# FORM 3 TERM 1 2021
CHEMISTRY

INSTRUCTIONS.
Answer all the questions in the spaces provided.

1. Fractional distillation of liquid air usually produces nitrogen and oxygen as the major products.
   a. Name one substance that is used to remove carbon (IV) oxide from the air before it is changed into liquid.   (1mk)

   b. Describe how nitrogen gas is obtained from the liquid air. (boiling points, nitrogen = 196ºC, oxygen = -183ºC)   (2mks)

2. The set up in the figure below can be used to prepare nitrogen (II) oxide. Use it to answer the questions that follow.

   a. Name substance A.   (1mk)

   b. When the gas jar containing nitrogen (II) oxide is exposed to air, a brown colour is observed. Explain.   (1mk)

   c. Write an equation for the reaction which accured in the flask.   (1mk)

3. Carbon (IV) oxide is present in soft drink. State two roles of carbon (IV) oxide in soft drinks.   (2mks)

b. Explain the observation made when a bottle containing a soft drink is opened.   (1mk)

4. Calculate the mass of Zinc oxide that will just neutralize dilute nitric (V) acid containing 12.6g of nitric (V) acid in water. (Zn=65., O=16.0, H=1.0, N=14.0)   (3mks)

5. When compound N is heated, a red-brow gas is evolved and a yellow residue is left on cooling. Name:
   a. Compound N   (1mk)

   b. The red-brown gas.   (1mk)

   c. Write the equation for the decomposition of compound N.   (1mk)

6. Calculate the volume of oxygen that would be obtained when 21.25g of sodium nitrate is decomposed at stp. (1 mole of a gas occupied $22.4dm^3$ at stp; N=14, Na=23, O=16)
                                                                                       (3mks)

7. In the extraction of sulphur by the Frasch process, water at a temperature of 170^oC is pumped into the sulphur deposits.
   a. State the role of the water.   (1mk)

   b. State how a temperature of 170^oC is achieved.   (1mk)

8.   When coloured flower petals are dropped into a gas jar containing sulphur(IV) oxide gas, they are bleached. Explain.   (2mks)

b. Write the equations for the reactions that occur in (a) above. (2mks)

9. State and explain the observations made when a burning piece of magnesium ribbon is placed in a gas jar of nitrogen gas. (3mks)

10. When cabon(IV) oxide is passed through calcium hydroxide solution for a short time, a white precipitate is formed, but when passed through sodium hydroxide no precipitate is formed. Explain. (3mks)

11. In a compound of magnesium and nitrogen, 54g of magnesium combine with 21g of nitrogen. Determine the empirical formula of the compound. (mg=24, N=14) (3mks)

12. A volume of 120cm^3 of nitrogen gas diffused through a membrane in 40 seconds, how long will 240cm^3 of carbon (IV) oxide take to diffuse through the same membrane? (N=14, C=12, O=16) (3mks)

13. The following set-up is used to prepare nitric (V) acid in the laboratory
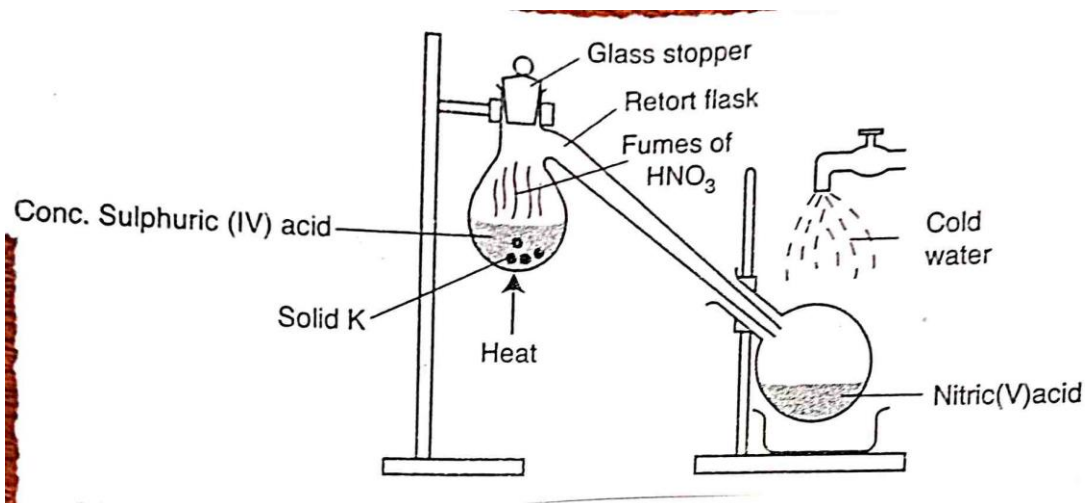
a. All the apparatus used during preparation of nitric (V) acid are made of glass. Give a reason. (1mk)

b. Name solid K. (1mk)

c. State one use of nitric (V) acid. (1mk)

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

| Yellow substance Y | →Heat O₂→ | Z | →Acidified K₂Cr₂O₇→ | Green solution |

Z → Solution P pH=5
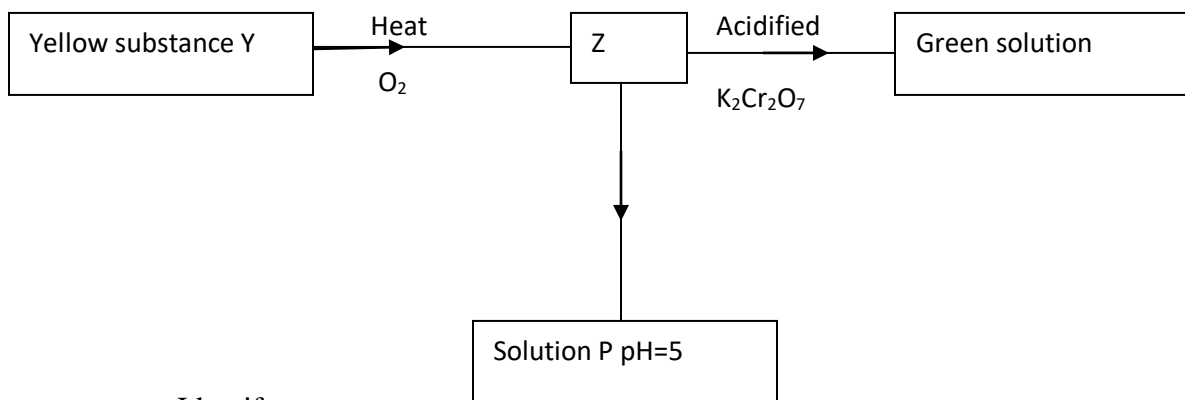
a. Identify:
   i. Z (1mk)

   ii. M (1mk)

15. In the contact process, during the production on sulphur (VI) oxide, a catalyst is used. Give two reasons why vanadium (V) oxide is preferred to platinum. (2mks)

16. Aqueous ammonia was added to copper (II) sulphate solution dropwise until in excess.
   a. What observations were made? (2mks)

   b. Write down the ionic equations representing the observation mentioned in (a) above. (2mks)

17. In the laboratory ammonia gas is prepared by the reaction between calcium hydroxide and ammonium chloride.
   a. Write the equation for the reaction which produces ammonia. (1mk)

   b. State the drying agent used to dry ammonia. (1mk)

   c. State the raw materials used in the manufacture of ammonia in the Haber process. (1mk)