



**GREENRIDGE SECONDARY SCHOOL**  
**2006 Mid-year Exam**  
**Pure Chemistry 5068**  
**Paper 2**  
**Secondary Three Express**

Date : 10 May 2006

1 h 45 min

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Name: \_\_\_\_\_ ( )

Class: 3E1

Parent's signature & date: \_\_\_\_\_

**INSTRUCTIONS TO CANDIDATES**

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

**Section A**

Answer all questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer **any three** questions.

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

**INFORMATION FOR CANDIDATES**

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 9.

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

*Name of Setter: Mr Victor Lee*

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

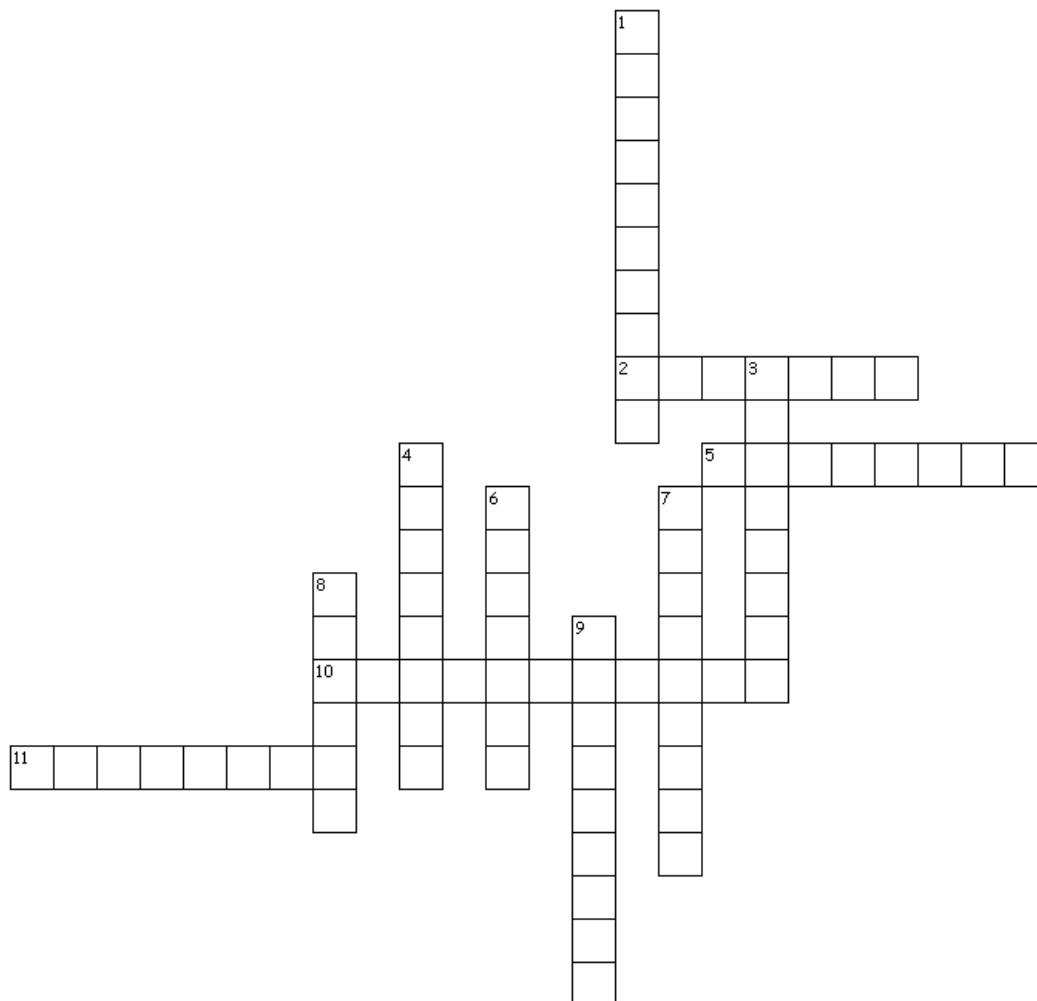
This question paper consists of **9** printed pages including this cover page

## Section A [50 marks]

Answer ALL questions in the spaces provided in question paper.

1. Use the following clues to complete the crossword.

[11]



### Across

2. An \_\_\_\_\_ is a pure substance that cannot be split up into two or more simpler substances by physical or chemical processes.
5. \_\_\_\_\_ are atoms of the same element with the same number of protons but different number of neutrons.
10. Rate of diffusion of a substance depends on its relative molecular mass and \_\_\_\_\_.
11. Liquids which evaporate quickly at low temperatures are called \_\_\_\_\_ liquids.

### Down

1. \_\_\_\_\_ are different forms of the same element.
3. Ethanol and water mix together completely to form a single solution. They are said to be \_\_\_\_\_.
4. Molecules formed by the combination of two atoms are called \_\_\_\_\_ molecules.
6. The number of protons and neutrons in an atom is called its \_\_\_\_\_ number.
7. \_\_\_\_\_ is the movement of particles from a region of higher concentration to a region of lower concentration.
8. \_\_\_\_\_ is defined as anything that occupies space and has mass.
9. A \_\_\_\_\_ solution is a solution that contains the maximum amount of solute at a given temperature.



4. State whether each of the following statements is either **TRUE** or **FALSE**

***Give a reason to justify your answer.***

(a) Hydrogen chloride is an ionic compound that dissolves in water to form hydrochloric acid. [2]

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(b) Helium is inert as the outermost electron shell of each atom contains an octet of electrons. [2]

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(c) Carbon dioxide gas has a very low melting and boiling point because it has very weak covalent bonds between its molecules. [2]

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(d) Copper (II) chloride is a good conductor only in aqueous or molten state because the copper metal is a good conductor of electricity. [2]

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5. (a) Give the formula of the ion which is produced in aqueous solution by alkali. [1]

\_\_\_\_\_

(b) Write the ionic equation, **including state symbols**, for the reaction between an acid and an alkali. [2]

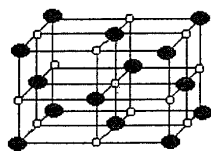
\_\_\_\_\_

(c) Name a salt which is prepared by precipitation and name a pair of reactants needed for this preparation. [3]

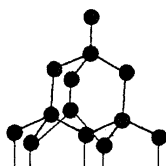
Name of salt : \_\_\_\_\_

Reactants : \_\_\_\_\_ and \_\_\_\_\_

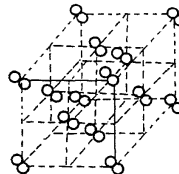
6. The diagram below shows the structure of three solids **A**, **B** and **C**.



**A**



**B**



**C**

(a) Name a substance, which has the same structure as

**A**: \_\_\_\_\_

**B**: \_\_\_\_\_

**C**: \_\_\_\_\_

[1.5]

(b) Name the type of particles (atoms, ions, molecules) present in the lattice of each of the following:

**A**: \_\_\_\_\_

**B**: \_\_\_\_\_

**C**: \_\_\_\_\_

[1.5]

(c) The melting point of **B** is very much larger than **C**. Explain, in terms of structure and bonding, why there is a large difference in melting point. [3]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Write the balanced chemical equations for the following reactions. **[4]**

(a) sodium hydroxide + sulphuric acid  $\rightarrow$  sodium sulphate + water

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(b) zinc carbonate + hydrochloric acid  $\rightarrow$  zinc chloride + water + carbon dioxide

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8. Fluorine, chlorine, bromine and iodine are elements from group VII.

(a) Why does reactivity decrease down the Group VII? **[2]**

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(b) Why does the melting and boiling point increase down the Group VII? **[3]**

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(ii) Give the number of protons and neutrons found in an atom of uranium-238. [2]

(c) The table below gives the number of protons, neutrons and electrons in particles V, W, X, Y and Z.

Particles	V	W	X	Y	Z
Protons	19	9	1	20	18
Neutrons	20	10	0	20	18
electrons	18	10	0	18	18

- (i) Which particle carries positive charges?  
(ii) Which particle carries negative charges?  
(iii) Which particles combine together to give ionic solids?  
(iv) Which particle represents the atom of a noble gas? [4]

**B4** You are given a solid mixture that contain 50g sample of potassium nitrate and 5g of sodium chloride. Both are soluble in water.

(a) Describe and explain the steps you would take to obtain at least 20g of solid crystals of potassium nitrate. You have been advised by your teacher to use a method called fractional crystallization. The below resources have been made available to you.

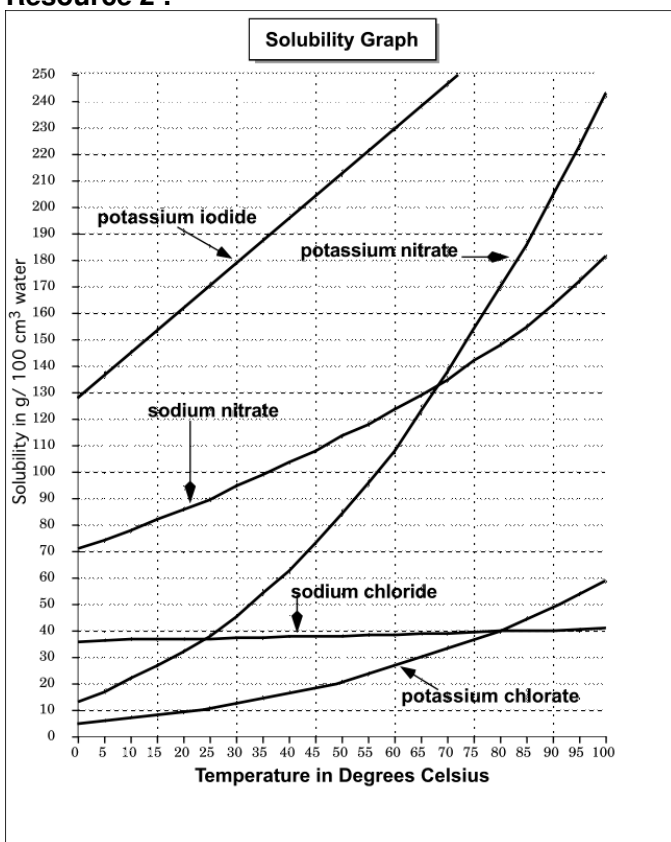
[7]

(b) Explain why it is **impossible** to obtain 50g of potassium nitrate. [3]

#### Resource 1 :

“In chemistry, fractional crystallization is a method of refining substances based on differences in solubility. If two or more substances are dissolved in a solvent, they will crystallize out of solution (precipitate) at different rates. Crystallization can be induced by changes in concentration, temperature or other means. Fractional crystallization can be used for purification or analysis.”  
(Quoted from From Wikipedia, the free encyclopedia at [http://en.wikipedia.org/wiki/Fractional\\_crystallisation](http://en.wikipedia.org/wiki/Fractional_crystallisation))

#### Resource 2 :



Source : <http://www.thesciencedesk.com/SolubilityGraph.html>

The Periodic Table of the Elements

		Group																																																																																													
I	II	III	IV	V	VI	VII	0																																																																																								
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 K Potassium 19	20 Ca Calcium 20	21 Sc Scandium 21	22 Ti Titanium 22	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Zr Zirconium 40	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	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	57 La Lanthanum 57	58 Ce Cerium 58	59 Pr Praseodymium 59	60 Nd Neodymium 60	61 Pm Promethium 61	62 Sm Samarium 62	63 Eu Europium 63	64 Gd Gadolinium 64	65 Tb Terbium 65	66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	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	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103

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

Key

a	X
b	

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

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