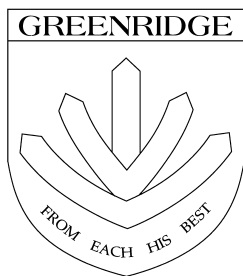


Name : _____ () Class : 4E1



GreenRidge Secondary School

Preliminary Examination 2001

Subject : Chemistry (5069)
Secondary Four Express
Paper 1

Date : 25 Sep 2001

Duration : 1 h

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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 the OMR sheet.

HAND UP OMR SHEET and QUESTION PAPER *SEPARATELY*.
DO NOT STAPLE THEM TOGETHER.

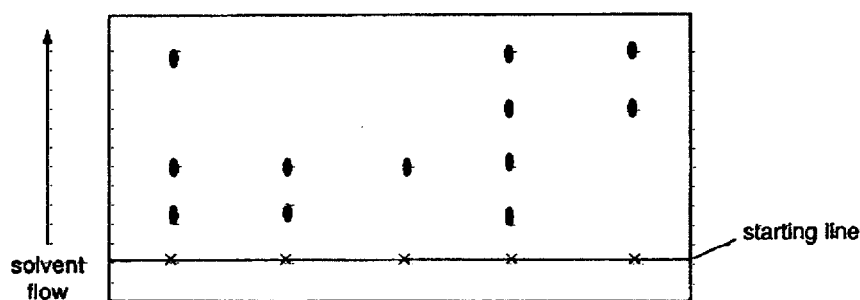
There are **40** questions in this section. Answer **all** questions.
Choose the one you consider correct and record your choice in soft 2B pencil on the OMR sheet.

INFORMATION FOR CANDIDATES

Each correct answer is awarded 1 mark.
A copy of the Periodic Table is printed on page 14.

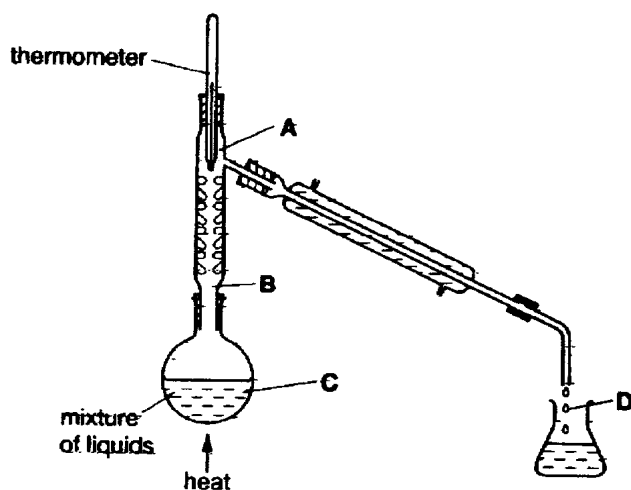
This paper consists of 14 printed pages, including this page.

1. The diagram shows a chromatogram which was prepared using spots of five different inks.

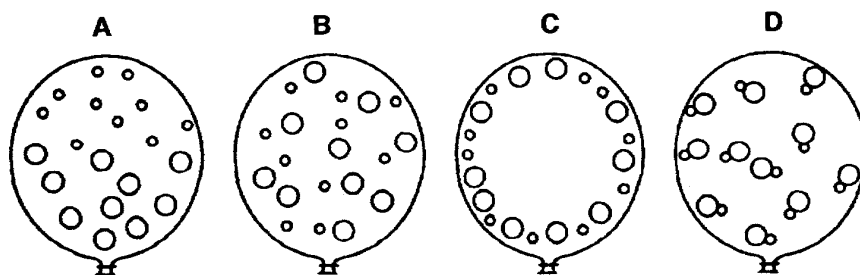


How many different dyes were used to make the five inks?

- A. 3
B. 4
C. 5
D. 12
2. Equal volumes of two liquids that mix completely but do **not** react together are placed in the apparatus shown. The mixture is heated. When the thermometer first shows a steady reading, at which point will there be the highest proportion of the liquid with the higher boiling point?



3. Which diagram shows the arrangement of particles inside a balloon filled with a mixture of neon and argon?



4. Which of the following is likely to be a pure compound?
- A. a white powder which dissolves in water
 - B. green crystals which melt at 50°C
 - C. blue crystals which melt over the range 55°C to 60°C
 - D. a white solid which dissolves in water to give a blue solution.
5. What method could be used to obtain zinc from a mixture of zinc powder and sodium chloride?
- A. Add excess water, and heat to evaporate the mixture to dryness.
 - B. Add excess aqueous ammonia, stir and filter the precipitate.
 - C. Add excess water to the mixture, stir and filter.
 - D. Add excess hydrochloric acid to the mixture, warm and filter.
6. Atoms undergo chemical reactions to form chemical bonds because
- A. ionic bonds are strong and not easily broken.
 - B. unbonded atoms have lesser energy and thus are unstable.
 - C. energy is absorbed when bonds are formed.
 - D. energy is lower when two atoms are bonded than when they are unbonded.

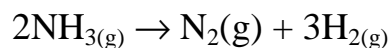
7. Silicon and carbon are both from Group IV in the Periodic Table. Silicon dioxide is a solid at room temperature while carbon dioxide is a gas. The reason for this difference in state at room temperature is that
- A. the covalent bonds in carbon dioxide are weaker than the covalent bonds in silicon dioxide.
 - B. the intermolecular forces present in silicon dioxide are stronger than those present in carbon dioxide.
 - C. the intermolecular forces present in carbon dioxide are weaker than the covalent bonds present in silicon dioxide.
 - D. the ionic bonds present in silicon dioxide are stronger than the covalent bonds present in carbon dioxide.
8. Which solid **does not** contain covalent bonds?
- A. copper (II) carbonate
 - B. copper (II) nitrate
 - C. copper (II) oxide
 - D. copper (II) sulphate
9. If element P has a atomic number of 9 and element Q has a proton number of 1, a chemical reaction between P and Q will form
- A. an ionic compound with the formula, PQ
 - B. a covalent compound with the formula, QP
 - C. an ionic compound with the formula, P₂Q
 - D. a covalent compound with the formula, Q₂P
10. Refer to the elements in the third period of the Periodic Table. Which of the following increases across the period from left to right?
- A. Melting point
 - B. Metallic character
 - C. Number of electron shells
 - D. Number of valence electrons

11. An element Y is in the same group as sulphur in the Periodic Table. Which one of the following gives a list of the possible formulae of some compounds of Y?
- A. H_2Y , YO_3 , KYO_3 , K_2YO_4
 - B. H_2Y_2 , YO , K_2YO_2 , KYO_4
 - C. HY , YO_2 , YO_4 , K_2YO_4
 - D. H_2Y , YO_2 , YO_3 , K_2YO_4

12. Which set of properties given below is likely to be that of a transition metal?

	Density	Melting point	Colour of ions in aqueous solution
A.	high	high	pink
B.	high	low	yellow
C.	low	high	green
D.	high	high	colourless

13. Ammonia gas decomposed according to the equation below.

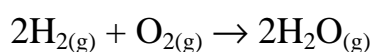


Which volume of hydrogen would be formed if 100cm^3 ammonia were decomposed? (measurements at r.t.p.)

- A. 75cm^3
- B. 100cm^3
- C. 150cm^3
- D. 300cm^3

14. When 7g of iron reacts with 4g of sulphur, 11g of iron (II) sulphide is produced. What will be collected at the end of the reaction if 7g of iron is reacted with 7g of sulphur?
- A. 11g of iron (II) sulphide and 3 g of unchanged iron
 - B. 11g of iron (II) sulphide and 3 g of unchanged sulphur
 - C. 11g of iron (II) sulphide only
 - D. 14g of iron (II) sulphide only

15. The equation for the burning of hydrogen in oxygen is shown below.



Which information does this equation give about the reaction?

- A. 36 g of steam can be obtained from 16g of oxygen.
 - B. 2 g of hydrogen combine with 1 g of oxygen.
 - C. 2 mol of steam can be obtained from 1 mol of oxygen.
 - D. 2 atoms of hydrogen combine with 2 atoms of oxygen.
16. Which of the following **does not** yield hydrogen at the cathode and oxygen at the anode?

	Electrolyte	Electrodes
I.	aqueous copper(II) sulphate	copper
II.	aqueous copper(II) sulphate	platinum
III.	concentrated sodium chloride solution	graphite

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

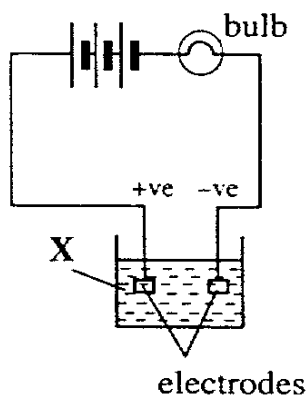
17. What are the products when concentrated aqueous lithium chloride is electrolysed?

- | | at the anode | at the cathode |
|----|---------------------|-----------------------|
| A. | chlorine | hydrogen |
| B. | chlorine | lithium |
| C. | oxygen | hydrogen |
| D. | oxygen | lithium |

18. Aqueous copper(II) sulphate is electrolysed using copper electrodes. Which observations will be made?

- | | at anode (+ve) | at cathode (-ve) | the electrolyte |
|----|-----------------------|-------------------------|------------------------|
| A. | anode dissolves | pink solid forms | blue colour fades |
| B. | anode dissolves | pink solid forms | no change |
| C. | colourless gas forms | colourless gas forms | no change |
| D. | colourless gas forms | pink solid forms | blue colour fades |

19. When the experiment shown was set up, the bulb lit, but there were no decomposition of products at the electrodes.



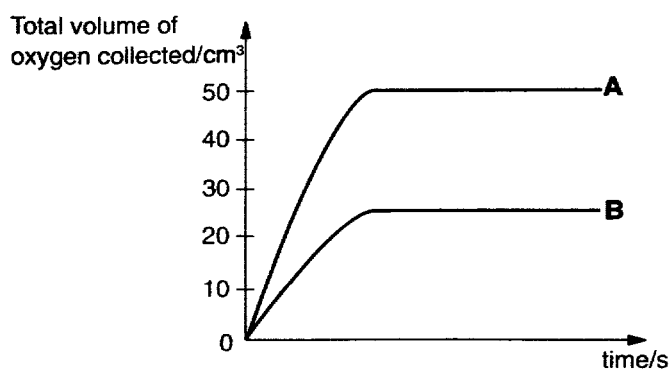
What is X?

- A. concentrated aqueous sodium chloride
- B. molten sodium chloride
- C. pure liquid bromine
- D. mercury

20. Which element requires the smallest number of electrons for one mole of atoms to be liberated during electrolysis?
- A. aluminium
 - B. copper
 - C. magnesium
 - D. sodium
21. Which statement concerning energy change is **false**?
- A. Electrical energy is absorbed during electrolysis.
 - B. Electrical energy is produced by the reaction in a fuel cell.
 - C. Light energy is absorbed during photosynthesis.
 - D. Heat energy is absorbed when calcium reacts with water.
22. The formation of hydrogen iodide from hydrogen and iodine is an endothermic reaction. What may be deduced from this information?
- $$\text{H-H} + \text{I-I} \rightarrow \text{H-I} + \text{H-I}$$
- A. The number of bonds broken is greater than the number of bonds formed.
 - B. The formation of H-I bonds absorbs energy.
 - C. The products possess less energy than the reactants.
 - D. The total energy change in bond formation is less than that in bond breaking.
23. Which one of the following reactions is endothermic?
- A. $2\text{F} \rightarrow \text{F}_2$
 - B. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 - C. $\text{F}_2 \rightarrow 2\text{F}$
 - D. $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$

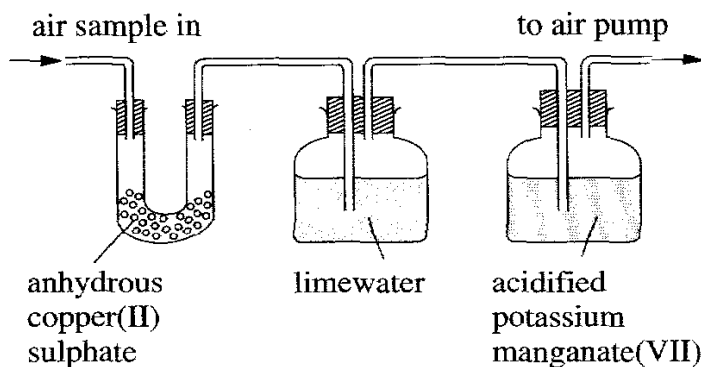
24. Which one of the following properties of a catalyst remains **unchanged** at the end of a reaction?
- A. Chemical composition
- B. Temperature
- C. Physical state
- D. Total surface area

25. The graphs **A** and **B** represent the results of two experiments showing the catalytic decomposition of hydrogen peroxide, H_2O_2 . Assuming that all other conditions are kept constant, which one of the following is the correct explanation for the results?



- | | Experiment A | Experiment B |
|----|--|--|
| A. | 20cm^3 of 1.0M H_2O_2 was used. | 10cm^3 of 2.0M H_2O_2 was used. |
| B. | 20cm^3 of 0.5M H_2O_2 was used with 2.0g of manganese(IV) oxide. | 20cm^3 of 0.5M H_2O_2 was used with 1.0g of manganese(IV) oxide. |
| C. | 10cm^3 of 1.0M H_2O_2 was used with 1.0g of manganese(IV) oxide at 80°C . | 10cm^3 of 1.0M H_2O_2 was used with 0.5g of manganese(IV) oxide at 40°C . |
| D. | 10cm^3 of 1.0M H_2O_2 was used with 0.5g of manganese(IV) oxide. | 10cm^3 of 0.5M H_2O_2 was used with 0.5g of manganese(IV) oxide. |
26. Which element in the reaction below is oxidised?
- $$2\text{FeSO}_4 + \text{Cl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 2\text{HCl}$$
- A. chlorine
- B. hydrogen
- C. iron
- D. sulphur

27. What happens when zinc is placed in aqueous silver nitrate?
- Silver atoms are oxidised.
 - Silver ions are oxidised.
 - Zinc atoms are oxidised.
 - Zinc ions are oxidised.
28. When a spoonful of solid mixture containing sodium sulphate, silver nitrate and lead (II) chloride is shaken up with some water, a solid remains insoluble after shaking. The solid is most likely to be
- lead (II) chloride only.
 - a mixture of silver sulphate and lead (II) chloride.
 - a mixture of silver chloride and lead(II) chloride.
 - a mixture of silver chloride and lead (II) sulphate.
29. In an attempt to determine the composition of air, a sample of air was taken from within an industrial area. The sample of air was passed through a series of chemicals as shown in the apparatus below.



The copper(II) sulphate turned blue, a white precipitate was formed in the limewater and the acidified potassium manganate(VII) was decolourised.
Which set of gases was present in the sample of air?

- H_2S , CO , SO_2
- H_2O , CO_2 , SO_2
- CO , CO_2 , H_2
- CO_2 , H_2O , O_2

30. Metal X is obtained from its ore by electrolysis. Metal Z reacts very slowly with steam when heated red-hot. When metal Z reduces the oxide of Y, a reddish-brown solid is formed. Which of the following could be the identities of metals X, Y and Z?

	Metal X	Metal Y	Metal Z
A.	Aluminium	Copper	Iron
B.	Magnesium	Iron	Sodium
C.	Calcium	Copper	Calcium
D.	Zinc	Iron	Aluminium

31. Which substance **does not** need air as a raw material for its manufacture?

- A. ammonia
- B. aluminium
- C. iron
- D. sulphuric acid

32. Which of the following statements about ammonium chloride is **true**?

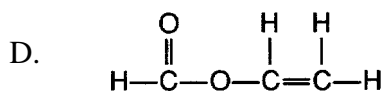
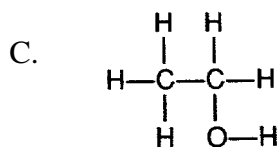
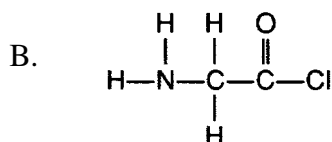
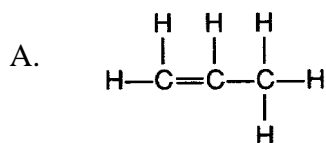
- A. It reacts with copper(II)sulphate to form a blue precipitate.
- B. It dissociates on heating to form ammonia and chlorine.
- C. It is a white solid that conducts electricity when dissolved in water.
- D. It can be prepared by precipitation reaction.

33. In the Contact Process for the manufacture of sulphuric acid, the sulphur trioxide formed is dissolved in

- A. concentrated nitric acid.
- B. concentrated sulphuric acid.
- C. dilute sulphuric acid.
- D. water at a pressure of 200 atmospheres.

34. Oxygen and hydrogen are similar in some ways. Which of the following is **incorrect**?
Both oxygen and hydrogen
- A. are used in rocket fuel.
 - B. are obtained by fractional distillation of liquid air.
 - C. exist as colourless and odourless diatomic molecules.
 - D. do not have reaction with acidified potassium dichromate (VI) solution.
35. Which of the following describes the properties of ethane and ethene correctly?
- A. Both are unsaturated hydrocarbons.
 - B. Both can undergo addition reaction.
 - C. Both can burn in oxygen to produce carbon dioxide and water.
 - D. Both can be polymerized readily.
36. What are the products formed when ethanol is completely burnt in air?
- A. Carbon monoxide and steam
 - B. Carbon dioxide and steam
 - C. Carbon dioxide, carbon monoxide and steam
 - D. Carbon dioxide and hydrogen
37. What do poly(ethene) and ethene have in common?
- I Chemical properties
 - II Empirical formula
 - III Percentage composition
- A. I and II
 - B. II and III
 - C. I, II and III
 - D. II only

38. A plastic which is biodegradable
- burns easily without producing toxic fumes.
 - can be absorbed through the roots of plants.
 - is broken down by bacterial decay.
 - is produced by biological reactions.
39. Which of the following pairs of substances would react with one another to form an ester with the formula $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3$?
- $\text{CH}_3\text{CO}_2\text{H}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$ and $\text{CH}_3\text{CH}_2\text{OH}$
 - $\text{CH}_3\text{CH}_2\text{O}_2\text{H}$ and $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$
 - HCO_2H and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{O}_2\text{H}$
40. Which one of the following represents a compound that is likely to undergo condensation polymerisation?



~ 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	<table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">I</td> <td style="text-align: center;">H Hydrogen 1</td> </tr> </table>																I	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										
I	H Hydrogen 1																																		
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	55 Mn Manganese 25	52 Cr Chromium 24	59 Co Cobalt 27	56 Fe Iron 26	65 Zn Zinc 30	64 Cu Copper 29	59 Ni Nickel 27	106 Pd Palladium 47	103 Rh Rhodium 45	101 Ru Ruthenium 44	190 Os Osmium 76	186 Re Rhenium 75	184 W Tungsten 74	181 Ta Tantalum 73	178 Hf Hafnium 72	89 Y Yttrium 39	88 Sr Strontium 38	85 Rb Rubidium 37	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	226 Ra Radium 88	227 Ac Actinium 89	+								
70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	127 Te Tellurium 52	128 I Iodine 53	131 Xe Xenon 54	204 Tl Thallium 81	201 Hg Mercury 80	197 Au Gold 79	195 Pt Platinum 78	192 Ir Iridium 77	190 Os Osmium 76	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86														

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

a	X
b	+

Key
 a = relative atomic mass
 X = atomic symbol
 b = proton number
 (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 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 dm³ at room temperature and pressure (r.t.p.)