NAME: ……..……

ADM NO.:……..DATE……

SCHOOL:..……..……SIGN……..……

233
CHEMISTRY
FORM TWO
THEORY
END OF YEAR 2017 EXAMINATION.
2 HOURS

INSTRUCTIONS TO CANDIDATES

- *Answer **all** the questions in the spaces provided*
- *Mathematical tables and electronic calculators **may** be used*
- *All workings **must** be clearly shown where necessary*

For Examiner's Use Only

Questions	Maximum Score	Candidates Score
1-29	100	

1. a) Name two commonly abused drugs in Kenya. (1 mark)

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b) Differentiate between prescription drugs and over the counter drugs. (2 marks)

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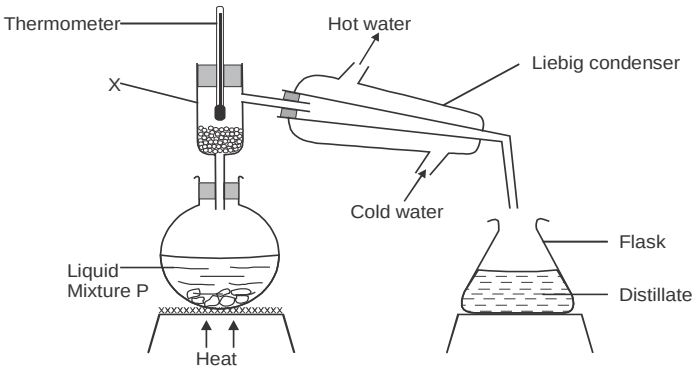
2. Study the diagram below and answer the questions that follow. The diagram shows the method used to separate component of mixture P.



a) Name X ..... (1 mark)

b) What is the name given to the method used in separation of mixture P ? (1 mark)

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c) What would happen if the inlet and outlet of water were interchanged ? (1 mark)

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d) Which physical property is used to separate mixture P ? (1 mark)

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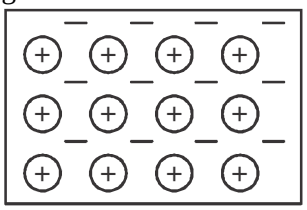
3. The diagram below is a section of a model of the structure of element T.



KEY

⊕ Charged nucleus

— An electron

a) State the type of bonding that exist in T. (1 mark)

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b) In which group of the periodic table does element T belong? Give a reason. (2 marks)

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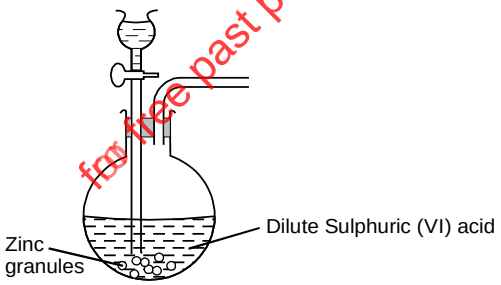
4. The set up below was used to prepare hydrogen gas.



a) Complete the diagram to show how a dry sample of hydrogen gas can be collected. (2 marks)

b) Write an equation which takes place when hydrogen gas burns in air. (1 mark)

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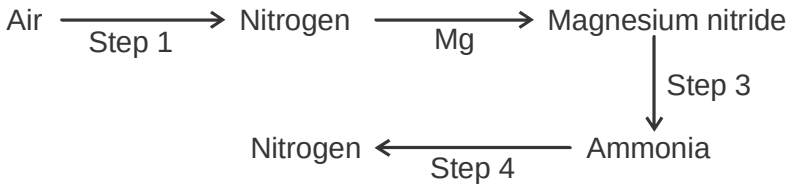
5. Study the sequence of reactions below and answer the questions that follow.



a) Name the process in step 4……(1 mark)

b) i) What reactant is used to achieve step 4 ? (1 mark)

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ii)Write a balanced chemical equation for step 3. (1 mark)

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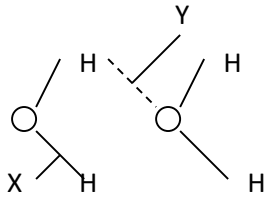
6. Structure of two molecules of water can be represented as shown below.



i) Name the type of bonds X and Y

I. X…….. (1mark)

II. Y…… (1mark)

ii) The table below gives some information about water and Methane.

Substance	Relative molecular mass	Boiling point (^{0}C)
Water	18	100
Methane	16	-161

Explain the difference between the boiling points of water and methane. (1mark)

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7. Below are PH values of some solutions.

Solution	Z	Y	X	W
PH	6.5	13.5	2.2	7.2

i) Which solution is likely to be

I. acidic rain ..... (1 mark)

II. Potassium hydroxide ..... (1 mark)

ii) A basic substance V reacted with both solutions Y and X. What is the nature of V. (1 mark)

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iii) Identify two substances that show these characteristics in question (ii) above. (1 mark)

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8. Metal S removes oxygen combined with P. Q reacts with an oxide of R and not with an oxide of P. P reacts with cold water but Q does not.

a) Which is the most reactive metal ?.....(1 mark)

b)Which is the least reactive metal?.....(1 mark)

c) Arrange the metals in order of reactivity starting with most reactive to the least reactive. (1 mark)

9. The electronic structures for elements represented by letters A, B, C and D are

A - 2.8.6 B - 2.8.2 C - 2.8.1 D - 2.8.8

a) Select the element which forms :

i) a double charged cation…….. (1 mark)

ii) a soluble carbonate……. (1 mark)

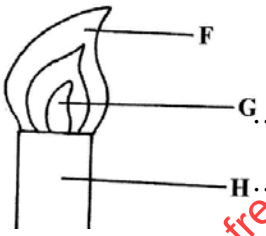
b) Which element has the shortest atomic radius ?..... (1 mark)

10. Bottle of sodium carbonate, sodium chloride and sugar have lost their labels. A student prepares and tests an aqueous solution of a sample of each bottle. The results obtained are as shown below.

Bottle	PH	Electrical conductivity	Correct label
1	7	conducts	
2	7	does not conducts	
3	10	conducts	

Complete the table by filling the correct label for each bottle. (3 marks)

11.Study the figure below and answer questions that follow.



G……

H……..

Name the parts labelled **F** and **G**. (1mk)

12. The table below gives information on four elements represented by K, L, M and N. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	**Electron arrangement**	**Atomic radius**	**Ionic radius**
K	2, 8, 2	0.136	0.065
L	2, 8, 7	0.099	0.181
M	2, 8, 8, 1	0.203	0.133
N	2, 8, 8, 2	0.174	0.099

(a) Which **two** elements have similar chemical properties? Explain. (2mks)

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13Describe how a solid sample of Lead (II) Chloride can be prepared using the following reagents:
Dilute Nitric(v) Acid, Dilute Hydrochloric Acid and Lead(II) Carbonate. (3mks)

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14.Both diamond and graphite have giant atomic structures. Explain why diamond is hard while graphite is soft. (2mks)

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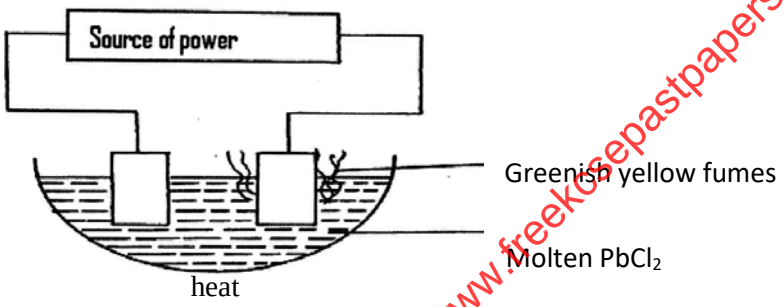
15.Use the set up below to answer the questions that follow.



(a) On the diagram, label the cathode. (1mk)
(b) Write the equation for the reaction at the cathode. (1mk)

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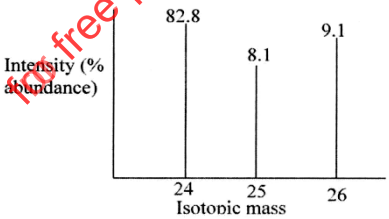
16.The peaks below show the mass spectrum of element X.



Calculate the relative atomic mass of X. (2mks)

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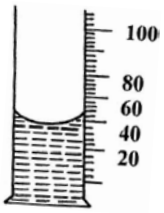
17. In an experiment, concentrated sulphuric (VI) acid was put in a beaker and exposed to air for one week as shown below.



(i) What observation was made after one week? Explain. (2mks)

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(ii) What property of sulphuric (VI) acid was being investigated in the experiment? (1mk)

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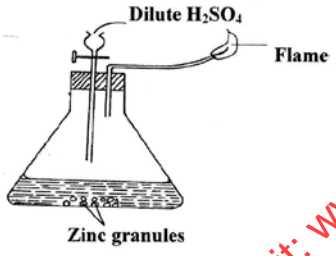
18. Below is a set-up of apparatus used to prepare hydrogen gas in the laboratory. Study it and answer the questions that follow.



(a) Write a chemical equation for the two reactions taking place in he above set-up. (2mks)

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(b) State the chemical test for hydrogen gas. (1mk)

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19.State **three** reasons why air is considered to be a mixture but not a compound. (3mks)

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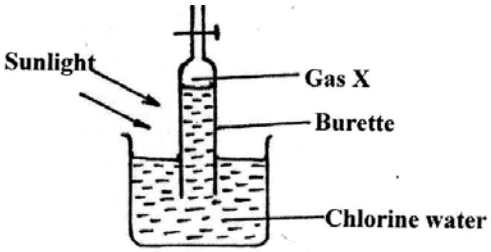
20.An experiment was set up using chlorine water as shown below.



(i) Identify gas X. (1mk)

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(ii) Write an equation for the production of gas X. (2mks)

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21.The 1st, 2nd and 3rd ionization energies in KJ/Mol of elements G and R are given below.

Element	**1st I.E**	**2nd I.E**	**3rd I.E**
G	520	7,300	9,500
R	420	3,100	4,800

(i) Define the term ionization energy. (1mk)

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(ii) Apart from the decrease in energy levels, explain the big difference between the 1st and 2nd ionization energies.(1mk)

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22. The table below shows the pH values of some solutions.

Solution	J	K	L	M	N
pH	6	13	2	10	7

Which solution is likely to be:

(i) Potassiumhydroxide……(1mk)

(ii) Lemonjuice……(1mk)

23. Using dots (•) and crosses (x) to represent electrons, show bonding in the compound formed when the following elements reacts. (N = 14, H = 1).

Nitrogen and Hydrogen. (1mk)

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24. Some salts may be classified as double salts or basic salts. Trona with the formula $Na_2CO_3.NaHCO_3$ is an example of a double salt. An example of a basic salt is basic magnesium carbonate with formula $MgCO_3.Mg(OH)_2$.

(a) What is meant by a double salt? (1mk)

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(b) Write equations of reactions that occur when dilute hydrochloric acid is reacted with: (2mks)

(i) Trona

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(ii) Basic magnesium carbonate.

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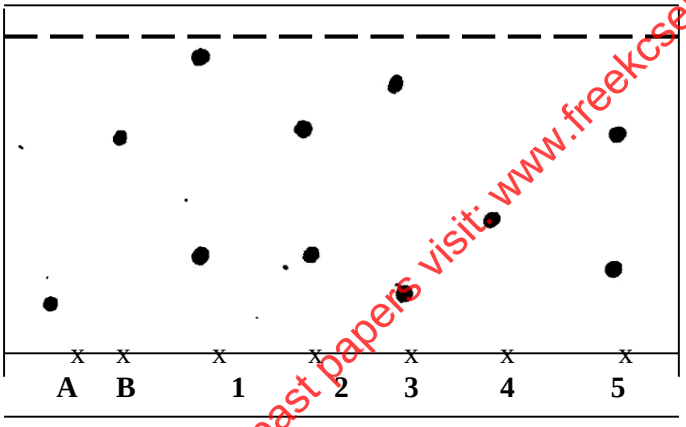
25. During Olympics, urine sample of five short distance runners were taken and tested for the presence of two illegal steroids by paper chromatography. Methanol was used as the solvent. A chromatogram from the test appeared as shown below. Study the chromatogram and answer the questions that follow.



KEY
SPOT A – STEROID A
SPOT B – STEROID B
SPOT 1 – ATHLETE 1
SPOT 2 – ATHLETE 2
SPOT 3 – ATHLETE 3
SPOT 4 – ATHLETE 4

(a) Which of the two steroids is most likely to be more soluble in methanol? Give a reason. (1mk)

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(b) Identify the athletes that tested positive for the illegal steroids. (2mks)

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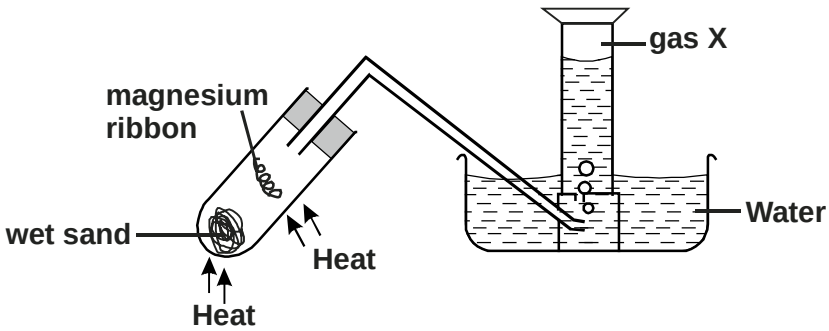
26. Magnesium reacts as shown below.



a) Identify gas X. (1 mark)

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b) Between wet sand and magnesium ribbon, which one should be heated first? Explain. (2 marks)

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27. Study the table below and answer the questions that follow.

Element	Atomic	Relative Atomic mass	Melting point (^{O}c)
Sodium	11	23.0	97.8
Aluminium	13	27.0	___
Phosphorus	___	31.0	44.2(white)590(Red)
Neon	10	____	-249
Calcium	20	40.0	850
Hydrogen	___	1.0	-259
Carbon	6	____	3730

a) Complete the table by filling in the missing atomic numbers and atomic mass. (2 marks)

b) i)Three isotopes of magnesium have mass numbers 24, 25 and 26. What is the mass number of the most abundant isotope of magnesium? Explain. (2 marks)

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ii) Define the term isotopes (1 mark)

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c) Phosphorous exists in two allotropic forms, white phosphorous and red phosphorous.

i) What are allotropes? (1 mark)

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ii) Name another element that exhibits allotropy. (1 mark)

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iii) Which of the allotropes of phosphorous has a higher density? Explain (1 mark)

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d) Explain the difference in the melting points of sodium and aluminium. (1 mark)

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e) Give the formula of the compound formed between aluminium and carbon. (1 mark)

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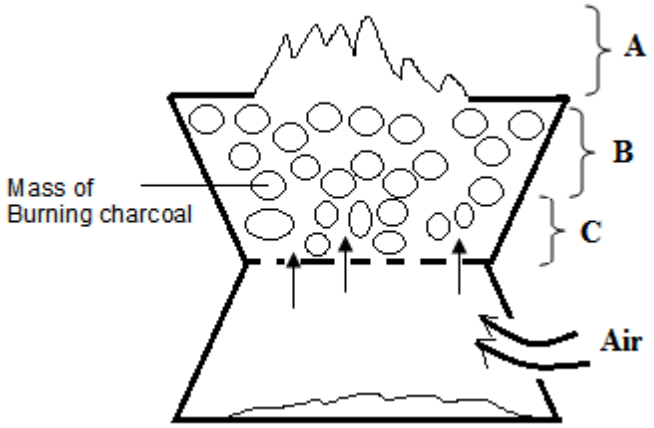
28.(I) The diagram below shows a burning jiko. Study it and answer the questions that follow.



(a) Write the equation for the reaction taking place in region A. (1mark)

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(b) Name the type of reaction taking place in region B. (1mark)

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(c) State **one** application of the process named in (b) above. (1 mark)

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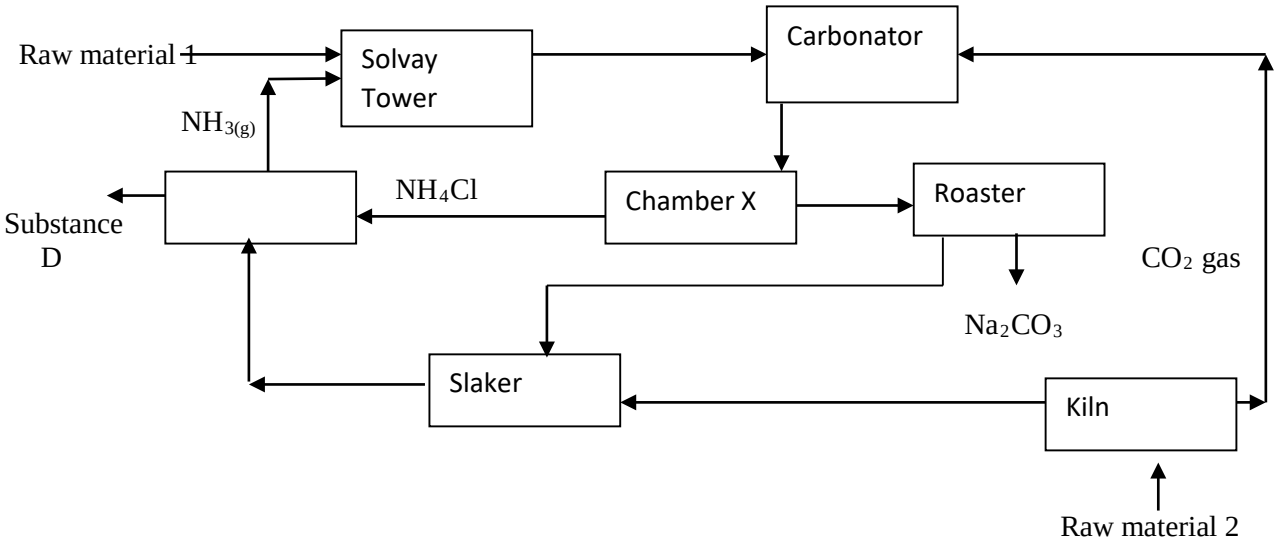
(II) Below is an illustration of the solvay process for manufacture of sodium carbonate. Use it to answer the questions that follow.



a) Name **two** raw materials, in this process other than ammonia. (1 mark)

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(a) the Solvay tower a lot of heat is produced. State how the heat produced is controlled. (1 mark)

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(b) The carbonator is cooled regularly. What does this suggest about the type of reaction in the carbonator?(1mark)

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(c) Write the overall equation for the reaction in the carbonator. (1mark)

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(d) Identify the process taking place in chamber X. (1mark)

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(e) State the property of sodium hydrogen carbonate that enables it to be separated from ammonium chlorid(1mark)

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(f) Name **two** substances that can be recycled. (1 mark)

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(g) Why is recycling important in this process? (1 mark)

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(h) Identify substance D. (1mark)

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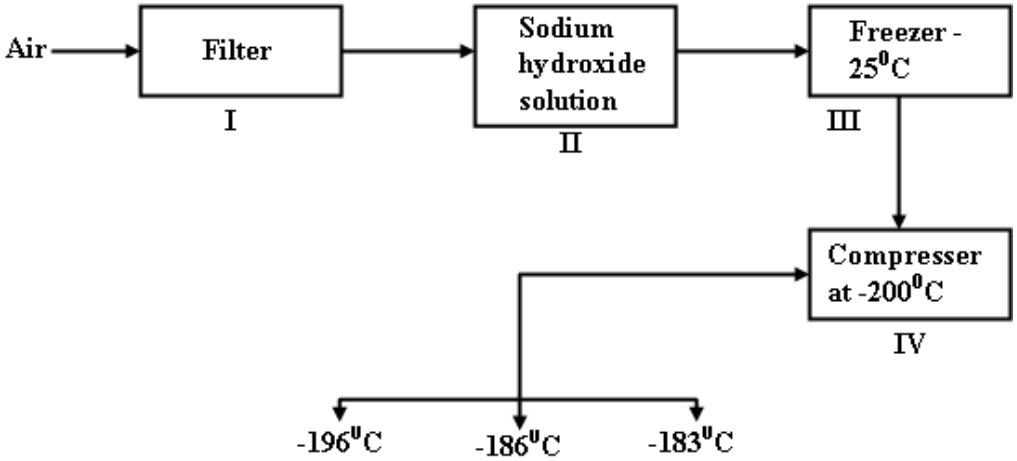
29. a)Study the flow chart below and answer the questions that follow.



i) Name the substances removed in steps I, II and III (3mks)

I. ……..……..

II. ……..……..

III. ……..……..

ii) Name the gases obtained with respect to their boiling points

- 196^0C……..

- 186^0C …….

- 183^0C…….. (3mks)

b) With the aid of labeled diagrams explain how you would show that for rusting to occur, oxygen is necessary. (2mks)

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c) State three uses of oxygen (3mks)

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