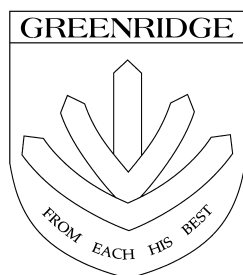


Name : _____ () Class : _____



GreenRidge Secondary School

PRELIMINARY EXAMINATION 2001

Subject : Science(Chemistry) (5133)
Secondary Four Normal (Academic)
Paper 4

Date : 11 Sep 2001

Duration : 1 h 15 min for
Paper 3 and 4 together

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INSTRUCTIONS TO CANDIDATES

Write your name, index number and class in the spaces at the top of this page.

Write your answers in the spaces provided on the question paper for all questions.

All essential working must be shown.

HAND UP QUESTION PAPER ONLY.

Section A

Answer **all** questions.

Section B

Answer **any 2** questions.

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 8.

FOR EXAMINER'S USE		
Section A		/14
Section B		/8
		/8
Total		/30

This paper consists of 8 printed pages, including this page.

Section A [14 marks]

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

1. The following are four particles:

proton **electron** **neutron** **atom**

Which of the particles listed above

- (a) has a relative mass of $\frac{1}{1840}$? _____
- (b) has a positive charge ? _____
- (c) is found outside the nucleus ? _____
- (d) is found in the nucleus of an atom, and does not have a charge ? _____ [2]

- 2.

Hydrogen Carbon dioxide Sulphur dioxide Methane
Nitrogen Carbon monoxide Argon Oxygen

Answer the following questions using only the above list of gases. You may use each item more than once, or not at all.

- (a) Name **FOUR** substances which are present in “clean air”. [2]

- (b) Name the poisonous gas found in motorcar exhaust fumes. [1]

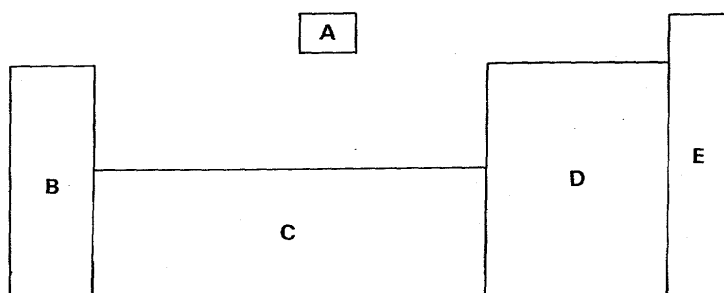
- (c) Name the **TWO** gases that react with each other to produce a single compound. [1]

3. Complete the table below. [2]

Name of compound	Molecular Formula	Structural Formula
		$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$
Propene	C_3H_6	
Propanol		$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C} & -\text{C} & -\text{C}-\text{O}-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$

4. The following shows an outline of the Periodic Table.

[2]



Which section of the table, **A, B, C, D or E**, contains

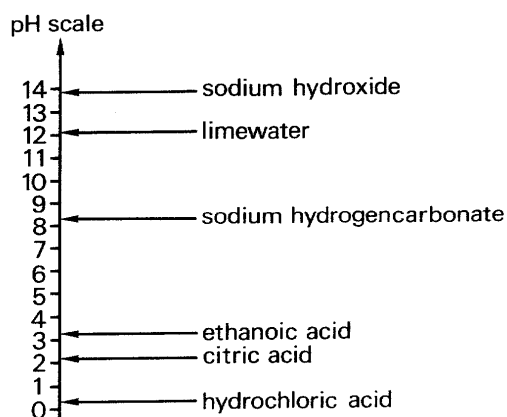
(a) metals that react readily with water?

(b) metals that can be used as catalysts?

(c) very unreactive elements that exists as monoatomic particles?

(d) both metallic and non-metallic elements?

5. The following chart shows the pH values of some aqueous solutions.



(a) The most acidic solution is _____

[1]

(b) The most alkaline solution is _____

[1]

(c) On the above scale, show by means of a **labelled arrow** the pH of pure water

[1]

(d) When 20cm^3 of sodium hydroxide is added to 20cm^3 of hydrochloric acid (*both are of the same concentration*), what would be the expected pH value of the mixture? [1]

Section B [16 marks]

Answer **any two** of the questions in the spaces provided.

1. In answering this question you may wish to use the Periodic Table on the back page.

(a) (i) In which period of the Periodic Table is Potassium? [1]

(ii) What is the electronic configuration of potassium? [1]

(iii) Write the formula for the potassium ion. [1]

(iv) Which **element** has the same electronic structure as that of the potassium ion? [1]

(b) Another element with proton number of 17 combines with potassium to form a white coloured solid.

(i) What is the name of the white coloured solid? [1]

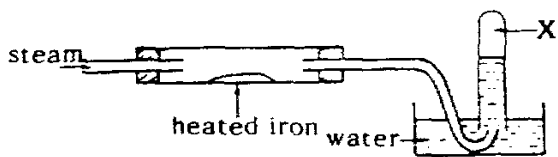
(ii) Is the white coloured solid an ionic or covalent compound? [1]

(iii) Explain how you come to your conclusion to (b)(ii). [1]

(c) Draw a 'dot and cross' diagram to show the bonding structure of the compound in (b).

[1]

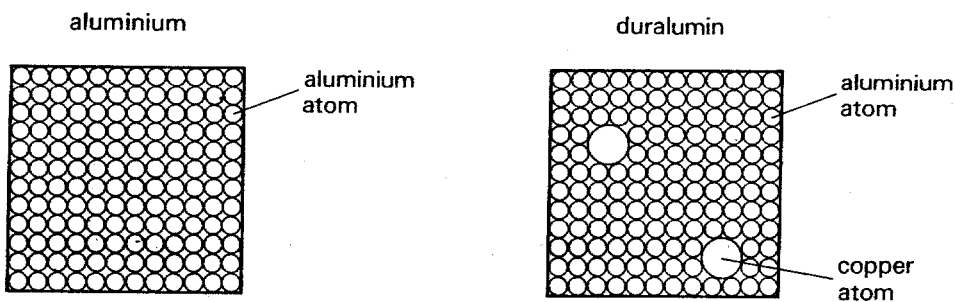
2. (a) The diagram shows steam being passed over heated iron.



(i) Name the gas X. [1]

(ii) Give a test to identify gas X. [1]

(b) The diagrams show the structures of pure aluminium metal and one of its alloys, duralumin, which contains copper.



Explain how the addition of copper makes the alloy stronger than the pure metal.

[1]

(c) Iron is extracted from haematite, iron(III) oxide, in the blast furnace. The materials used in the blast furnace are haematite, limestone, solid X and gas Y. The solids are put into the top of the furnace and the gas is forced into the furnace near the bottom.

(i) Write the chemical formula of haematite. [1]

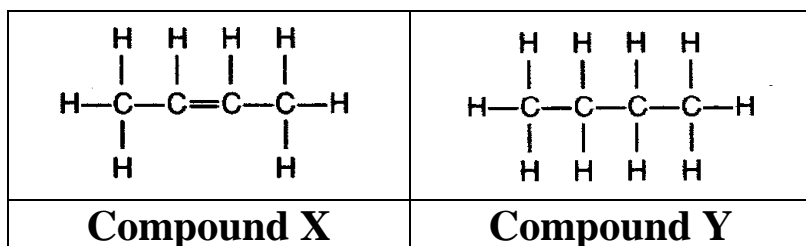
(ii) Name solid X. [1]

(iii) Name gas Y. [1]

(iv) Write the equation for the reaction between gas Y and solid X that produces heat in the furnace. [1]

(d) Mild steel is an alloy of iron containing a non-metallic element Z.
Name element Z. [1]

3. The structure of molecules of compound X and Y are shown below.



(a) Name compound X. [1]

(b) To which homologous series does compound X belong? [1]

(c) Compound X undergoes a reaction to become compound Y.
Name the type of chemical reaction. [1]

(d) Describe a chemical test that you could carry out to distinguish between compound X and compound Y. [3]

Test :

Result with Compound X : _____

Result with Compound Y : _____

(e) When compound X is incompletely burnt in air, the products are water and carbon monoxide. Write a **balanced** equation for **this incomplete** combustion. [1]

(f) Compound X can undergo another reaction with compound Z to give butanol. [1]
Name compound Z.

~ The End ~

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	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	
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 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 47	
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	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	
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89								201 Hg Mercury 80
				70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	
				115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	
				204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	

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

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	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	232 Pa Protactinium 91	238 U Uranium 92	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

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 dm³ at room temperature and pressure (r.t.p.)