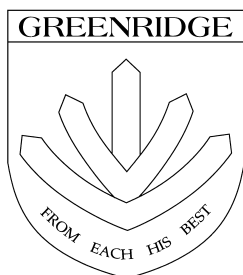


Name : _____ ()

Class : 4E1



GreenRidge Secondary School

Mid-Year Examination 2001

Subject : Chemistry (5069)
Secondary Four Express
Paper 1

Date : 14 May 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 the OMR sheet.

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

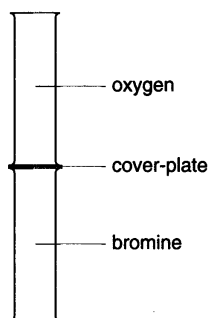
There are **40** questions in this section. Answer **all** questions.
Choose the one you consider correct and record your choice in soft 2B pencil on the OMR sheet.

INFORMATION FOR CANDIDATES

Each correct answer is awarded 1 mark.
A copy of the Periodic Table is printed on page 11.

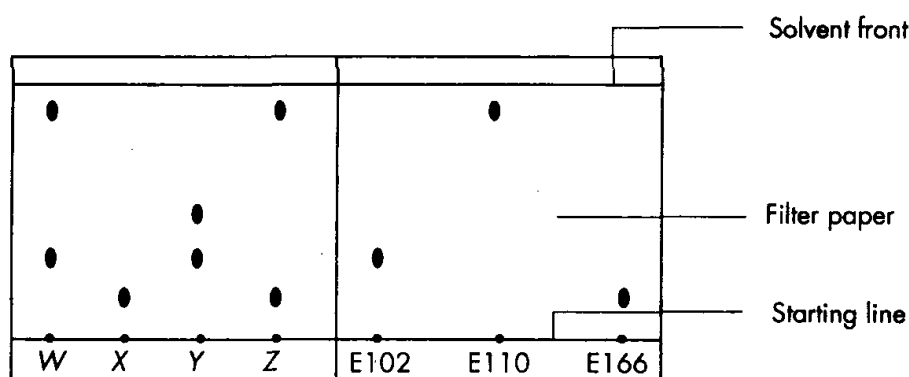
This paper consists 11 printed pages, including this page.

1. The cover-plates were removed from the gas jars shown in the diagram. After several days, the colour of the gas was the same in both jars.



Which statement explains this change?

- A. Oxygen and bromine molecules are in random motion.
 B. Oxygen and bromine molecules diffuse at the same rate.
 C. Oxygen and bromine gases have same densities
 D. Oxygen and bromine gases have different densities
2. An impure sample of substance X melts at 108°C . Which of the following could be the melting point of pure X?
- A. 98°C
 B. 107°C
 C. 110°C
 D. 130°C
3. E102 and E110 are two permitted artificial food colourings. E166 is a recently discovered colouring that is banned by the authorities for its detrimental effects on health. Four brands of packet drinks, W, X, Y and Z, are analyzed using chromatography together with these three colourings. The resulting chromatogram is shown below.

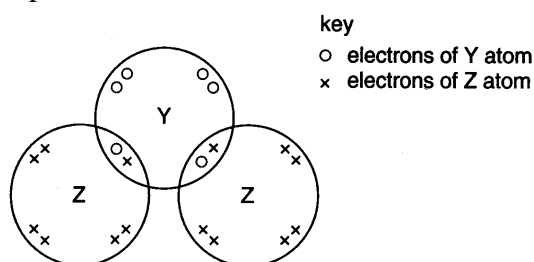


Which brand(s) will definitely **not** be approved for sale?

- A. W and Z only
 B. X and Y only
 C. X and Z only
 D. X, Y and Z only

4. From which mixture can the underlined substance be obtained by adding water, stirring and filtering?
- barium sulphate and silver chloride
 - copper(II) sulphate and sodium carbonate
 - ethanoic acid and ethanol
 - silver iodide and ammonium sulphate

5. The diagram shows the arrangement of electrons in the outer shells of the atoms in the compound YZ_2 .



Which pair of elements could be Y and Z?

- | | Z | Y |
|----|----------|----------|
| A. | sulphur | fluorine |
| B. | carbon | oxygen |
| C. | hydrogen | oxygen |
| D. | chlorine | sulphur |
6. The electronic structure of the atoms of hydrogen, carbon and nitrogen are hydrogen 1; carbon 2.4 ; nitrogen 2.5

The formula of the hydrides of carbon and nitrogen are:

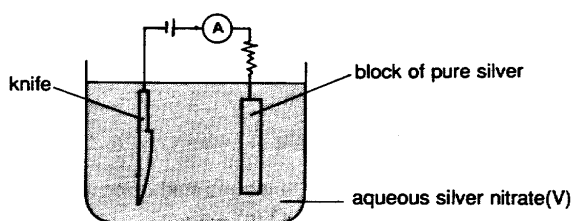
- | | | |
|----|-------------------------------|-------------------------------|
| A. | CH | NH |
| B. | CH ₄ | NH ₄ |
| C. | CH ₄ | NH ₃ |
| D. | C ₂ H ₄ | N ₂ H ₅ |
7. Which one of these statements about the nucleus of an atom is **incorrect**?
- A nucleus always contains protons and neutrons.
 - The nucleus is very small in comparison with the total size of the atom.
 - Nearly all the mass of the atom is found in the nucleus.
 - The nucleus of an atom is always positively charged.
8. The elements P, Q and R in the Periodic Table have consecutive decreasing proton numbers. If element Q is a noble gas, what is the symbol for the ion of element P?
- P⁻
 - P²⁻
 - P⁺
 - P²⁺

9. An element Y is found in Group II of the Periodic Table. It is likely to
- be a metal which forms an oxide, Y_2O .
 - be a non-metal which forms an oxide, YO_2 .
 - form ionic compounds with halogens.
 - be found in uncombined state in the earth.
10. The isotope of hydrogen containing one neutron per atom is called deuterium (symbol D) Which reaction **does not** take place?
- $3D_2 + N_2 \rightarrow 2ND_3$
 - $2D_2 + O_2 \rightarrow 2D_2O$
 - $CuO + D_2 \rightarrow D_2O + Cu$
 - $2DCl + Cu \rightarrow CuCl_2 + D_2$
11. An oxide of titanium is used as a white pigment for paint. 32 g of this oxide was found to contain 19.2 g of titanium. What is the formula of the pigment?
- Ti_2O
 - TiO
 - TiO_2
 - Ti_2O_4
12. Which of these nitrogenous fertilizers contains the greatest percentage by mass of nitrogen?
- Hydrazine, N_2H_4
 - Ammonium Nitrate, NH_4NO_3
 - Ammonium Sulphate, $(NH_4)_2SO_4$
 - Urea, NH_2CONH_2
13. 100 cm^3 of gaseous nitrogen contain 'k' molecules. How many molecules will there be in 100 cm^3 of gaseous methane under the same conditions of temperature and pressure?
- 0.5k
 - k
 - 1.5k
 - 2k
14. Copper can be extracted from copper(II) sulphate solution by electrolysis. What is the maximum mass of copper that can be extracted from 500 cm^3 of 2M copper(II) sulphate solution?
- 160g
 - 128g
 - 96g
 - 64g

15. Which of the following occurs during the electrolysis of molten calcium chloride between carbon electrodes?

- A. The hydrogen ions gain electrons to form hydrogen gas at the cathode.
- B. The hydroxide ions lose electrons to form oxygen atoms at the anode.
- C. The calcium ions gain electrons to form calcium atoms at the cathode
- D. The chloride ions lose electrons to form chlorine atoms at the cathode

16. A knife which is made of metal M can be silver-plated by the following setup. When the current has been passed through the solution for some time, which of the following will occur?

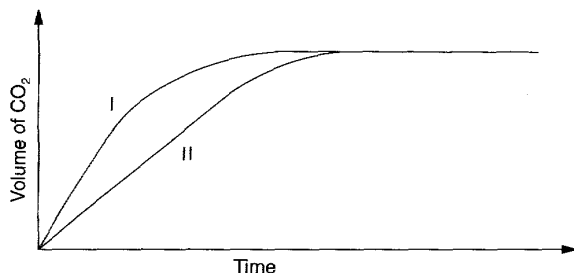


- A. The metal M dissolves to form ions.
 - B. The mass of the knife will decrease.
 - C. Silver ions will migrate to the silver anode.
 - D. Silver ions will be reduced at the cathode.
17. The balanced chemical equation for the formation of water from its elements is:
- $$2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l}) \quad \Delta\text{H} = -58 \text{ kJ mol}^{-1}$$

58 kJ is the quantity of heat which is

- A. gained from the surroundings when one mole of water is formed.
 - B. gained from the surroundings when two moles of water are formed.
 - C. lost to the surroundings when one mole of water is formed.
 - D. lost to the surroundings when two moles of water are formed.
18. 100 cm³ of 0.5 mol dm⁻³ potassium hydroxide solution is reacted with 50 cm³ of 0.5 mol dm⁻³ sulphuric acid. Given that the amount of heat released in the neutralization reaction is 58 kJ per mol of water formed, what is the amount of heat given out in this experiment?
- A. 2.9kJ
 - B. 5.8kJ
 - C. 29kJ
 - D. 58kJ

19.



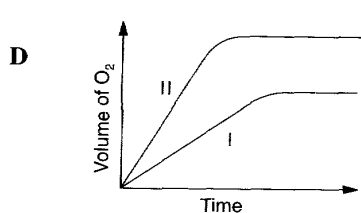
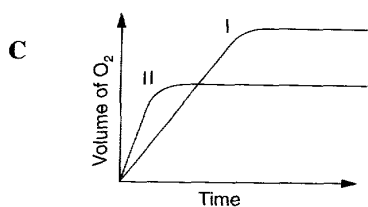
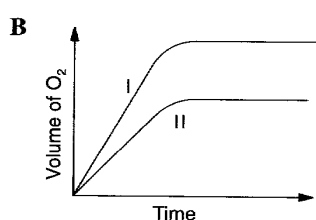
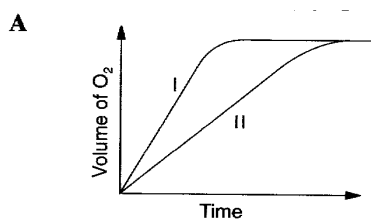
In two separate experiments, powdered calcium carbonate was reacted with an excess of dilute hydrochloric acid. Which one of the following gives the graph above?

	Amount of carbonate		Nature of the carbonate
	<u>I</u>	<u>II</u>	
A.	1g	1g	both finely powdered
B.	1g	2g	both finely powdered
C.	2g	2g	powder finer in I than in II
D.	3g	3g	powder finer in II than in I

20. Two experiments were performed to measure the rate of evolution of oxygen from hydrogen peroxide solution on adding the catalyst manganese(IV) oxide. In each experiment, the mass of manganese(IV) oxide was the same.

Experiment	Solution used
I	1 litre of 2 mol/dm ³ H ₂ O ₂
II	2 litres of 0.5 mol/dm ³ H ₂ O ₂

Which one of the following graphs is correct?



21. Which of the following is a reducing agent?

- A. Chlorine
- B. Carbon
- C. Oxygen
- D. Potassium manganate(VII)

22. In which of the following reactions is the underlined substance oxidised?
- A. $4\text{HCl} + \underline{\text{MnO}_2} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
- B. $\underline{\text{H}^+} + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- C. $\underline{\text{Zn}} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$
- D. $\underline{\text{Fe}_2\text{O}_3} + 6\text{H}^+ \rightarrow 2\text{Fe}^{3+} + 3\text{H}_2\text{O}$
23. A factory was allowing its acid waste to drain into a nearby river. The result was that fish and plant life were killed. Which one of the following substances should be added to the acid waste to help reduce the acidity?
- A. Aqueous ammonia solution
- B. Fine powdered charcoal
- C. Bauxite
- D. Powdered limestone
24. When a hydrogen ion is lost from an acid molecule the resulting particle is called its conjugate base. Which one of the following particles would be the conjugate base for the acid HSO_4^- ?
- A. H_2SO_4
- B. HSO_4^-
- C. SO_4^{2-}
- D. SO_4^{2-}
25. When gas X is added to acidified potassium manganate (VII) solution it turns colourless. X is most likely to be
- A. Chlorine gas
- B. Sulphur dioxide gas
- C. Hydrogen gas
- D. Carbon dioxide gas
26. A new element Kalamium has been discovered. Which of the following properties of Kalamium indicates conclusively that it is a metal?
- A. Its melting point is 2000°C
- B. It conducts electricity in both solid and liquid state.
- C. It burns in air to give a white solid oxide.
- D. It forms a chloride which does not conduct electricity in any state.
27. Which one of the following correctly describes the processes occurring at the electrodes when molten potassium chloride is electrolysed?
- | | <u>Anode</u> | <u>Cathode</u> |
|----|--------------|----------------|
| A. | oxidation | no reaction |
| B. | reduction | no reaction |
| C. | reduction | oxidation |
| D. | oxidation | reduction |

28. Which of the following metals is produced commercially by reducing the metal oxide with coke?
- Aluminium
 - Iron
 - Copper
 - Magnesium
29. Which one of the following pairs of substances is most suitable for the preparation of copper(II) sulphate?
- copper and dilute sulphuric acid
 - copper(II) carbonate and dilute sulphuric acid
 - aqueous copper(II) nitrate and aqueous sodium sulphate
 - copper(II) hydroxide and aqueous potassium sulphate

30. The products of the thermal decomposition of the carbonate and nitrate salts of three metals, X, Y and Z are tabulated as shown below:

	Carbonate	Nitrate
X	No reaction	Nitrate(III) of X and oxygen
Y	Carbon dioxide & oxides of Y	Oxygen, Nitrogen dioxide & oxide of Y
Z	No reaction	Oxygen, Nitrogen dioxide & oxide of Z

What is the order of the metals, X, Y and Z arranged in order of decreasing reactivity?

- Y, X, Z
 - Y, Z, X
 - X, Y, Z
 - X, Z, Y
31. Which one of the following metallic carbonates does **not** give off any gas on heating?
- Copper(II) carbonate
 - Calcium carbonate
 - Sodium carbonate
 - Potassium carbonate
32. In which of the following forms can most plants absorb nitrogen?
- In the form of soluble nitrate salts.
 - In the form of soluble ammonium salts.
 - In the form of gaseous nitrogen directly from the atmosphere.
 - In the form of nitrogen dioxide from the atmosphere.

33. Which of the following are important uses of sulphur dioxide?
- To manufacture sulphuric acid in the Contact Process.
 - As a bleaching agent.
 - As a source of sulphur.
- I only
 - I and II
 - II and III
 - I, II and III

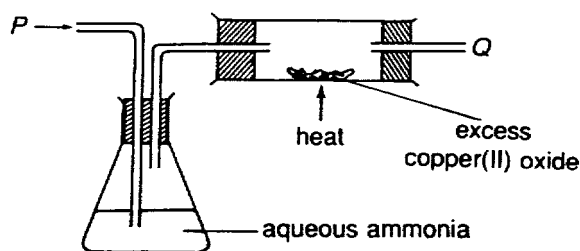
34. The manufacture of sulphuric acid starting from sulphur can be represented as follows:



Which one of the following correctly shows the oxidation number of sulphur at each stage?

	S	SO ₂	SO ₃	H ₂ SO ₄
A.	0	+2	+3	+4
B.	0	+2	+3	+8
C.	0	+4	+6	+8
D.	0	+4	+6	+6

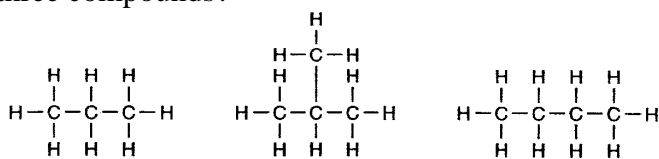
- 35.



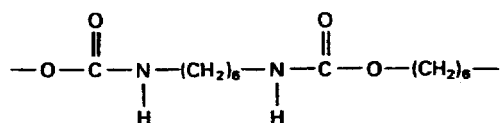
P is a sample of waste gases obtained from a factory. P is a mixture of sulphur dioxide, carbon monoxide, carbon dioxide, nitrogen and noble gases. In the above experiment, P was bubbled into a solution of aqueous ammonia and then passed over heated copper(II) oxide. What is the constituent of the gas that emerged at Q?

- Carbon monoxide only.
 - Carbon dioxide only.
 - Nitrogen and noble gases.
 - Carbon dioxide, nitrogen and noble gases.
36. Water
- is a good electrolyte.
 - is an ionic solvent.
 - turns anhydrous cobalt chloride paper pink.
 - is a liquid which boils at 100°F.

37. The diagrams show the structures of three hydrocarbons. Which statement is correct for all three compounds?



- A They are isomers of each other.
 B They react with aqueous bromine readily.
 C They have the same general formula.
 D They have the same physical properties.
38. What is produced when ethanol is boiled with an excess of acidified potassium dichromate(VI)?
- A. Ethanoic acid
 B. Ethene
 C. Ethyl ethanoate
 D. Ethyl dichromate (VI)
39. The diagram shows the structure of expanded polyurethane. This polymer is going out of use in furniture manufacture. When polyurethane burns, it produces a number of products, including some that cause air pollution. Which of the following sets are the products considered atmospheric pollutants?



- A. C CO NO₂
 B. C CO₂ H₂O
 C. C SO₂ NO₂
 D. CO₂ H₂O NO₂
40. Which diagram represents the structure of Terylene?
- A $\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---CH}_2\text{---}$
- B $\text{---CH}_2\text{---}\underset{\text{Cl}}{\text{CH}}\text{---CH}_2\text{---}\underset{\text{Cl}}{\text{CH}}\text{---}$
- C $\text{---C(=O)---}\square\text{---C(=O)---O---}\square\text{---O---C(=O)---}\square\text{---C(=O)---O---}\square\text{---O---}$
- D $\text{---C(=O)---}\square\text{---C(=O)---NH---}\square\text{---NH---C(=O)---}\square\text{---C(=O)---NH---}\square\text{---NH---}$

~ The End ~

