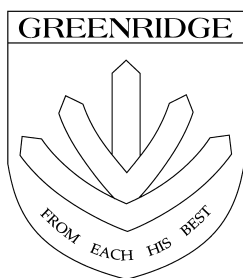


Name : \_\_\_\_\_ (    )

Class : \_\_\_\_\_



# GreenRidge Secondary School

## Mid-Year Examination 2002 Paper 3

**Subject : Science(Chemistry) [5142]  
Secondary Five Normal Academic**

Date : 14 May 2002

Duration : 1 h15 mins

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### INSTRUCTIONS TO CANDIDATES

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

#### **Section A**

Answer ***all*** questions.

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

#### **Section B**

Answer any ***two*** questions.

Write your answers on the separate answer paper provided.

At the end of the examination, fasten all separate answer papers securely to 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.

FOR EXAMINER'S USE	
<b>Section A</b>	<b>/45</b>
<b>Section B</b>	<b>/20</b>
<b>Total</b>	<b>/65</b>

*This paper consists 9 printed pages, including this page.*

### Section A [45 marks]

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

- A1. By referring to the first 20 elements in the Periodic Table, name [8]
- (a) the most reactive metal. \_\_\_\_\_
  - (b) an element that exists as individual atoms. \_\_\_\_\_
  - (c) two elements that combine together to form a covalent compound that is a solid at room temperature. \_\_\_\_\_
  - (d) an element that forms a neutral oxide of formula, XO. \_\_\_\_\_
  - (e) an element that forms a protective inert oxide layer. \_\_\_\_\_
  - (f) an element that reacts readily with cold water and forms an ion with charge 2+. \_\_\_\_\_
  - (g) the most reactive non-metal. \_\_\_\_\_
  - (h) an element that exists as diatomic molecules and burns readily \_\_\_\_\_

- A2. The incomplete table below describes the properties of three liquids. [3]
- (a) Complete the table.

Liquid	pH	colour with Universal Indicator paper
sulphuric acid	1	
water		Green
aqueous sodium hydroxide		Violet

- (b) Explain briefly, using your knowledge of ions in solutions, the differences in pH of the three liquids in the table above. [3]

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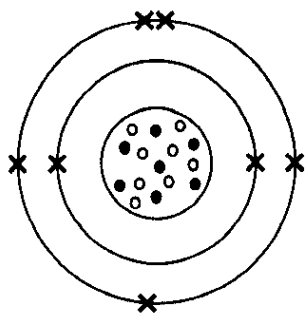
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A3. The diagram below shows the atomic structure of element X.



(a) (i) What is the proton number of X? [1]

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(ii) What is the nucleon number of X? [1]

---

(iii) What is the electron configuration of X? [1]

---

(iv) In which group of the Periodic Table does element X belong? Explain [2]

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(b) Is element X a metal or non-metal? Explain your answer. [2]

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---

(c) Draw a 'dot and cross' diagram to show all electrons in a molecule formed between X and chlorine. [2]

A4. (a) What is meant by a catalyst? [1]

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(b) Name a catalyst used for each of the following conversions.

(i) nitrogen to ammonia [1]

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(ii) hydrogen peroxide to oxygen [1]

---

(iii) ethene to ethane [1]

---

(iv) ethene to ethanol [1]

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(c) State **three** other factors that can increase the speed of a chemical reaction, involving a solid and a solution as reactants. [3]

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A5. (a) Organic compounds can be placed in homologous series.  
State **two** characteristics common to all members of the same homologous series. [2]

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(b) The structures of six organic compounds are shown below:

$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ <p><b>A</b></p>	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \quad   \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad   \quad   \\ \quad \quad \quad \text{H} \quad \text{H} \end{array}$ <p><b>E</b></p>
$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad \quad   \quad   \\ \text{H} \quad \quad \quad \text{H} \\   \\ \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$ <p><b>B</b></p>	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\   \quad   \quad    \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad \quad   \\ \text{H} \quad \quad \quad \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$ <p><b>F</b></p>
$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{Br} \quad \text{Br} \end{array}$ <p><b>C</b></p>	$\begin{array}{c} \text{H} \quad \text{O} \\   \quad    \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\   \\ \text{H} \end{array}$ <p><b>G</b></p>
$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{OH} \end{array}$ <p><b>D</b></p>	$\begin{array}{c} \text{H} \quad \text{O} \quad \quad \text{H} \quad \text{H} \\   \quad    \quad \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{H} \\   \quad \quad \quad   \quad   \\ \text{H} \quad \quad \quad \text{H} \quad \text{H} \end{array}$ <p><b>H</b></p>

Use one or more letters to answer each of the following questions.

Which of the compounds

(i) is an alcohol? [1]

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(ii) is unsaturated? [1]

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(iii) are members of the same homologous series? [1]

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(iv) react to produce a sweet-smelling compound? [1]

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(v) is a product of addition reaction? [1]

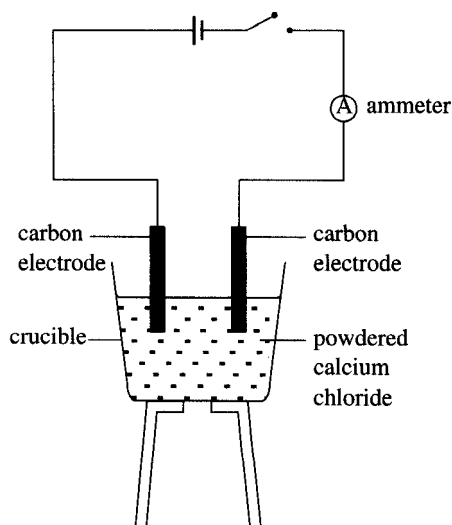
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## Section B [20 marks]

Answer **two** questions. Write your answers on the foolscap papers provided.  
Attach the foolscap to the question paper.

B7. The apparatus below is used to determine the electrical conductivity of calcium chloride.



- (a) Give the formula of calcium chloride. [1]
- (b) Give the formula of the particles in calcium chloride. [2]
- (c) What type of bond holds these particles together in calcium chloride? [1]
- (d) (i) When powdered calcium chloride was used in the experiment *without* heating, the ammeter did *not* register any reading. Briefly explain this observation. [2]
- (ii) What steps must be taken to make the calcium chloride conduct electricity? [2]
- (e) Give **two** physical properties of calcium chloride. [2]
- B8. (a) Sodium phosphate is the sodium salt of phosphoric acid,  $\text{H}_3\text{PO}_4$
- (i) What is the formula of sodium phosphate? [1]
- (ii) Give the formula of the ions present in sodium phosphate. [2]
- (b) (i) Name an alkali which reacts with phosphoric acid to give sodium phosphate. [1]
- (ii) Write a balanced equation for the reaction involving phosphoric acid and the alkali named in b(i). [1]
- (c) (i) Name a carbonate which reacts with phosphoric acid to give sodium phosphate. [1]
- (ii) Write a balanced equation for the reaction involving phosphoric acid and the carbonate named in c(i). [1]
- (d) Give **two** reasons why sodium phosphate can be used as a fertiliser. [2]
- (e) What problems may arise from the excessive use of sodium phosphate as a fertiliser? [1]

- B9. (a) Name a fuel from crude oil (petroleum) and describe how it is separated from crude oil. [3]
- (b) Suggest why sulphur and its compounds must be removed from all fuels. Write a full chemical equation to support your suggestion. [2]
- (c) A hydrocarbon **P** has the formula  $C_nH_{2n}$ . When 0.010 mole of **P** was completely burnt in excess oxygen,  $480\text{ cm}^3$  of carbon dioxide was produced at room temperature and pressure. [One mole of gas occupies  $24000\text{ cm}^3$  at room temperature and pressure.]
- (i) Calculate the number of moles of carbon dioxide produced. [1]
- (ii) How many moles of carbon dioxide will be produced from burning one mole of **P**? [2]
- (iii) Determine the value of  $n$ . [1]
- (iv) What is the molecular formula of **P**? [1]

# The Periodic Table of the Elements

Group																								
I	II										III	IV	V	VI	VII	0								
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10							
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18							
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 27	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	127 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54								
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	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											98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium						
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