

Name..... Index No.....

233/1
CHEMISTRY
Paper 1
(THEORY)
July/August, 2011
2 hours

Adm Class

Candidate's Signature.....

Date.....

BARINGO COUNTY EDUCATIONAL IMPROVEMENT EXAMINATION 2011

Kenya Certificate of Secondary Education
CHEMISTRY THEORY

Instructions to candidates:

Write your **Name** and **Index Number** in spaces provided **above**.
Sign and write the date of examination in spaces provided **above**.
Answer **ALL** the questions in spaces provided.
Mathematical table and electronic calculators **may be** used.
All working **must be** clearly shown where necessary.

For Examiner's Use Only

Questions	Maximum Score	Candidate's Score
1 – 28	80	

1. Potassium is isotopic and has relative atomic mass of 39.5. Work out the percentage abundance of each isotope. The two isotopes are ^{39}K , ^{40}K and ^{38}K (0.01%). (3mks)

2. Chelule mixed wax and ammonium chloride accidentally. He found that it is not advisable to heat the mixture in order to separate them. Briefly explain how he could have separated them. (3mks)

3. In ancient Greece, chewing chalk was used to combat excess stomach acid. A patient suffering from duodenal ulcer releases 30cm^3 of 1M hydrochloric acid in the stomach. He chewed 5g of impure chalk to neutralize the acid released. (Ca = 40, C = 12, O = 16).

- (a) Write a well balanced chemical reaction that took place. (1mk)

- (b) Calculate the number of moles of calcium carbonate used up. (1½mks)

- (c) Calculate the percentage impurity in calcium carbonate, chalk used. (1½mks)

4. Give **two** reasons why solid carbon (IV) oxide is a better cooling agent than ice. (2mks)

5. (a) Define the term ionization energy. (1mk)

(b) Sodium and aluminium belong to the same period, which of the two has a lower ionization energy. Explain. (2mks)

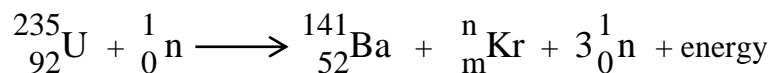
6. Zinc is normally extracted from its natural ores, such as zinc blende (ZnS) and calamine ($ZnCO_3$).

(a) Why is it not advisable to refer to these ores as zinc sulphide and zinc carbonate. (1mk)

(b) The 1st step in the extraction process is roasting of ores. Write equations of reactions taking place when the two ores are roasted. (2mks)

(c) Which of the **two** ores is recommended to be used as source of zinc metal? Give a reason. (1mk)

7. Study the nuclear equation below and answer the questions that follow.



(a) Determine the values of n and m. Show your working.

n (½mk)

m (½mk)

(b) State **two** useful applications of this type of reaction. (1mk)

8. When 8.8g of hydrocarbon was burnt in excess air 14.4g of water and 13.44dm³ of carbon (IV) oxide were obtained at s.t.p. Determine the empirical formula of the compound. (3mks)

9. (a) Distinguish isomers from isotopes. (2mks)

10. (a) Two gases A and B have molecular masses 64 and 100 respectively. If 300cm^3 of gas A diffuse through a porous plug in 20 seconds. How long will it take for 100cm^3 of gas B to diffuse through the same pug. (2mks)

- (b) Identify and state the law above. (1mk)

11. Explain the industrial conversion of ammonia to nitric (V) acid. (3mks)

12. Both anhydrous calcium chloride and copper II sulphate are put on separate petri dishes in the laboratory and left over night. What was the observable difference made in the morning? (2mks)

13. How would you distinguish between lead ions and zinc ions. (2mks)

14. Give the name and formula of:
(i) the complex cation containing a transition metal. (1mk)

(ii) the complex anion containing a transition metal. (1mk)

15. Study the physical properties of magnesium and calcium. Use it to answer the questions that follow.

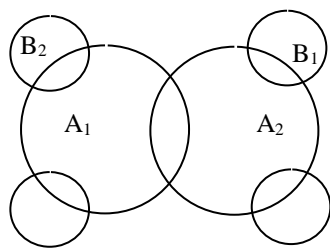
Element	Mg	Ca
Atomic radius (nm)	0.16	0.20
M.P(°C)	650	838
B.P(°C)	1110	1440
Atomic number	12	20

(a) Explain why calcium has a higher M.P than magnesium. (2mks)

(b) Write the electron arrangement of calcium in the following compound $\text{Ca}_3(\text{PO}_4)_2$. (1mk)

16. The mass of a solution of salt χ is 65g. This solution has 5g of salt χ dissolved in it. The solubility of this salt is 25g/100g of water at 20°C. How much salt χ will remain undissolved. (3mks)

17. A student during an organic Chemistry lesson drew a dot (·) and cross (x) diagram for a hydrocarbon as follows.



- (a) Identify two atoms labeled:

A₁ _____ (½mk)

B₁ _____ (½mk)

- (b) Name the type of bond existing between A₁ and A₂. (1mk)

- (c) In which homologous series does the above hydrocarbon belong? (1mk)

18. Using a well labeled diagram, show how you can determine electrode potential of copper using the hydrogen half-cell. (2mks)

- (b) Given that:



Can a solution of zinc chloride be kept in a tin container? Show how you arrived at your answer. (2mks)

19. Actal is one of the over the counter drugs (O.T.C) used to relieve indigestion.

(a) Write an ionic equation to show how actal really works.

(1mk)

(b) Explain why actal tablet is recommended that you chew first.

(1mk)

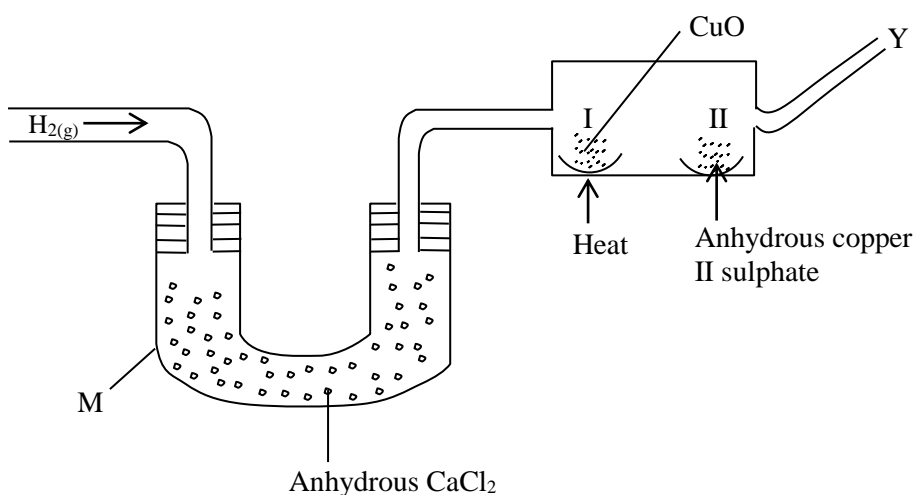
20. During the extraction of aluminium, a current of 0.2 amphere was passed for one hour through the molten aluminium oxide.

(a) Write equations for the reaction that took place at the cathode. ($A1 = 27$, $1F = 96500C$). (1mk)

(b) Calculate the mass of aluminium produced.

(2mks)

21. Study the diagram below and use it to answer the questions that follow.



(a) What are the observation made in the combustion tube at:

Part I _____ (1mk)

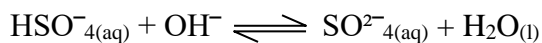
Part II _____ (1mk)

(b) Write a chemical equation for the reaction taking place at point Y. (1mk)

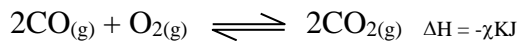
(c) Name the apparatus labeled M. (1mk)

22. Determine the heat of solution of potassium fluoride given that its lattice energy is +801KJ/mole and the heats of hydration of potassium and fluoride ions are -322 and -506KJ/mole respectively. (3mks)

23. Identify the species that act as bases in the equation given below. Give a reason (2mks)



24. Consider the reaction below.

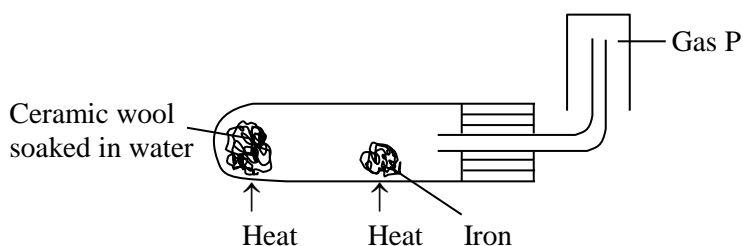


(a) State and explain the effect of:
Removing oxygen in the reaction above. (2mks)

25. (a) Using dots (·) and crosses (x), draw the dimer structure of aluminium chloride and name the bonds. (2mks)

- (b) State and explain the observation made when sodium carbonate powder is dropped into a solution of aluminium chloride. (2mks)

26. Study the diagram below and answer the questions that follow.



- (a) Give an equation for the reaction taking place in the boiling tube. (1mk)

- (b) Explain why it is not advisable to prepare gas P in the laboratory by reacting calcium metal with dilute sulphuric (VI) acid. (1mk)

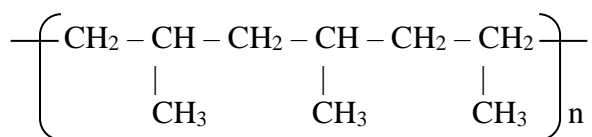
(c) Give **one** industrial use of gas P. (1mk)

27. Name the catalyst used in:

(a) the decomposition of hydrogen peroxide. (1mk)

(b) the conversion of vegetable oil into margarine. (1mk)

28. A polymer has the following structure.



(a) Draw the structure of the monomer. (1mk)

(b) A sample of the polymer is found to have molecular mass of 6426. Determine the number of monomers present. (C = 12, H = 1). (2mks)
