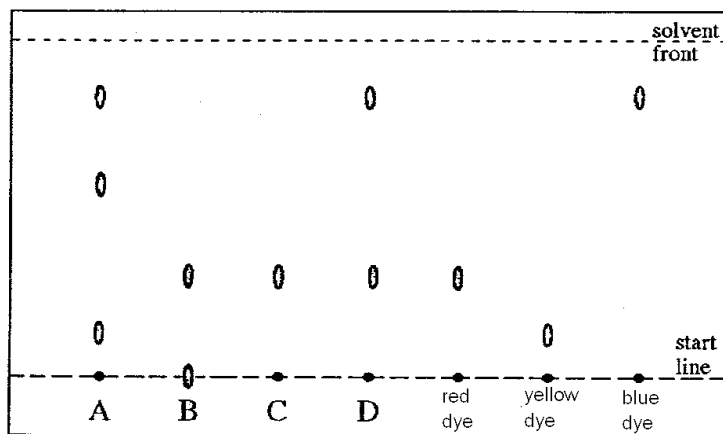
- (a) (i) **W** is a compound while **X** is an element.
Name the substances **W** and **X**. [2]
- (ii) Explain why **W** is added to the Blast Furnace. [1]
- (b) The reduction of haematite to iron occurs at a temperature of 1500°C.
Explain what produces the high temperature of 1500°C. [1]
- (c) (i) Name the gaseous reducing agent in the furnace. [1]
- (ii) Construct an equation for a reaction in which it is produced. [1]
- (d) The iron produced by the Blast Furnace is converted into alloys used in building constructions and car manufacturing industries. Explain what is meant by an alloy. [1]
- (e) Name the hot gas **V**. [1]

- (f) (i) Name the substance **Z** [1]
(ii) Construct an equation for the reaction that produces **Z**. [1]

B11. (a) The bar chart shows the relative radii of atoms compared to the hydrogen atom.

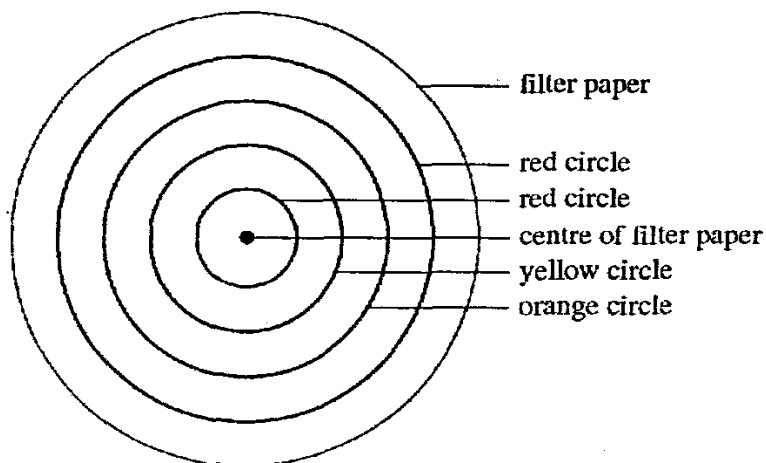


- (i) Explain why the size of potassium atom is much larger than lithium atom. [2]
(ii) Explain why the size of atoms decreases on going across a period. [2]
- (b) The diagram below shows a chromatogram obtained using solutions of three single dyes (red, yellow and blue) and four other solutions (**A**, **B**, **C** and **D**).

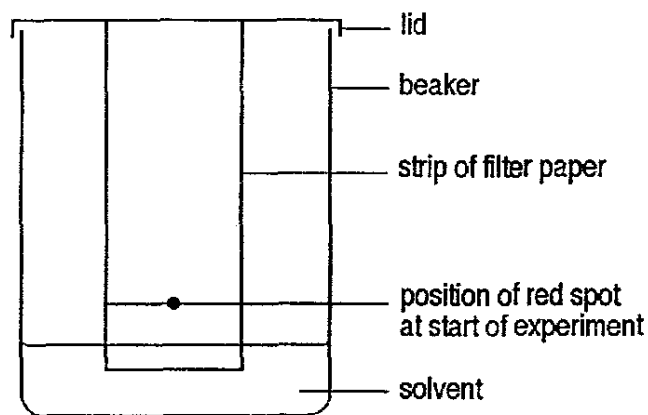


- Which of the solutions, **A**, **B**, **C**, **D** or none contains the following: [3]
- (i) one dye only?
(ii) three of the dyes?
(iii) an unknown dye only?

- (c) Orange dye was commonly used to make orange soft drinks. Two drops of the orange drink were placed at the centre of a circle of filter paper and allowed to dry. Drops of pure solvent were slowly added to the centre of the filter paper. After a time, four coloured circles were seen, as shown in the diagram below.



- (i) How many different dyes are there in the fizzy drink? [1]
- (ii) An alternative set of apparatus for this experiment is shown below. In this case, a strip of filter paper is used and the filter paper is dipped into a solvent.



Draw and label a chromatogram to show the results you would expect if this was set up and left until the solvent reached nearly to the top of the filter paper. [2]

~ The End ~

The Periodic Table of the Elements

Group		I	II	III	IV	V	VI	VII	0
		1 H Hydrogen							4 He Helium
7 Li Lithium 3	9 Be Beryllium 4								
23 Na Sodium 11	24 Mg Magnesium 12								19 F Fluorine 9
39 K Potassium 19	40 Ca Calcium 20								16 O Oxygen 8
85 Rb Rubidium 37	88 Sr Strontium 38								32 S Sulphur 16
133 Cs Caesium 55	137 Ba Barium 56								35.5 Cl Chlorine 17
									40 Ar Argon 18
									79 Se Selenium 34
									80 Br Bromine 35
									127 I Iodine 53
									131 Xe Xenon 54
									207 Pb Lead 82
									209 Bi Bismuth 83
									210 Po Polonium 84
									212 At Astatine 85
									210 Rn Radon 86

11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 N Nitrogen 7	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18
27 Al Aluminium 13	28 Si Silicon 14	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34
49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	55 Cs Caesium 55	56 Ba Barium 56
81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Fr Francium 87	88 Ra Radium 88
101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	104 Rf Rutherfordium 104	105 Db Dubnium 105	106 Sg Seaborgium 106	107 Bh Bohrium 107	108 Hs Hassium 108
109 Mt Meitnerium 109	110 Ds Darmstadtium 110	111 Rg Roentgenium 111	112 Cn Copernicium 112	113 Nh Nihonium 113	114 Fl Flerovium 114	115 Mc Moscovium 115	116 Lv Livermorium 116
117 Ts Tennessine 117	118 Og Oganesson 118	119 Uue Ununennium 119	120 Uuo Unbinilium 120	121 Uuq Untrium 121	122 Uuq Unquadrium 122	123 Uuq Unquadium 123	124 Uuq Unquadium 124

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

Key

a	X
b	b

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.)