

# LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM

*Kenya Certificate of Secondary Education – K.C.S.E*

## 233/1 CHEMISTRY

### THEORY:

**TIME: 2 HOURS**

NAME..... ADM NO. .... CLASS.....

INDEX NO..... DATE..... SIGN.....

### INSTRUCTIONS TO CANDIDATES

- ☐ Write your **name** and **index number** in the spaces provided above
- ☐ **Sign** and write the **date** of examination in the spaces provided.
- ☐ Answer **all** the questions in the spaces provided.
- ☐ Mathematical table and silent electronic calculators may be used.
- ☐ All working **must** be clearly shown where necessary.

### FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1- 27	80	

1. Elements are placed on the periodic table based on their atomic numbers.

a. What does atomic number represent?

(1mk)

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b. An element J has atomic number 19 while element K has atomic number 9. Write the electronic configuration of the most stable ions of J and K:-

(1mk)

J .....

K .....

c. Write chemical equation for the reaction that would form a compound of J and K

(1mk)

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2. a). Excess magnesium ribbon sample was heated in equal volumes of:

i) Pure oxygen gas

ii) Air

i. Why was the mass of the resulting product in (ii) more than in (i)?

(1mk)

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ii. Write the equations for the reactions in part (ii)

(1mk)

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b). When the air hole is open, the Bunsen burner produces a certain flame.

i. name the type of flame produced

(1mk)

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ii. Explain why the flame above is produced

(1mk)

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3. (a). The molecular formula of two hydrocarbons is  $C_4H_6$  and  $C_4H_{10}$ . Given bromine water, describe a chemical test that can be used to distinguish the two compounds. (2mks)

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- (b) Write the chemical equation for the complete combustion of  $C_4H_{10}$  (1mk)

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4. (a). When 10g of Sodium carbonate were reacted with  $50\text{ cm}^3$  of 2M nitric (V) acid. A certain amount of the carbonate remained unreacted. Calculate the percentage mass of Sodium Carbonate that remained unreacted. (Na = 23, C = 12, O = 16) (3mks)

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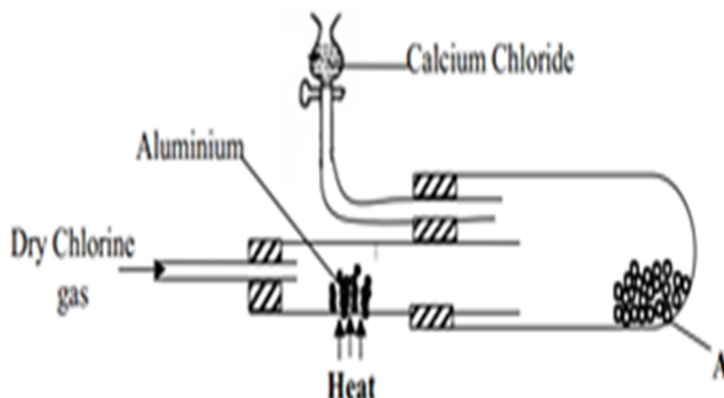
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- (b). In the above reaction, if sodium carbonate is replaced with zinc metal, very little hydrogen gas is liberated. Give a possible reason for this observation. (1mk)

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5. In an experiment, dry chlorine gas was reacted with Aluminium as shown in the diagram below:



i) Name substance A. (1mk)

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ii) State another substance that can be used instead of Calcium chloride. (1mk)

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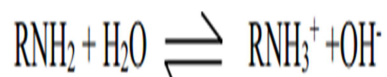
iii) Write an equation for the reaction taking place between dry chlorine gas and Aluminium metal. (1mk)

6. a) Define an acid. (1mk)

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b) Given the equation below;



Identify the substance that acts as an acid in the backward reaction. (1mk)

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7. a) What is a half-life (1mk)

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b) If 1g of Caesium – 137 decays to  $\frac{1}{32}$  in 100 days. What is the half-life of Caesium- 137? (2mks)

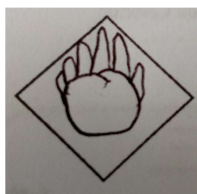
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8. a). What do the following label on a chemical container mean? (1mk)



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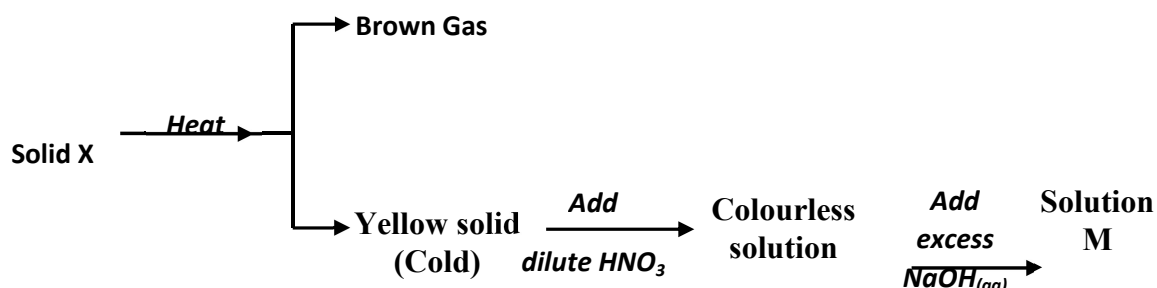
b) After use, a non-luminous flame should be put off or adjusted to luminous. Explain. (1mk)

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c). Give the main cause of accidents in the laboratory. (1mk)

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9. Study the flow chart below and answer the questions that follow.



a) Identify the cation and anion present in solid X. (1mk)

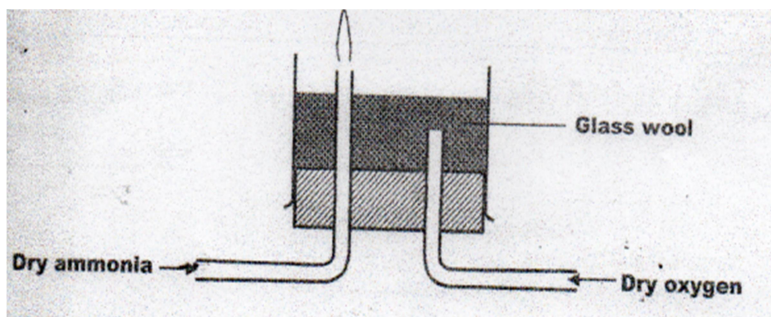
Cation .....

Anion .....

b) Identify the complex ion present in solution M (1mk)

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10. Dry ammonia and dry oxygen were reacted as shown in the diagram.



(a) What is the purpose of the glass wool? (1mk)

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(b) What product would be formed if red-hot platinum was introduced into a mixture of ammonia and oxygen? (1mk)

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c) Explain why high temperature is required for Nitrogen to react with Oxygen. (1mk)

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11. A volume of  $280\text{cm}^3$  of nitrogen gas diffuses through a membrane in 70 seconds, how long will it take  $400\text{cm}^3$  of carbon(IV) oxide to diffuse through the same membrane? (N=14, C=12, O=16) (3mks)

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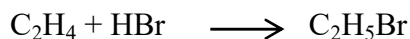
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12. a). Use the following data to calculate the enthalpy change for the reaction of ethane and Hydrogen bromide. (2mks)



Bond	Bond Energy kJ/Mol
C-C	436
C-H	413
C=C	612
C-Br	276
H-Br	366

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b). Is the reaction exothermic or endothermic? Explain. (1mk)

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**13.** Identify the laboratory apparatus used for:

(a) Holding and supporting pieces of apparatus such as burette during experiment (½mk)

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(b) Scooping solid chemical substances during experiments. ( ½mk)

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(c) Using diagrams, distinguish between a conical flask and a volumetric flask (2mks)

**14.** Crude oil is a source of many compounds that contain carbon and hydrogen only.

(a) Name the process used to separate the components of crude oil. (1mk)

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(b) On what two physical properties of the above components does the separation depend? (1mk)

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(c) Under certain conditions hexane can be converted to two products. The formula of one of the products is  $C_3H_8$ . Name the other product. (1mk)

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15. a) Give the chemical symbols of the following elements

(1½mks)

compound	Chemical symbol
Fluorine	
Beryllium	
Copper	

b) Identify the radicals present in the following compounds;

(1½mks)

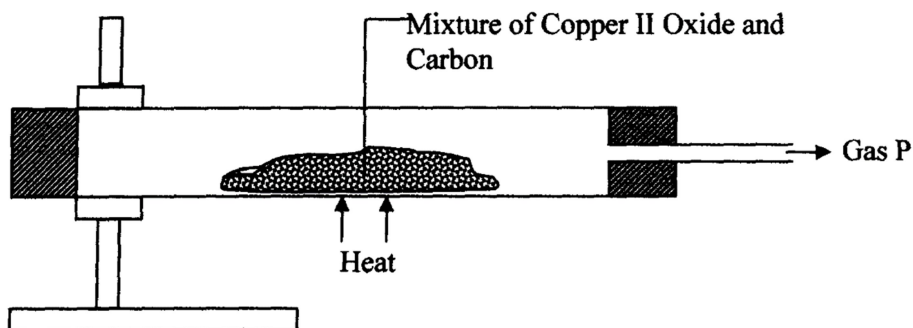
i.  $\text{NH}_4\text{NO}_3$

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ii.  $\text{Ca}(\text{HCO}_3)_2$

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



(a) State the observation made in the combustion tube.

(1mk)

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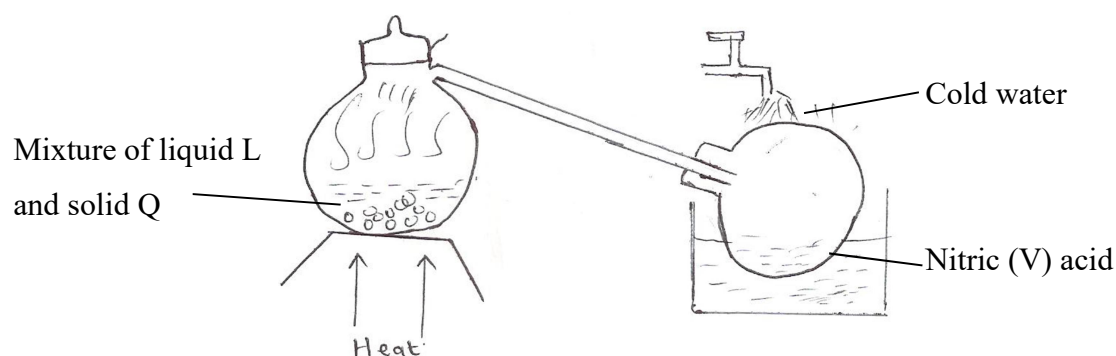
(b) Write an equation for the reaction that took place in the combustion tube

(1mk)

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17. The diagram below shows the preparation of Nitric (V) acid.



a). Name the liquid L and solid Q used to prepare Nitric (V) acid. (2mks)

L .....

Q .....

b). The colour of the freshly prepared acid is yellow. Give a reason for this observation. (1mk)

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c). Name the apparatus in which the reaction is taking place. (1mk)

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18. 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? (½mk)

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(ii) Element Z? (½mk)

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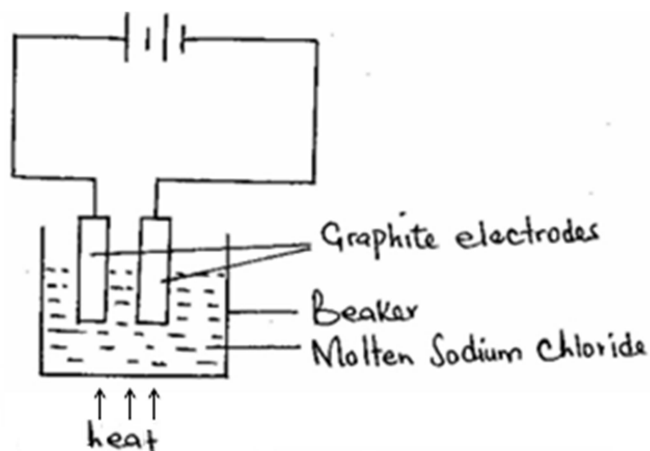
b) Determine the relative formula mass of the compound formed between **T** and **Z** (1mk)

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19. The diagram below represents an experiment which was carried out by a student to investigate the effect of passing an electric current on molten sodium chloride.



a). Molten sodium chloride is a binary electrolyte. State the meaning of the term binary electrolyte.

(1mk)

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b) State the observation made at the anode.

(1mk)

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c) Write an equation to show what happens at the cathode.

(1mk)

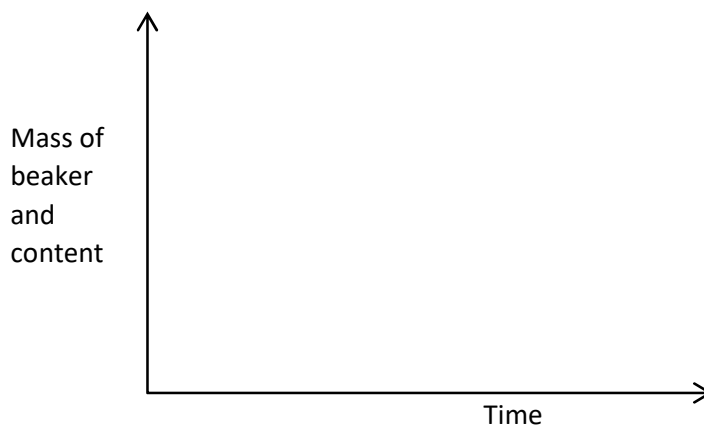
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20. In an experiment 30g of a metal carbonate were added to 30cm<sup>3</sup> of 1M hydrochloric acid in a beaker. The mass of the beaker and its contents were weighed at time intervals.

a). Sketch a graph on the axis given below and label it as Q.

(1mk)



b). On the same axes sketch another graph when 2M of the acid is used with the same mass of the carbonate.

(1mk)

c). Identify the component that is used to determine the rate of a reaction in this experiment.

(1mk)

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21. (a) Define solubility.

(1mk)

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(b) 28g of a saturated solution of a salt at 25°C yielded 7g of a solid when evaporated to dryness. Find the solubility of the salt at 25°C.

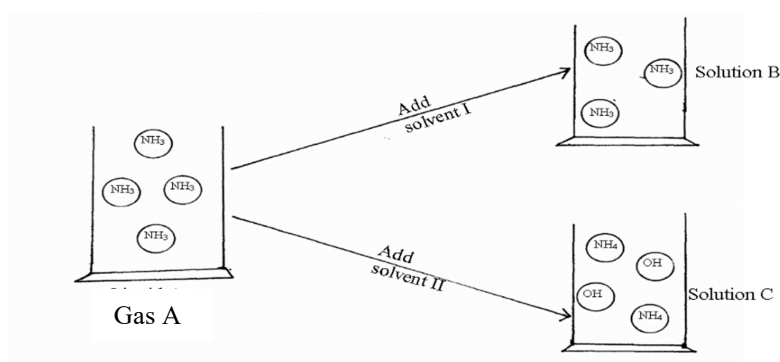
(2mks)

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



(a) Identify the solvent used in step I and step II.

I..... (1mk)

II ..... (1mk)

(b) State and explain what is observed if a red litmus paper was dipped in solution B and C. (2mks)

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23. 20cm<sup>3</sup> of a solution containing 4.5g/dm<sup>3</sup> of sodium hydroxide reacted exactly with 24cm<sup>3</sup> of dilute sulphuric acid solution. Calculate the molarity of the sulphuric acid. (3mks)

( Na=23.0, O=16.0, H= 1.0)

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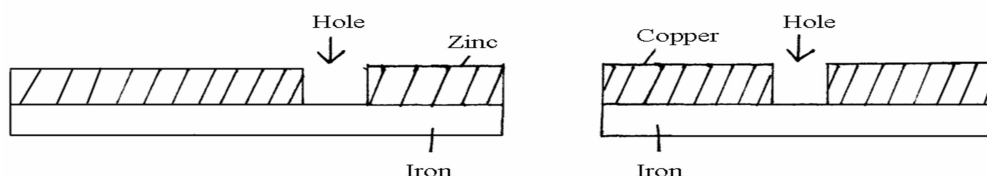
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24. The figure below shows cross – sections of two pieces of iron coated with Zinc and Copper respectively.



I

II

a). Which piece of iron would rust when the holes were filled with water and left for some time?

Explain. (2mks)

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b). Which method of protection is demonstrated above? (1mk)

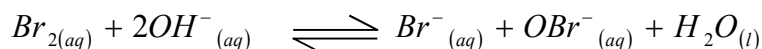
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25. a). Define a dynamic equilibrium. (1mk)

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b). When bromine gas reacts with aqueous sodium hydroxide, the equilibrium represented by the equation below is established.



(Brown)

(Yellow)

State and explain the observation that would be made if a few drops of Hydrochloric acid were added to the equilibrium mixture? (2mks)

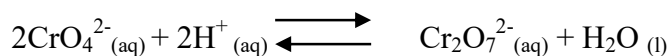
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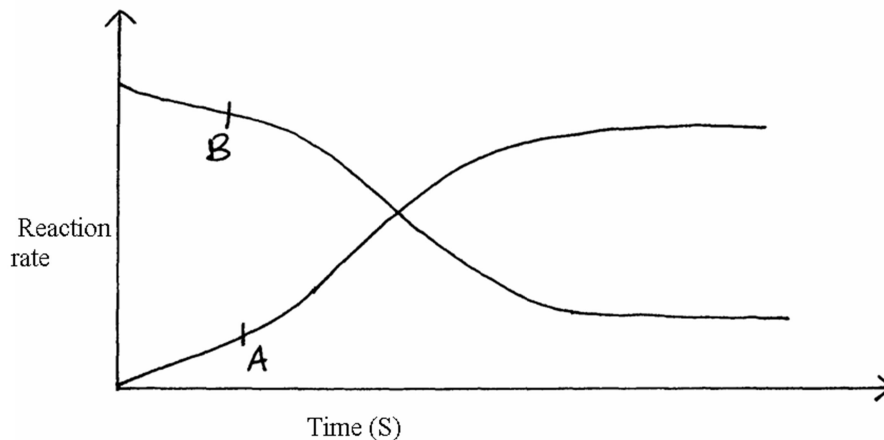
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c). The equation below shows a reaction at equilibrium



If a graph of reaction rate against time was plotted, the curve obtained is as shown.

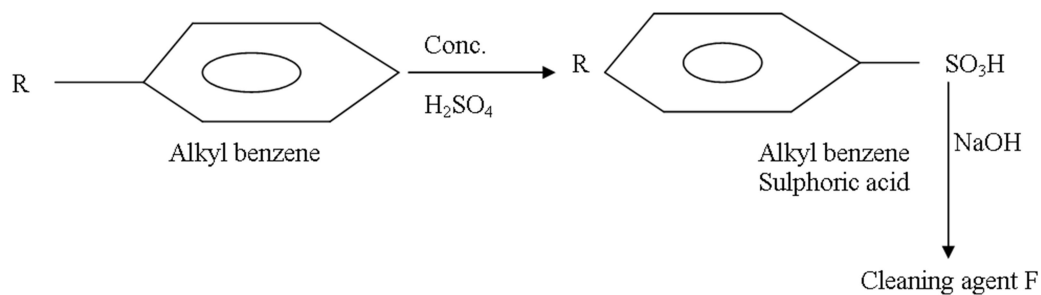


Identify species A and B.

A ..... (½ mk)

**B** ..... (½ mk)

**26.** The scheme below represents the manufacture of a cleaning agent F.



(a) Give the formula of F and the type of cleaning agent in which F belongs. (2mks)

Formula: .....

Type: .....

(b) State one disadvantage of using F as a cleaning agent. (1mk)

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**27.** Draw a dot (•) and cross (X) diagram to show bonding in carbon (II) oxide. (2mks)