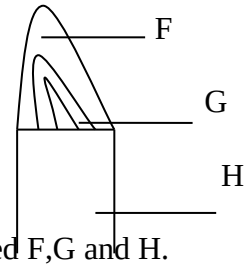
NAME:…….CLASS:……..ADM NO:..…
233
CHEMISTRY
PAPER 1
ENDTERM 1 YEAR 2020 EXAM
TIME: 2 HOURS
MAXIMUM SCORE = 80 MARKS

INSTRUCTIONS TO CANDIDATES
Answer all questions in the spaces provided. Mathematical tables and electronic calculators may be used.

1. In the figure below



   a. Name the parts labeled F,G and H. (1 ½ mks)
   F
   G
   H
   b. Describe an experiment that would confirm that the region labeled G is unsuitable for heating. (1 ½ mks)

2. Give the names of the following processes used to: (1mk)
   a. Obtain a solvent from a saturated solution

   b. Separate zinc carbonate from water.

3. When dilute nitric (V) acid was added to a sample of solid M, a colourless gas that formed a white precipitate with lime water was produced. When another sample of solid M was heated strongly in a dry test tube, there was no observable change.
   i. Write the formula of the ions present in M. (1mk)

   ii. Write a chemical equation for the reaction which took place between M and nitric (v) acid. (1mk)

4. Describe how a solid sample of lead (II) chloride can be prepared using the following reagents; dilute nitric (V) acid, dilute hydrochloric acid and lead carbonate. (2mks)

b. Give a disadvantage of evaporating a solution to dryness during crystallization. (1mk)

5. In an experiment to study properties of carbon, a small amount of charcoal is placed in a boiling tube. 5.0cm^3 of concentrated nitric (V) acid is added. The mixture is then heated.
   a. What observations are made? Explain. (2mks)

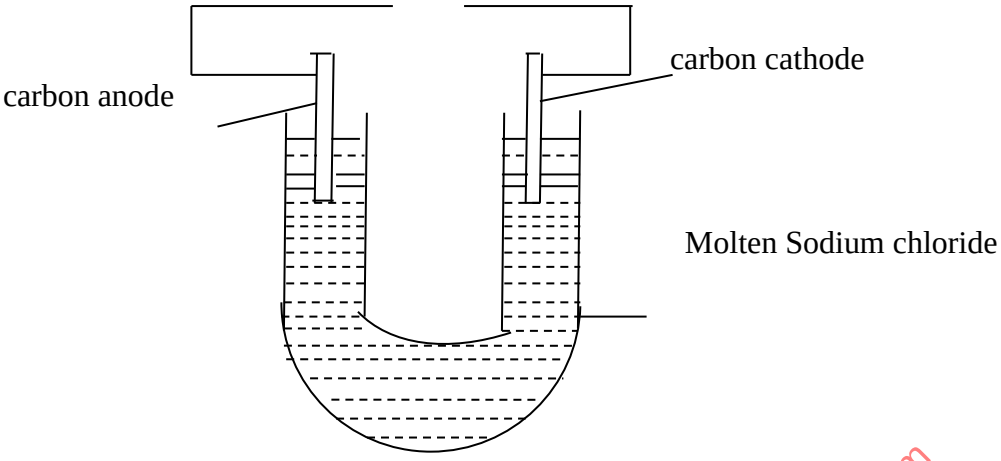
6. A substance containing only carbon and hydrogen has 80% by mass of carbon. It is also given that 1 dm^3 of the compound has a mass of 1.35g. determine the molecular formula of the compound. (C=12, H=1, MGV at stp =22.4dm^3) (3mks)

7. State Graham's law of diffusion. (1mk)

   b. 100cm^3 of carbon (IV) oxide diffuses through a porous plate in 30 seconds. How long will it take 150cm^3 of nitrogen (IV) oxide to diffuse across the same plate under similar conditions? (3mks)

8. What is an electrolyte? (1mk)

   b. Below is a set up used to investigate the effect of electric current on molten sodium chloride



A gas was formed at the anode. Write an ionic equation to show the formation of the gas. (1mk)

i. State the observation made at the cathode (1mk)

c. State how the following substances conduct electricity.

i. Molten magnesium chloride. (½ mk)

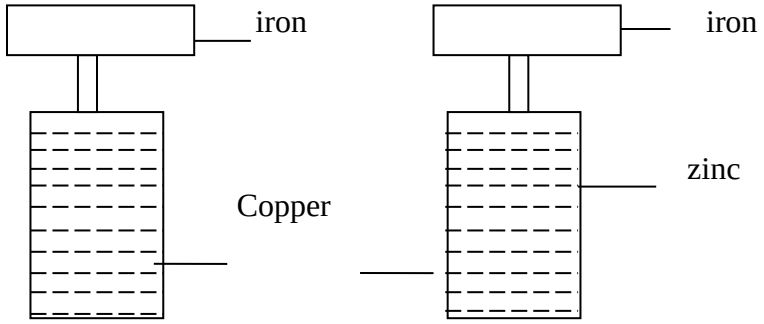
ii. Copper metal (½ mk)

9. What causes water hardness? (1mk)

b. State two methods of removing permanent water hardness in water. (2mks)

c. State one advantage of drinking hard water. (1mk)

10. A form two student in an attempt to prevent rusting put copper and zinc in contact with iron as shown below.

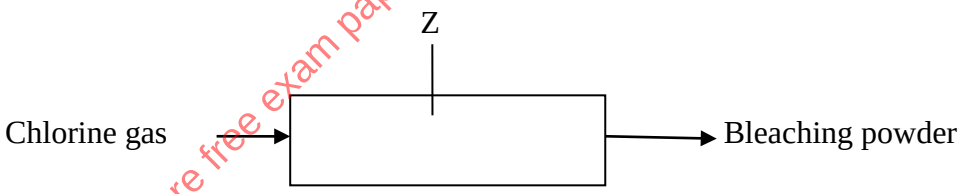


i. State what would happen in set up x and y after one week. (2mks)

ii. Explain your answer in diagram. (1mk)

iii. What name is given to the above method? (1mk)

11. The flow chart below represents an industrial process for the manufacture of bleaching powder.



a. Name substance Z (1mk)

b. Write a formula of bleaching powder. (1mk)

c. Explain why a lot of soap is used during washing with water containing bleaching powder? (1mk)

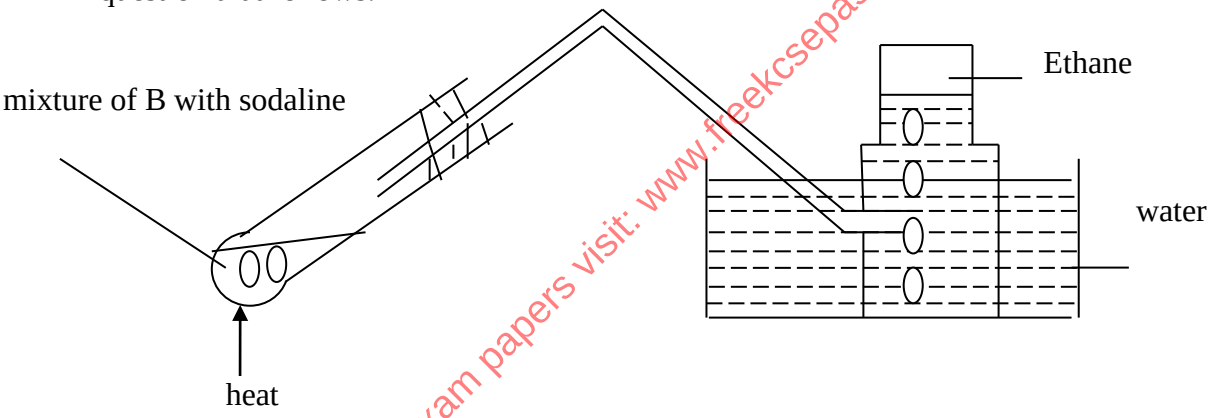
12. Explain:

a. Why dilute nitric (V) acid is not used in hydrogen gas preparation? (1mk)

b. Why copper metal granules are not used to prepare hydrogen gas. (1mk)

13. Explain why the boiling point of ethanol is higher than that of hexane. (R.M.M of ethanol is 46 while that of hexane is 86) (2mks)

14. The set up below was used to prepare a sample of ethane gas. Study it and answer the question that follows.



a. Name B (1mk)

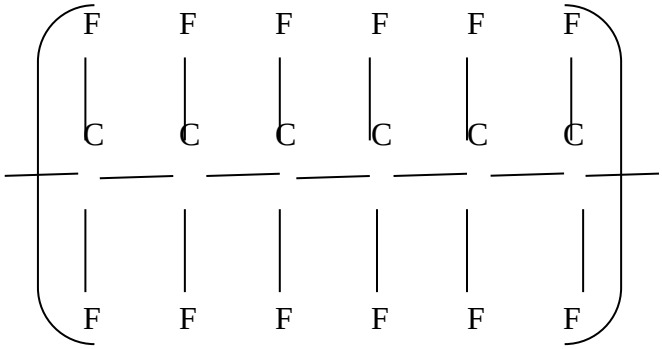
b. Write an equation for the reaction which took place. (1mk)

c. State one use of ethane. (1mk)

15. In an experiment to determine the solubility of solid Y in water at $30^{O}C$, the following results were obtained.
Mass of empty evaporating dish = 26.2g
Mass of evaporating dish + saturated solution = 42.4g
Mass of evaporating dish + dry solid y = 30.4g

a. Use the data to calculate the solubility of Y in grams of y per 100g of water at $30^{O}C$. (2mks)

16. The structure given below represents a segment of a polymer. Use it to answer the questions that follow.



a. Identify the polymer. (1mk)

b. Name and draw the structure of the monomer. (1mk)
   i. Name (1mk)

   ii. Structure (1mk)

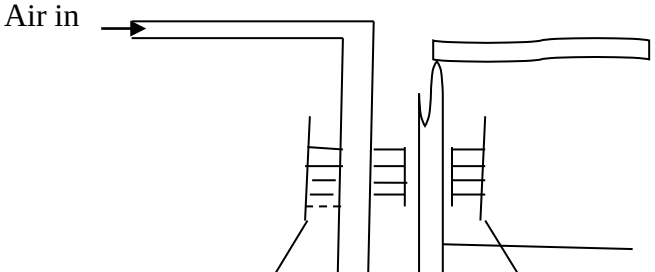
c. Give the systematic names of the following compounds.
   i. CH_3CH_2COOH (½ mk)

   ii. $CH_3CH_2CH_2CHCH_2$ (½ mk)

   iii. $CH_3CH_2CH_2CH_2OK$ (½ mk)

   iv. CH_3CH_2CCH (½ mk)

17. Ammonia gas is oxidized in air to nitrogen (II) oxide when in contact with heated platinum. The apparatus set up for this reaction is shown in the diagram below.



Hot platinum

Conical flask

Conc. Ammonia solution

a. Write a balanced equation for the reaction taking place in the conical flask. (1mk)

b. The spiral end of the platinum wire is first heated and quickly hanged inside the conical flask. The wire remains red hot throughout the reaction even without further heating. Explain. (1mk)

18. Explain why burning magnesium continues to burn in a gas jar full of sulphur (IV) oxide while a burning splint would be extinguished. (2mks)

19. Given the element $^{31}_{15}P$

Write:

i. The group (1mk)

ii. The period (1mk)

iii. The electron arrangement (1mk)

20. Using dots (.) and crosses (x) to represent outermost electrons, draw diagrams to show bonding in:

i. Magnesium chloride, $MgCl_2$ (1 ½ mks)

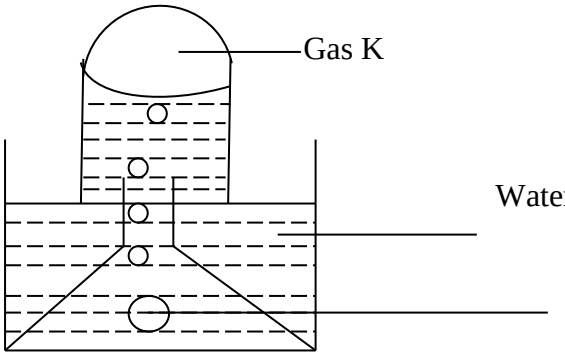
ii. Ammonium ion (NH_4^+) (1 ½ mks)

b. State two properties exhibited by substances to which magnesium chloride belong. (2mks)

21. Calculate the volume of nitrogen (I) oxide produced when 38.2g of ammonium nitrate is completely decomposed by heating at s.t.p. (N = 14, H= 1, O=16) (3mks)

22. State and explain the observation made when a moist red litmus paper is put in a gas jar of dry chloride gas. (2mks)

23. The set up below was used to collect gas k, produced by the reaction between water and calcium metal.



Name gas k (1mk)

a. At the end of the experiment, the solution in the beaker was found to be a weak base. Explain. (2mks)

24. The table below shows the relative atomic masses and percentage abudance of the isotopes L_1 and L_2 of element L.

	Relative atomic mass	**% abundance**
L_1	62.93	69.09
L_2	64.93	30.91

Calculate the relative atomic mass of element L. (2mks)

25. The table below gives information about the ions T^+ and Z^{2-}.

Ion	**T^+**	**Z^{2-}**
Electron arrangement	2.8	2.8.8
Number of neutrons	12	16

a. How many protons are there in the nucleus of:

i. Element T? (½ mk)

ii. Element Z? (½ mk)

b. State two similarities of neutrons and protons. (2mks)

26. A sample of water is suspected to contain sulphite ions. Describe an experiment that can be carried out to determine the presence of sulphite ions.
(2 ½ mks)

27. State two laboratory rules that should be followed to avoid contamination and wastage of chemicals. (2mks)

28. Hydrogen peroxide decomposes slowly to form oxygen gas and water. Name a substance used to speed up its decomposition in laboratory. (½ mk)

b. Write an equation for the decomposition reaction involving the substance identified in (a) above. (1mk)

c. State one industrial use of oxygen gas. (1mk)