

FORM FOUR TERM ONE EXAM 2017

CHEMISTRY
Paper 2
Time: 2 Hours

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- 1.
- (i) Which letter represents an element that gains electrons most easily? Give a reason for your answer . (2mrks)
.....
.....
- (ii) Write the electronic configuration for the stable ion of **Y**. (1mrk)
.....
- (iii) How do you compare the electronic conductivity of **X** and **Y**. Give a reason for your answer. (2mrks)
.....
.....
- (iv) Give a reason(s) why the radius of **W** is larger than that of **G**. (2mrks)
.....
.....
- (v) Show the position of an element **A** that forms stable ions with a charge of +2 and an electronic configuration 2,8,8. (1mrk)
- (vi) Write the formula of the oxide of **Y** and state its nature. (2mrks)
.....
.....
- (vii) State the type of bonds found in the chloride of **W**. Give a reason for your answer. (2mrks)
.....
.....
- (viii) Calculate the mass of **E** that reacts with water to produce 2.4dm^3 at room temperature, (molar gas volume = 24 at room temperature, relative atomic mass of **E**=24).(2mrks)

2. (a) Define the terms

(i) Saturated solution. (1mrk)

.....

(ii) Solubility (1mrk)

.....

(b) The table below gives solubilities of potassium nitrate at different temperatures

Temperature ($^{\circ}\text{C}$)	10	20	30	35	40	50	55	60
Solubility gm /100gm of water	20	31	45	53	62	84	96	110

(i) Plot a graph of solubility of potassium nitrate (vertical axis) verses temperature (Horizontal axis)
(3mks)

(ii) State the name given to the graph obtained (1 mrk)

.....

(iii) Use the graph to
I Determine the solubility of potassium nitrate at 28°C (1mrk)

.....

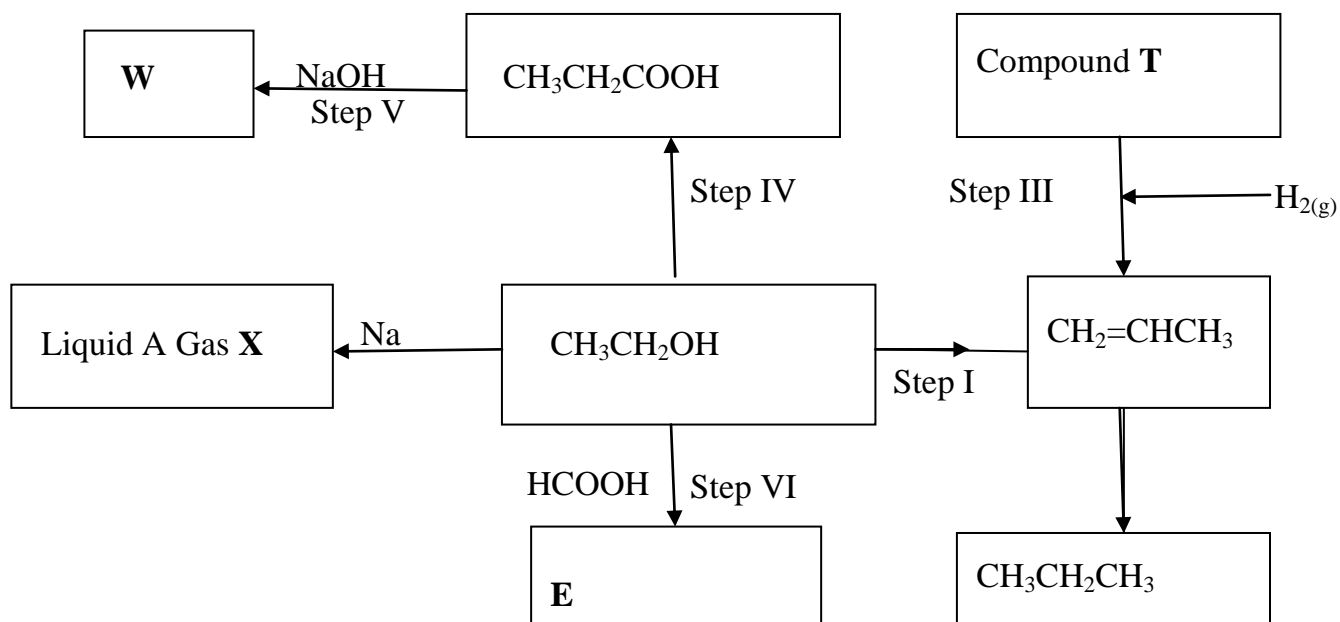
II Determine the mass of potassium nitrate that crystallise out when 100cm^3 of water containing 82grams of potassium nitrate at 54°C is cooled to 38C . (2mrks)

III State the relationship between solubility of potassium nitrate and temperature. (1mrk)

.....

(c) Calculate the molarity of a saturated solution of potassium nitrate at 34°C . (K=39,N=14,O=16, density of water at 34°C =10g per cm^3) (3mrks)

3. The scheme below shows a series of reactions starting with propan-1-ol, Use it to answer the questions that follow



(a) Name the reagent for (3mrks)

(i) Step (IV)

.....

(ii) Step (II)

.....

(iii) Step (I)

.....

(b) Name the types of reactions in ; (4mrks)

(i) Step (V)

.....

(ii) Step (VI)

.....

(iii) Step (IV)

.....

(iv) Step (I)

.....

(c) State the conditions necessary for the reactions in

(i) Step II

(1mrk)

.....

(ii)step VI

(1mrk)

.....
(d) Name the substances

(4mrks)

(i) **A**

.....
(ii) **T**

.....
(iv) **W**

.....
(v) **E**

4. 50cm³ of 2M Copper (II) sulphate solution was placed in a 100cm³ plastic beaker and its temperature was noted. Excess magnesium powder was added to the solution which was stirred and its highest temperature reached was noted the results were as follows

Initial temperature of the 2M CuSO ₄	21.5°C
Final temperature of the mixture	29.0°C

(i) State with a reason whether the reaction was exothermic or endothermic. (2mrks)

.....
.....
(ii) Other than temperature change , state two other observation that were made at the end of the experiment. (2mrks)

.....
.....
(iii) Calculate the heat transferred to the reaction mixture (assume density of solution =1gcm⁻³,specific het capacity of the solution =4.2 joules per gram°C) (1mrk)

(iv) State the reason for using excess of magnesium powder. (1mrk)

(v) Calculate the molar heat of reaction for displacement of Copper (III) ions by Iron. (2mrks)

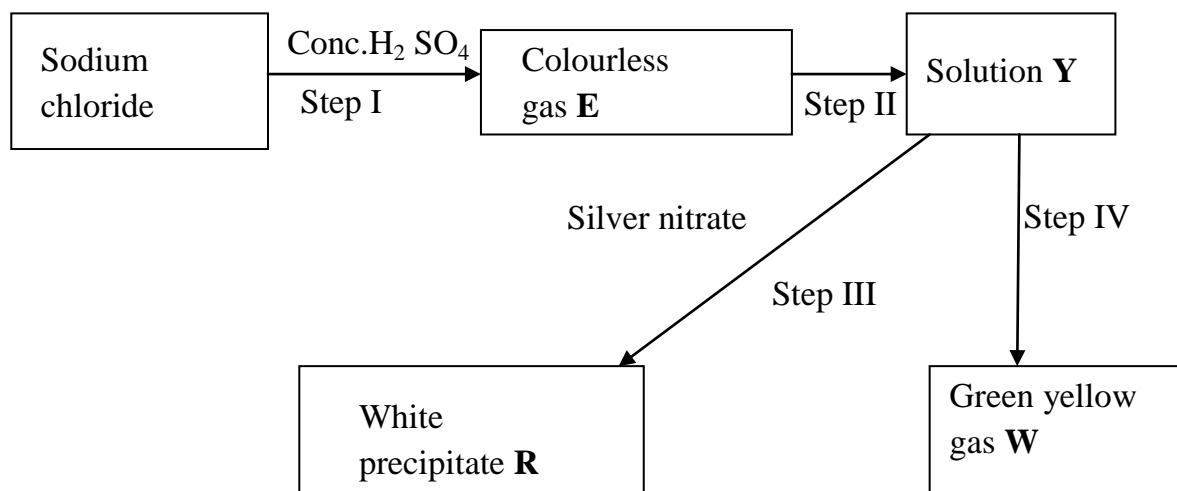
(vi) Why is it preferred to use plastic beaker than glass beaker? (1mrk)

(vii) The value obtained in (V) above is less than the theoretical value, give a reason for this. (1mrk)

(viii) Sketch an energy level diagram for reaction taking place in this experiment. (2mrks)

(ix) Write the ionic equation for the reaction taking place in the above experiment. (1mrk)

5. The flow chart below shows a series of reactions starting with sodium chloride



(a) Name the substances (4mrks)

E

.....
Y

.....
R

.....
W

.....
(b) Name the reagent for step IV (1mrk)

.....
(c) Write a balanced equation for the reaction in step I (1mrk)

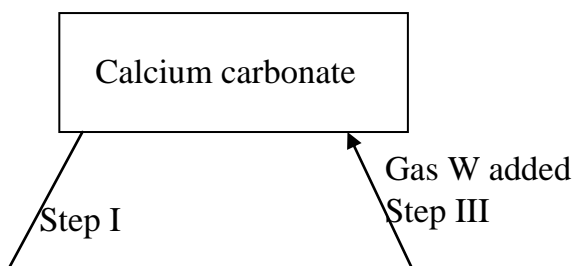
(d) Give a reason why dry chlorine gas has no effects on dry blue litmus while it affects wet blue litmus paper. (½ mrk)

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(e) What do you observe when **R** is exposed to sunlight ? Explain (2mrks)

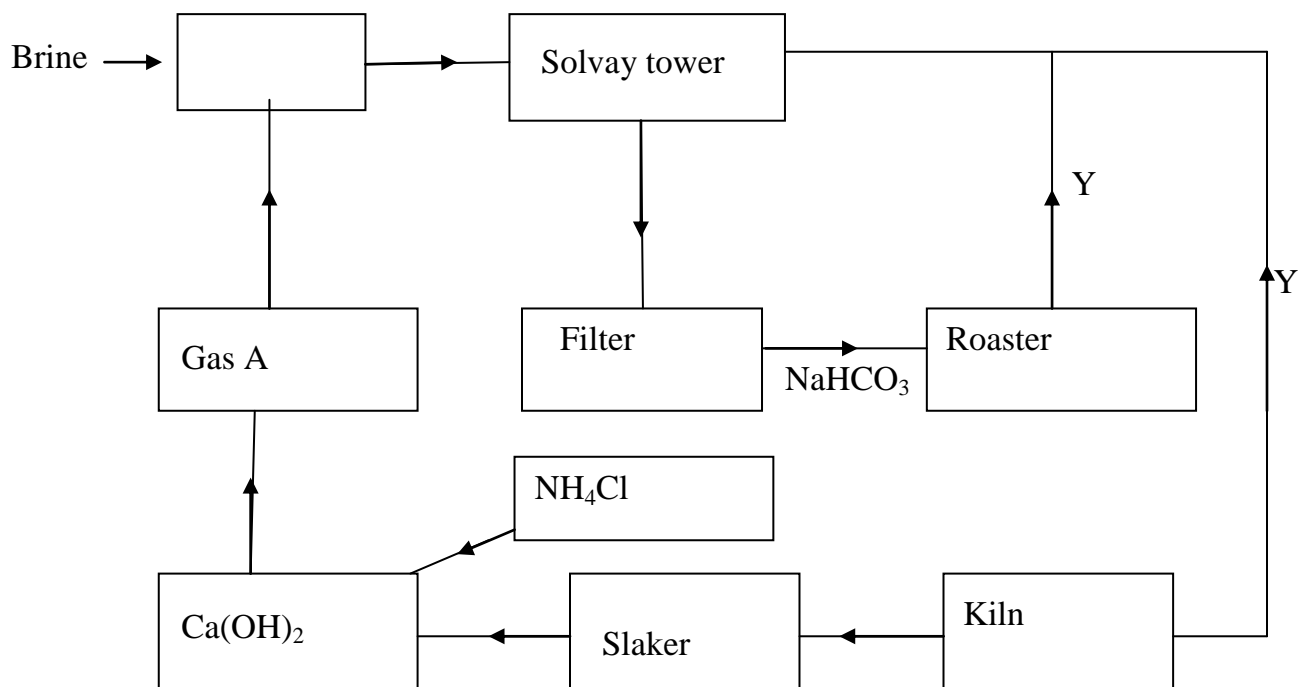
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(f) Write the ionic equation for the reaction in Step III. (1mrk)

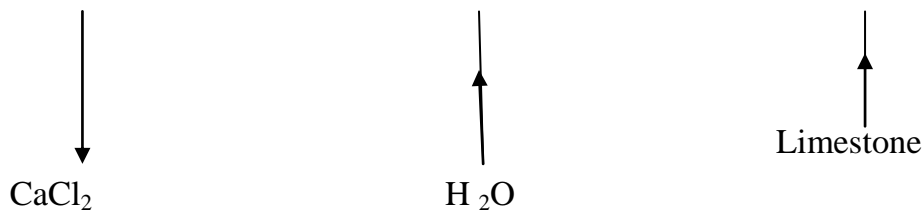
(g) State **one** major use of chlorine gas. (1mrk)

6. Study the following diagram and answer the questions that follow



- (i) Name the process in
- (a) Step I (1mrk)
-
- (b) Step II (1mrk)
-
- (ii) State the property of gas **T** displaced in step III. (1mrk)
-
- (iii) Write a balanced equation for the reaction in steps
- (a) Step II (1mrk)
-
- (b) Step III (1mrk)
-
- (iv) Name the main materials used in the Solvay process. (3mrks)
-
-
-
- (v) Study the chart below and answer the questions that follow.





(a) Name the substance indicated as

I Gas A (½ mrk)

.....

II Gas Y (½ mrk)

.....

(b) State the use of baffles in the Solvay tower. (1mrk)

.....

(c) Write a balanced equation for the reaction in the Solvay tower. (1mrk)

7. In an experiment to find out the effect of temperature on reaction rate, a student added 1cm magnesium ribbon to 25cm³ of 1M HCl at 22.0 °C and recorded the volume of gas evolved at intervals of 30seconds. She plotted the graph and got it as shown below

(i) Write a balanced equation for the reaction taking place. (2mrks)

(ii) Sketch the graph that would be obtained if the experiment was done using hydrochloric acid on the same grid above at (2mrks)

a. 35.0°C

b. 18.0°C

(iii) State and explain the effects of temperature on reaction rate . (2mrks)

.....

.....

(iv) Use the graph to work out the total volume of gas evolved. (1mrk)