K.C.S.E CHEMISTRY PAPER 233/1 2002

1. Name **one** property of neon that makes it possible to be used in electric lamps (1 mark)

2. Oxygen and sulphur belong to group (VI) of the periodic table. Explain why there is a big difference in their melting points (melting point of oxygen is –216°C while that of sulphur is 44°C) (2 marks)

3. The oxides of elements A and B have the properties shown in the table below
(The letters do not represent the actual symbols of the elements)

A	B
Gaseous at room temperature	Solid at room temperature
Dissolves in water to form an acidic solution	Dissolves in water for form an alkaline solution

Give one example of elements A and B (2 marks)

A

B

4. The following two tests were carried out on chlorine water contained in two test-tubes.
   a) A piece of blue flower was dropped into the first test-tube. Explain why the flower was bleached. (2 marks)

   b) The second test-tube was corked and exposed to sunlight. After a few days, it was found to contain gas that rekindled a glowing splint.
   Write an equation for the reaction which produced the gas (1 mark)

5. a) Write the electronic configuration of calcium (atomic number 20) and beryllium (atomic number 4)
   Calcium (½ mark)

   Beryllium (½ mark)

   b) Why is calcium more reactive than beryllium? (2 marks)

6. When potassium nitrate is heated, it produces potassium nitrate and gas C_1
   a) Identify gas C_1 (1 mark)

   b) Name the type of reaction undergone by the potassium nitrate (1 mark)

7. State and explain how the rate of reaction between zinc granules and steam can be increased (2-marks)

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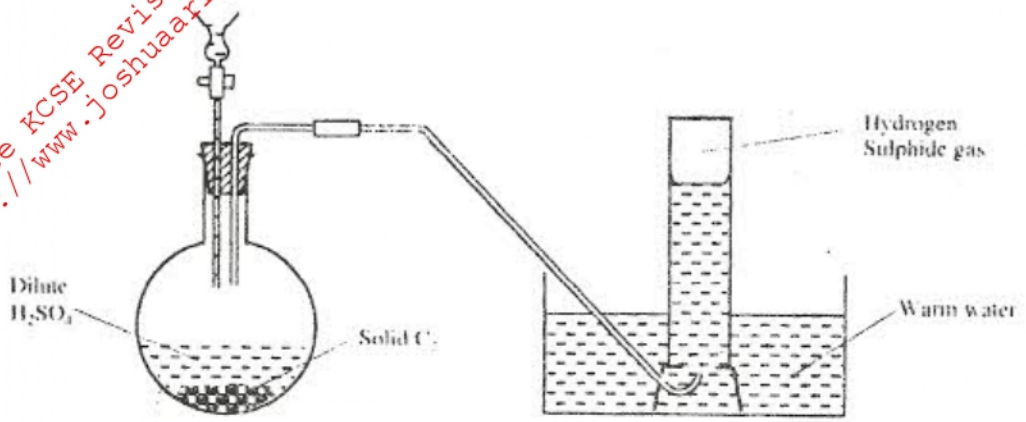
_____

8. The apparatus shown below was set up to prepare and collect hydrogen sulphide gas?



a) Name solid C_2 (1 mark)

_____

b) Give a reason why warm water is used (1 mark)

_____

c) What observation would be made if hydrogen sulphide gas was bubbled into a solution of lead II nitrate? (1 mark)

_____

_____

9. Use the reactions given below to answer the questions that follow
(The letters do not represent the actual symbols of the elements)

$D_{(s)} + E^{2+}_{(aq)} \rightarrow D^{2+}_{(aq)} + E_{(s)}$

$D_{(s)} + 2F^{+}_{(aq)} \rightarrow D^{2+}_{(aq)} + 2F_{(s)}$

$E_{(s)} + 2F^{+}_{(aq)} \rightarrow E^{2+}_{(aq)} + 2F_{(s)}$

$G_{(s)} + E^{2+}_{(aq)} \rightarrow G^{2+}_{(aq)} + E_{(s)}$

$G_{(s)} + D^{2+}_{(aq)} \rightarrow$ No reaction

a) What name is given to the type of reactions given above? (1 mark)

_____

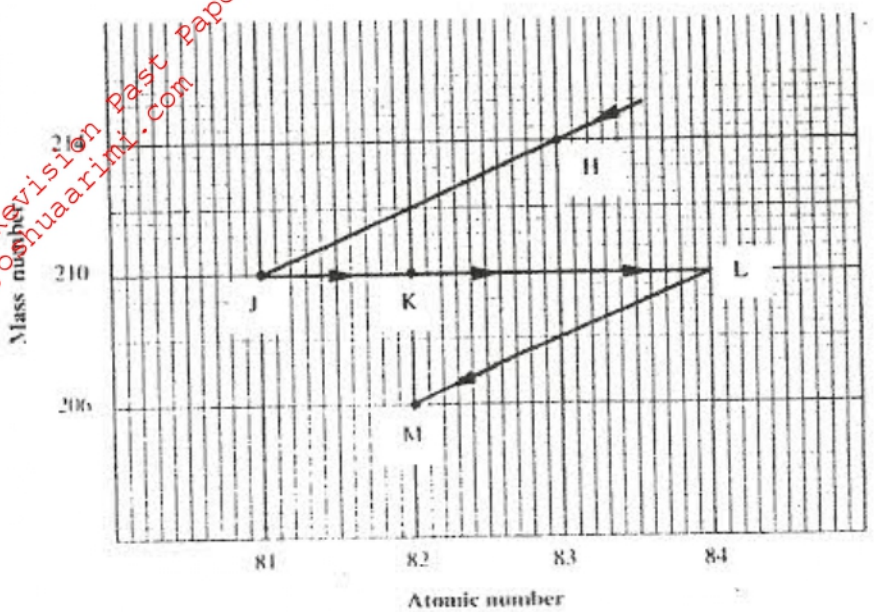
b) Arrange the elements D, E, F and G in order of their reactivity starting with the most reactive

_____

c) Complete the equation below

$G_{(s)} + 2F^{+4}_{(aq)} \rightarrow$ _____ (1 mark)

10. The graph below represents a radio active decay series for isotope H. Study it and answer questions that follow.



a) Name the type of radiation emitted when isotope H changes to isotope J (1 mark)

_____

_____

b) Write an equation for the nuclear reaction that occurs when isotope J changes to isotope K (1 mark)

_____

_____

c) Identify a pair of isotopes of an element in the decay series (1 mark)

_____

_____

11. In an experiment, sulphur dioxide gas was bubbled into water followed by chlorine gas. The resulting clear solution gave a while precipitate when mixed with acidified barium chloride solution.
Explain these observations (3 marks)

12. Concentrated nitric acid was added to iron II sulphate acidified with dilute sulphuric acid and the mixture heated. The solution turned from pale green to yellow with evolution of brown gas. Explain these observations. (3 marks)

13. Use the equations below to answer the questions that follow

$$K^+_{(g)} + Cl^-_{(g)} \rightarrow KCl_{(s)};\ \Delta H_1 = -701 kJmol^{-1}$$

$$KCl_{(s)} \xrightarrow{H_2O_{(l)}} K^+_{(aq)} + Cl^-_{(aq)};\ \Delta H_2 = +15 kJmol^{-1}$$

a) What is the name of ΔH_1? (1 mark)

b) Calculate the heat change for the process:

$$K^+_{(g)} + Cl^-_{(g)} \xrightarrow{H_2O_{(l)}} K^+_{(aq)} + Cl^-_{(aq)}$$ (2 marks)

14. Iron is extracted from its ore by the blast furnace process

a) Name one ore from which iron is extracted (1 mark)

b) One of the impurities in iron ore is removed in the form of calcium silicate. Write an equation for the reaction in which calcium silicate is produced (1 mark)

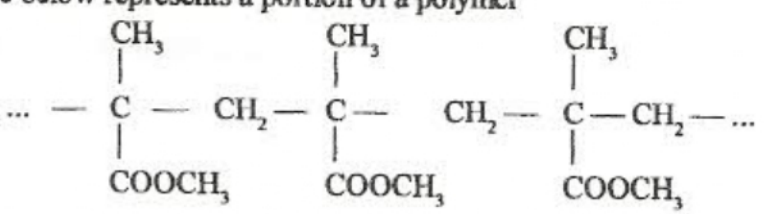
15. When carbon dioxide gas was passed through aqueous calcium hydroxide, a white suspension was formed.

a) Write an equation for the reaction that took place (1 mark)

b) State and explain the change what would occur when excess carbon dioxide gas is bubbled through the white suspension. (2 marks)

16. With reference to iodine, distinguish between covalent bonds and Van der Waals forces (3 marks)

17. The structure below represents a portion of a polymer



Give

a) the name of the polymer

b) one industrial use of the polymer

18. Describe how a solid sample of zinc II carbonate can be prepared starting with Zinc oxide (3 marks)

_____

_____

_____

19. Bismuth chloride ($BiCl_3$) reacts with water according to the equation given below

$$BiCl_{3(aq)} + H_2O_{(l)} \rightleftharpoons \underset{\text{white}}{BiOCl_{(s)}} + 2HCl_{(aq)}$$

a) State what would happen when a few drops of dilute hydrochloric acid are added to the mixture at equilibrium (1 mark)

_____

b) Give a reason for your answer in (a) above (1 mark)

_____

20. The table below given some information about the electrical conductivity and the likely bonding in substances N, P and Q. Complete the table by inserting the missing information in the spaces numbered I, II and III.

Substance	Likely type of bonding present	Electrical conductivity	
		Solid	Molten
N	Metallic	I _____	Conducts
P	II	Does not conduct	Conducts
Q	III	Does not conduct	Does not conduct

21. In an experiment, $30cm^3$ of 0.1m sulphuric acid were reacted with $30cm^3$ of 0.1M sodium hydroxide.

a) Write an equation for the reaction that took place (1 mark)

_____

_____

b) State the observations that were made when both blue and red litmus papers were dropped into the mixture. (1 mark)

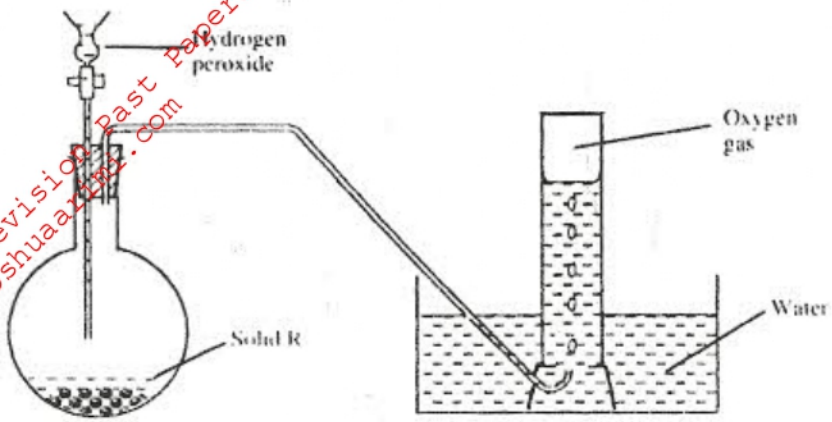
_____

_____

c) Give a reason for your answer in (b) above. (1 mark)

_____

22. The diagram below is a set-up for the laboratory preparation of oxygen gas



a) Name solid R (1 mark)

b) Write an equation for the reaction that takes place in the flask (1 mark)

c) Give one commercial use of oxygen (1 mark)

23. When excess lead nitrate solution was added to a solution containing sodium chloride, the precipitate formed was found to weigh 5.56g. Determine the amount of sodium chloride in the solution. (3 marks)
(Pb= 207, Cl = 35.5, Na = 23).

24. a) Give a reason why concentrated sulphuric acid is not used to dry ammonia gas (1 mark)

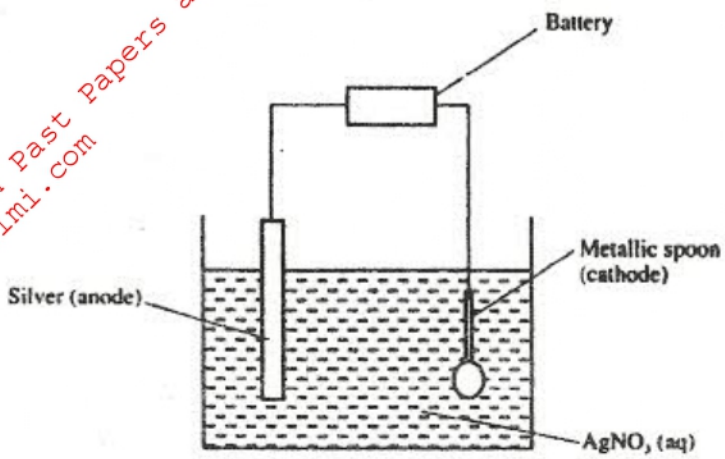
b) Name one suitable drying agent for ammonia gas (1 mark)

25. But-2-ene undergoes hydrogenation according to the equation given below
$CH_3\ CH{=}{=}\ CH\ CH_{3(g)} + H_{2(g)} \rightarrow CH_3CH_2CH_2CH_{3(g)}$

a) Name the product formed when but-2-ene reacts with hydrogen gas (1 mark)

b) State one industrial use of hydrogenation (1 mark)

26. The set-up below to electroplate a metallic spoon. Study it and answer the questions that follow



a) Write an ionic equation for the reaction that occurred at the cathode (1 mark)

b) State and explain what happened to the anode (2 marks)

27. The following tests were carried out on three separate portions of a colourless solutions S

Tests	Observations
i) Addition of dilute hydrochloric acid to the first portion of solution	No observable change
ii) Addition of aqueous sodium carbonate to the second portion of solution S	A white precipitate was formed
iii) Addition of aqueous ammonia to the third portion of solution S	A white precipitate was formed which dissolved on addition of excess aqueous ammonia.

a) From the information in test (i), name a cation which is not present in solution S (1 mark)

b) Identify a cation which is likely to present in solution S (1 mark)

c) Write an ionic equation for the reaction which takes place in test (ii) (1 mark)