Name…….Index No……./……

School……Adm No……Stream……

Date……

233/1
CHEMISTRY
Paper 1
(THEORY)
NOV 2021
TIME: 2 HOURS

SAMIA SUB-COUNTY JOINT EXAMINATION-2021

Kenya Certificate of Secondary Education (K.C.S.E) Trial Examination

INSTRUCTIONS TO CANDIDATES

- *Write your **name** and **Index Number** in the spaces provided above.*
- ***Sign** and **write date** of examination in the spaces provided above.*
- *Answer **ALL** questions in the spaces provided.*
- *Mathematical tables 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
1-27	80	

1.

a. Define the term **half-life** as used in radioactivity. (1mk)

b. 100g of radioactive substance was reduced to 12.5g in 15.6years. **Calculate** the half-life of the substance. (2mks)

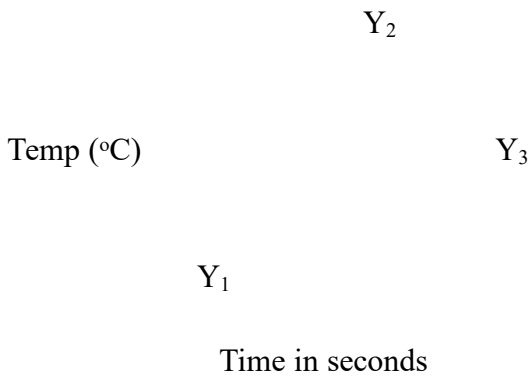
2. You are provided with water and usual laboratory apparatus. Describe how you would fully separate solid lead (II) carbonate from a mixture of iron fillings, lead (II) carbonate and sodium carbonate. (3mks)

3. In order to determine the molar heat of neutralization of sodium hydroxide, $100cm^3$ of 1M NaOH and $100cm^3$ of 1M HCI both at the same initial temperature were mixed and stirred continuously with a thermometer. The temperature of the resulting solution was recorded after every 30 seconds until the highest temperature was attained. Thereafter the temperature of the solution was recorded for further two minutes.

a. Write the ionic equation for the reaction which took place. (1mk)

b. The sketch below was obtained when the temperature of the mixture were plotted against time.

Study it and answer the questions that follow.



i. What is the significance of point Y_2 (1mk)

ii. **Explain** the temperature change;
Between Y_1 and Y_2 (1mk)

Between Y2 and Y3 (1mk)

4. Dry chlorine gas was passed through two pipes of coloured cotton cloth as shown below.

Dry chlorine Dry chlorine

Exp 1. **Exp. 2**

Wet red cloth

Dry red cloth

a. **State** what is observed in each of the experiment;
Experiment 1 (1mk)

Experiment 2 (1mk)

b. Explain your observation using an equation. (1mk)

5. Two elements **A** and **B** have electronic configuration 2.8.3 and 2.6 respectively.
a. To which group and period does element B belong? (1mk)

b. If the two react, what is the formula of the compound they form? (1mk)

6. Iron fillings react with steam according to the equation given below.

$3Fe_{(s)} + 4H_2O_{(g)}$ $\quad\quad\quad\quad$ $Fe_3O_{4(s)} + 4H_{2\,(g)}$

State and **explain** the effects of each of the following on the equilibrium.

i. Increase in pressure (2mks)

ii. Addition of magnesium ribbon to the equilibrium mixture. (2mks)

7. Unknown substances had PH values as shown in the table below.

Substance	PH values
A	6.0
B	2.0
C	8.0

State which substance is likely to be;

i. Lemon juice (1mk)

ii. Phosphoric (v) acid (1mk)

iii. **Identify** a substance that would be a better electrolyte? (1mk)

8. In an experiment to study diffusion of gases, the following set up was used.

Cotton wool Soaked in Conc Ammonia	Cotton wool soaked in Conc hydrolic acid

i. **State** and **explain** the observations made in the experiment. (2mks)

ii. Write an equation for the reaction that occurs in the experiment. (1mk)

9. An electric current was passed through molten potassium fluoride using inert electrodes.
   a. Name the products at;
   Anode (1mk)

   Cathode (1mk)

   b. Write an equation for the reaction at the anode. (1mk)

10. During the extraction of copper and zinc from their ores, some of the processes include;
    i. Crushing
    ii. Mixing of the crushed ore with oil and water and bubbling air through it.

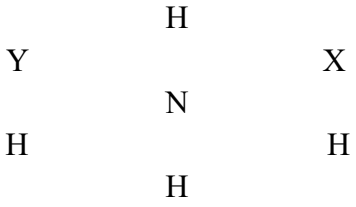
    a.
    i. Name the process (ii) above. (1mk)

    ii. What is the purpose of process (ii) above? (1mk)

b. Bronze is an alloy of copper and another metal. **Identify** the other metal. (1mk)

11. Name **another** gas which is used together with oxygen in welding. (1mk)

12. The structure of ammonium ion is shown below.



a. Name the type of bond represented by X and Y
X…… (1mk)

Y…….. (1mk)

b. How many electrons are used in bonding in the ammonium ion? (1mk)

13. A dibasic acid $H_2C_2O_4nH_2O$ of concentration 6.3g/dm^3 was titrated against NaOH solution. 25cm$_3$ of the acid solution required 15.6cm^3 of 0.16MNaOH for complete neutralization. **Calculate** the value of n in the formula. (H=1, O=16, C=12) (3mks)

14. The table below shows the solubility of potassium nitrate and potassium chlorite at various temperatures.

Salt	Solubility at various temperatures	
	50°c	20°C
KNO_3	86g	31g
$KClO_3$	18g	8g

A mixture of salts contains 20g of KNO3 and 18g of $KClO_3$ in 100g of water at 50°C.

a. **State** the method which may be used to separate the mixture. (1mk)

b. If the mixture was cooled from 50°C to 20°C, **state** and **explain** what would be observe. (2mk)

15.

a. Name the following organic compounds.

O

CH3CH2CH2C OH (1mk)

CH3CH2CH2CH3 (1mk)

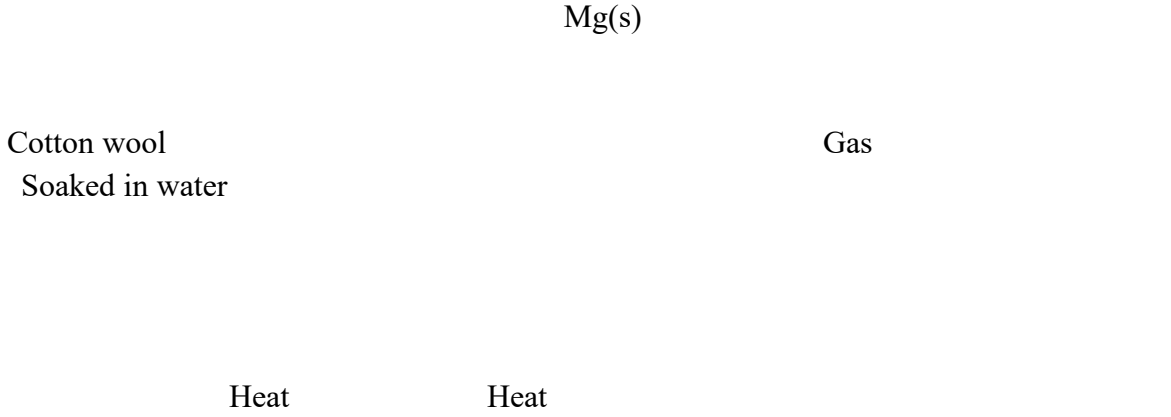
b. Below is a simple representation of a soap molecule.

Polar head Non polar head

Using the structure above show how soap removes an oil smear from the fabric below.(2mks)

16. Explain how a sample of lead(ii) chloride can be prepared using the following reagents.
    i. Dilute nitric (v) acid
    ii.Dilute hydrochloric acid
    iii.Lead (ii) carbonate (3mks)

17. The diagram below represents a set up used to react magnesium with steam. Study it and answer the questions that follow below.

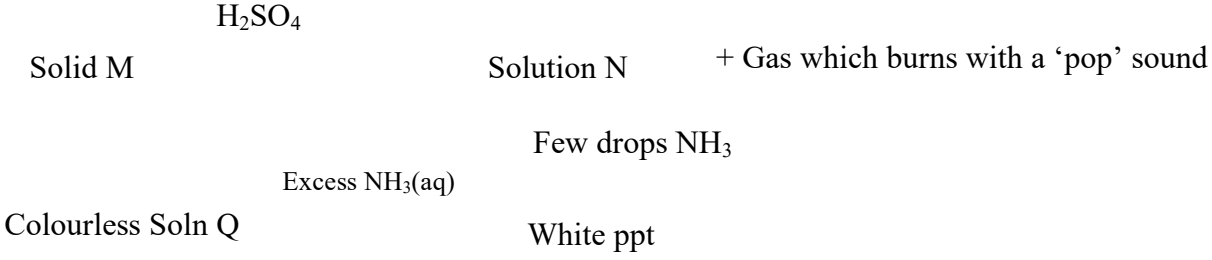


i. **State** the observation made in the combustion tube. (1mk)

ii. Why would it not be advisable to use potassium in place of magnesium In the above set up. (1mk)

iii. Explain **why** cotton wool is heated prior to heating magnesium (1mk)

18. The scheme below shows some reaction sequence starting with solid M.



i. Name solid **M** (1mk)

ii. Write the formula of a complex ion present in solution **Q** (1mk)

iii. Write an ionic equation of the reaction between Barium nitrate and solution **N**.(1mk)

19.

a. Below are standard reduction potentials of **3** electrodes.

$Fe^{2+}(aq) + 2e$	Fe(s)	-0.44v
$Zn^{2+}(aq) + 2e$	Zn(s)	-0.76v
$Sn^{2+}(aq) + 2e$	Sn(s)	-0.14v

Calculate the electromotive force of a cell formed between Fe/Fe^{2+} half-cell and Zn/Zn^{2+} half-cell. (2mks)

b. Draw a clearly labeled diagram of a set up you would use to electroplate an iron spoon with silver metal. (2mks)

20.

a. Name the **process** of extracting Sulphur. (1mk)

b. What is the **role** of super-heated water? (1mk)

c. State **two** uses of sulphur (1mk)

21. The diagram below shows how carbon (ii) oxide can be prepared starting with carbon (iv) oxide and solid W. study it and answer the questions that follow.

Solid **W**

Carbon (iv) Oxide

Potassium Hydroxide Solution

Heat

a. With reasons, **state** a suitable location where such an experiment should be rightly conducted. (1mk)

b. What is the purpose of concentrated potassium hydroxide? (1mk)

c. Identify solid **W** (1mk)

22.

a. Explain how you would separate a mixture of nitrogen and oxygen. (2mks)

b. **Draw** a well labeled diagram to show the percentage composition of oxygen in air can be determined. (2mks)

23. Use the information below to answer the questions that follow.

$H2(g) + {}^{1}{}_{2}O_2$ $H_2O(l)$ $\Delta H_1 = -286KJ/Mol$

$C(s) + O_2(g)$ $CO_2(g)$ $\Delta H_2 = -384KJ/Mol$

$C(s) + 4H_2(g) + {}^{1}{}_{2}O_2(g)$ C_3H_7OH $\Delta H3 = -2686.6KJ/Mol$

a. Define '**enthalpy** of formation' (1mk)

b. Determine the molar enthalpy of formation of propanol. (2mks)

24. Most natural water occurs as permanent hard water or temporary hard water.

a. Name **two** compounds that cause;

i. Temporary hardness (1mk)

ii. Permanent hardness (1mk)

b. How is temporary hardness removed from water? (1mk)

c. State **one** disadvantage of using hard water in boilers. (1mk)

25. Both Sodium and Aluminum are metals in period 3 yet sodium has much lower melting point than aluminum. **Explain**. (2mks)

26. Determine the values of X and Y in the equation below.

$^{236}_{92}U + {}^{x}_{Y}Ba \rightarrow {}^{92}_{36}Kr + {}^{1}_{0}Z + Energy$

x……. Y…….. (1mk)

27. State **two** effects of emitting SO_2 in the environment. (1mk)