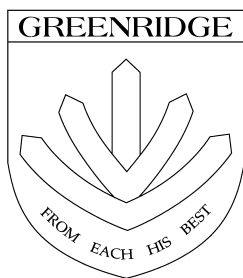


Name : _____ ()

Class : 4E1



GreenRidge Secondary School

Mid-Year Examination 2002

Subject : Chemistry (5068)
Secondary Four Express
Paper 1

Date : 14 May 2002

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.

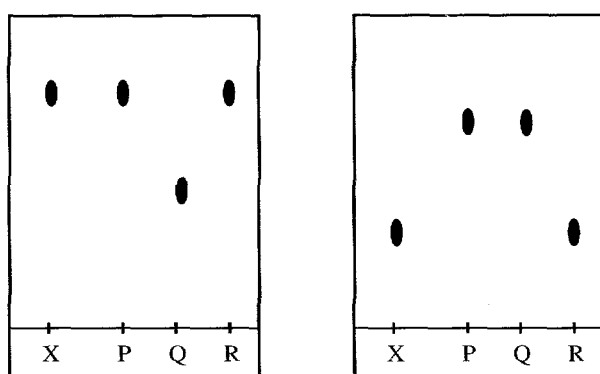
There are **40** questions in this section. Answer **all** questions.
Choose the one you consider correct and record your choice in soft 2B pencil on the OMR sheet.

INFORMATION FOR CANDIDATES

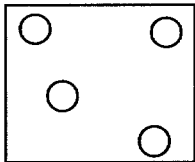
Each correct answer is awarded 1 mark.
A copy of the Periodic Table is printed on page 10.

This paper consists 10 printed pages, including this page.

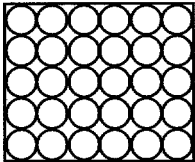
- Which gas is produced in large quantities by fractional distillation?
 - krypton
 - chlorine
 - nitrogen
 - hydrogen
- A bottle contains a powdered mixture of copper and copper(II) oxide. Which one of the following should be added to remove the copper(II) oxide?
 - dilute sulphuric acid
 - concentrated sulphuric acid
 - paraffin oil
 - benzene
- An unknown substance X, together with three known substances P, Q, and R, were analysed by chromatography using two different solvents water and ethanol. The diagram below shows the final chromatograms.



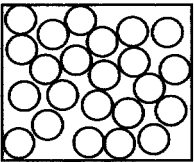
- Which one of the three substances P, Q and R is found in X?
- P.
 - Q.
 - R.
 - Q or R.
- Which one of the following shows the arrangement of particles in water?



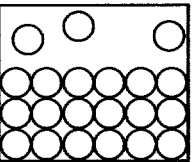
A



B



C

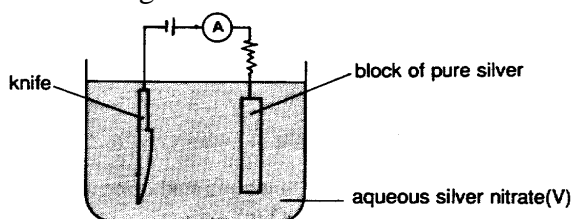


D
 - A metal M forms a phosphate of formula MPO_4 . What is the formula of the oxide of M?
 - MO
 - M_2O
 - M_2O_3
 - MO_2

6. At room temperature and pressure, one mole of carbon dioxide and one mole of ammonia have the same
- I mass
 - II volume
 - III number of molecules
 - IV number of atoms
- A. II
B. I and II
C. II and III
D. II, III and IV
7. 20 cm³ of propane was mixed with 200 cm³ of oxygen. The mixture was ignited and a reaction occurred according to the following equation:
- $$\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{H}_2\text{O}(\text{l}) + 3\text{CO}_2(\text{g})$$
- What is the total volume of gases present at the end of the reaction?
[All gas volumes are measured at the room temperature and pressure.]
- A. 30cm³
 - B. 70cm³
 - C. 160cm³
 - D. 170cm³
8. What is the minimum volume of oxygen that is required for the complete combustion of 24 dm³ of ethene? (with all gases measured at room temperature and pressure)
[The volume of one mole of gas at r.t.p. is 24 dm³.]
- A. 24 dm³
 - B. 48 dm³
 - C. 72 dm³
 - D. 96 dm³
9. 100 cm³ of a gaseous oxide of nitrogen, N₂O, was completely decomposed into x cm³ of nitrogen and y cm³ of oxygen at the same temperature and pressure. What is the value of x and of y ?
- A. $x = 200, y = 100$
 - B. $x = 100, y = 100$
 - C. $x = 100, y = 50$
 - D. $x = 50, y = 100$
10. Nickel can be extracted from nickel (II) nitrate solution by electrolysis. What is the maximum mass of nickel that can be extracted from 500cm³ of 2M nickel (II) nitrate solution?
- A. 27 g
 - B. 54 g
 - C. 59 g
 - D. 118 g

11. Which of the following occurs during the electrolysis of molten calcium chloride between carbon electrodes?
- The hydrogen ions gain electrons to form hydrogen gas at the cathode.
 - The hydroxide ions lose electrons to form oxygen atoms at the anode.
 - The calcium ions gain electrons to form calcium atoms at the cathode.
 - The chloride ions lose electrons to form chlorine atoms at the cathode.

12. 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?



- The metal M dissolves to form ions.
 - The mass of the knife will decrease.
 - Silver ions will migrate to the silver anode.
 - Silver ions will be reduced at the cathode.
13. Which one of the following correctly describes the processes occurring at the electrodes when molten zinc chloride is electrolysed?

	<u>Anode</u>	<u>Cathode</u>
A.	oxidation	no reaction
B.	reduction	no reaction
C.	reduction	oxidation
D.	oxidation	reduction

14. Which of the following is **NOT** a reducing agent?

- Ammonia gas
- Carbon
- Sulphur dioxide
- Potassium manganate(VII)

15. In which of the following reactions is the underlined substance reduced?

- $4\text{HCl} + \underline{\text{MnO}_2} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$
- $\underline{\text{H}^+} + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- $\underline{\text{Zn}} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$
- $\underline{\text{Fe}_2\text{O}_3} + 6\text{H}^+ \rightarrow 2\text{Fe}^{3+} + 3\text{H}_2\text{O}$

16. A new element Weberium has been discovered. Which of the following properties of Weberium indicates conclusively that it is a metal?

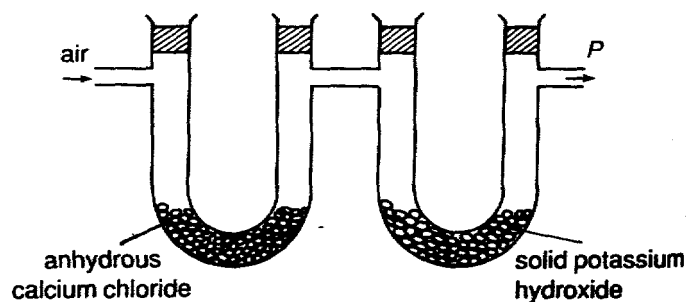
- It has a melting point of 4000°C
- It conducts electricity in both solid and liquid state.
- It burns in air to give a white solid oxide.
- It forms a chloride which does not conduct electricity in any state.

17. 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.
18. The elements P, Q and R in the Periodic Table have consecutive increasing proton numbers. If element Q is a noble gas, what is the symbol for the ion of element P?
- P^-
 - P^{2-}
 - P^+
 - P^{2+}
19. A factory accidentally leaked 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?
- Aqueous ammonia solution
 - Powdered charcoal
 - Powdered sodium carbonate
 - Powdered calcium carbonate
20. Which one of the following pairs of reactants will **NOT** produce copper(II) sulphate when mixed together?
- copper and dilute sulphuric acid
 - copper and concentrated sulphuric acid
 - copper(II) oxide and dilute sulphuric acid
 - copper(II) carbonate and dilute sulphuric acid
21. 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
22. 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.

23. A slow stream of dry air was pumped through the apparatus shown below.



- The gas coming out from the apparatus at *P* consisted of
- nitrogen only.
 - nitrogen and noble gases.
 - nitrogen, noble gases and carbon dioxide.
 - nitrogen, noble gases and oxygen.
24. Ammonium sulphate is used as a chemical fertiliser. This chemical can be prepared in the laboratory by treating
- aqueous ammonia with dilute sulphuric acid.
 - aqueous ammonia with sulphur dioxide.
 - ammonia gas with sulphur and oxygen.
 - nitrogen gas with sulphur and oxygen.
25. Leaded petrol contains tetraethyllead, $\text{Pb}(\text{C}_2\text{H}_5)_4$. Which of the following is **not** produced from the combustion of tetraethyllead?
- carbon monoxide
 - nitrogen monoxide
 - lead(II) oxide
 - water vapour
26. In the reaction of an acid on marble chips (calcium carbonate), why is the reaction speed much slower if sulphuric acid of the same concentration is used instead of hydrochloric acid?
- Sulphuric acid is a dibasic acid while hydrochloric acid is a monobasic acid.
 - The molecules of sulphuric acid are heavier than those of hydrochloric acid and therefore move more slowly with less kinetic energy.
 - Calcium sulphate is formed which is insoluble and tends to coat the marble chips and preventing further reaction.
 - Calcium is a metal and will react more vigorously with a non-metal like chlorine.
27. 100 cm^3 of 1 mol/dm^3 sodium hydroxide solution was added to 100 cm^3 of 1 mol/dm^3 hydrochloric acid. The maximum rise in temperature recorded was T_1 . The experiment was repeated with 50 cm^3 of each solution and the rise in temperature this time was T_2 . Which one of the following about T_1 and T_2 is true?
- T_1 is equal to T_2
 - T_1 half the value of T_2
 - T_2 is half the value of T_1
 - T_2 is a quarter the value of T_1

28. Which of the following reactions are endothermic?

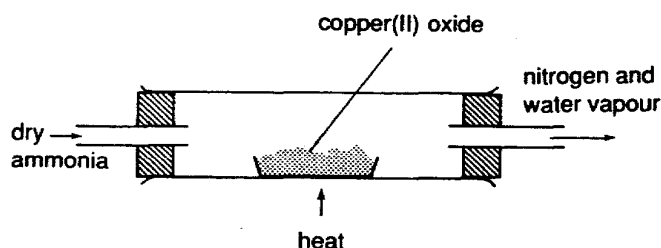
- I. $\text{NH}_4\text{Cl}(\text{s}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{Cl}^-(\text{aq})$
- II. $6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l}) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6(\text{s}) + 6\text{O}_2(\text{g})$
- III. $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$

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

29. 100 cm^3 of 0.5 mol/dm^3 potassium hydroxide solution is reacted with 100 cm^3 of 0.5 mol/dm^3 hydrochloric acid. Given that the amount of heat released in the neutralization reaction is 58 kJ/mol , what is the amount of heat given out in this experiment?

- A. 2.9 kJ
- B. 5.8 kJ
- C. 29 kJ
- D. 58 kJ

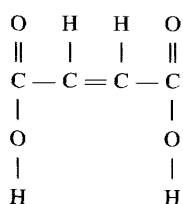
30.



In the above reaction, ammonia is

- A. an oxidising agent.
 - B. a reducing agent.
 - C. a dehydrating agent.
 - D. a drying agent.
31. The reaction between concentrated sulphuric acid and propanol to give propene is an example of concentrated sulphuric acid used as
- A. a reducing agent.
 - B. an oxidising agent.
 - C. a drying agent.
 - D. a dehydrating agent.
32. The reaction between ethanol and ethanoic acid in the presence of concentrated sulphuric acid is an example of concentrated sulphuric acid used as
- A. a catalyst.
 - B. a reducing agent.
 - C. an oxidising agent.
 - D. a drying agent.

33. Compound **X** has the structural formula given below.

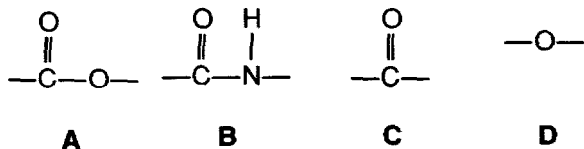


Which one of the following statements about compound **X** is **not** correct?

- A. Empirical formula of **X** is CHO.
 B. One mole of **X** is neutralised by one mole of aqueous sodium hydroxide.
 C. **X** decolourises aqueous potassium manganate(VII).
 D. **X** reacts with ethanol to form an ester.
34. In the Contact Process for the manufacture of sulphuric acid, the sulphur trioxide formed is dissolved in
 A. water at high pressure.
 B. steam at high pressure.
 C. concentrated sulphuric acid.
 D. dilute sulphuric acid.
35. An organic compound, **Y**, reacts with sodium to give a compound with molecular formula $\text{C}_2\text{H}_5\text{ONa}$. What is compound **Y**?
 A. ethane
 B. ethene
 C. ethanol
 D. ethanoic acid
36. What is the molecular formula of dibromohexane?
 A. $\text{C}_6\text{H}_{14}\text{Br}_2$
 B. $\text{C}_5\text{H}_{13}\text{Br}_2$
 C. $\text{C}_6\text{H}_{12}\text{Br}_2$
 D. $\text{C}_6\text{H}_{10}\text{Br}_2$
37. The diagram below represents the structure of a protein molecule.

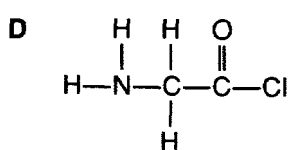
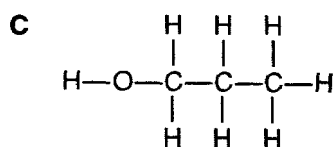
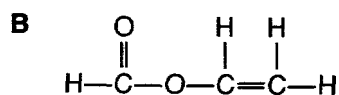
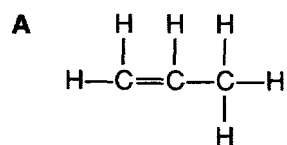


Which one of the following linkages does **Y** represent?

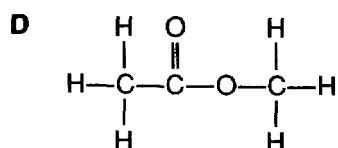
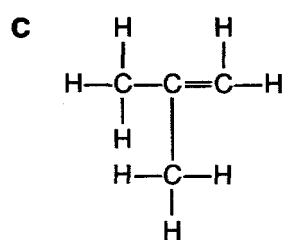
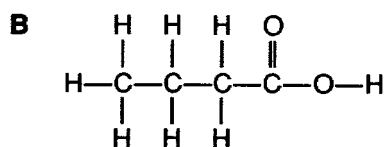
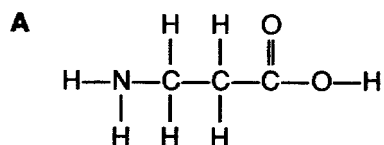


38. Which of the pair of compounds will undergo a substitution reaction in the presence of sunlight to produce $\text{C}_7\text{H}_{14}\text{Cl}_2$?
 A. C_7H_{14} and Cl_2
 B. C_7H_{16} and Cl_2
 C. C_6H_{12} and HCl
 D. C_7H_{14} and HCl

39. Which one of the following represents a compound that is likely to undergo condensation polymerisation?



40. Which one of the following formulae represents a monomer that is likely to undergo addition polymerisation?



~ The End ~

