NAME: ……..……

ADM NO.:……..DATE……

SCHOOL:……..……SIGN……..……

233

CHEMISTRY

FORM TWO

THEORY

END OF YEAR 2018 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
1-23	100	

1. Describe the non-luminous flame of a Bunsen burner and give a reason why it's preferred when heating substances in the laboratory. (3 marks)

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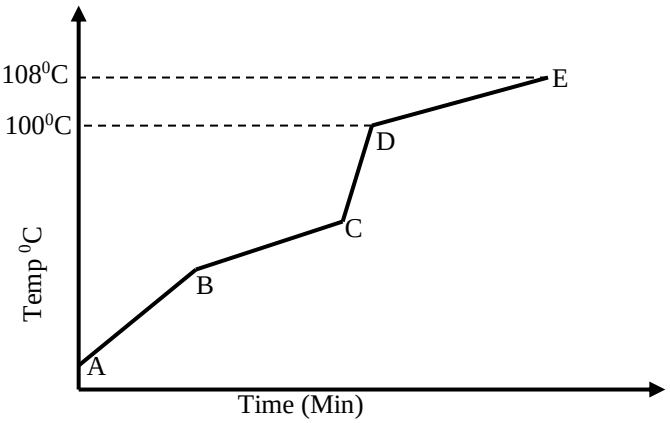
2. Study the diagram shown below to answer the questions that follow. The curve shows the heating curve of water in the laboratory.



(i) At what temperature does the water boil? (1 mark)

……

(ii) Is the curve for a pure water or impure water? Give a reason for your answer (1 mark)

……

(iii) Give the effect of impurities on the boiling point of water (1 mark)

……

3. Calcium carbonate reacts with dilute sulphuric (VI) acid to form some products.
(i) Write an equation for the above reaction (1 mark)

……

(ii) Why would the above reactants not be suitable for preparation of the salt? (2 marks)

……

……

4. Excess magnesium ribbon sample was heated in equal volumes of:-
   (i) Pure oxygen gas
   (ii) Air

   a) Why was the mass of the resulting product in (ii) more than in (i)? (1 mark)

……

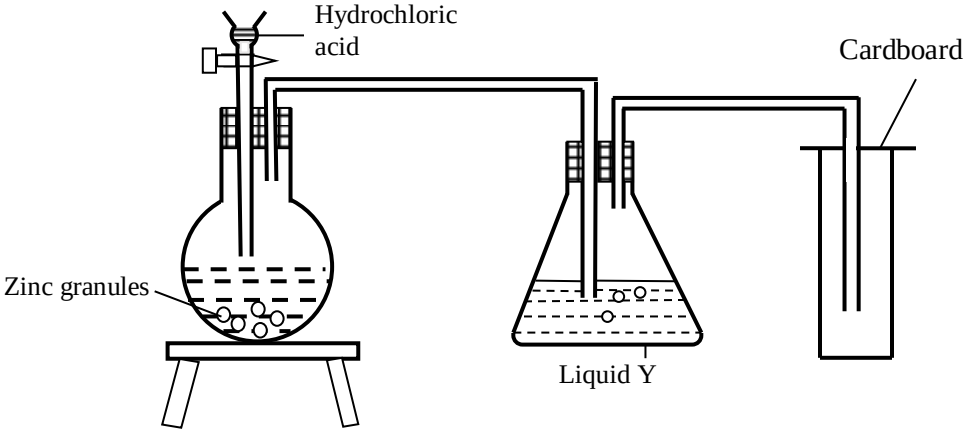
……

   b) Write the equations for the reactions in part (ii) (2 marks)

……

……

5. The set up below was used to prepare dry hydrogen gas. Study it and answer the questions that follow.



(i) Is the method of collecting the gas correct? Give a reason. (1 mark)

……

(ii) What would be liquid Y? (1 mark)

……

(iii)Give two physical properties of hydrogen gas (1 mark)

……

6. Study the information tabulated below to answer the questions that follow:

Melting point	Element	Atomic number
97.8	**P**	**11**
1441	**Q**	**14**
-42	**X**	**17**
64	**Y**	**19**

(a) Write the electron arrangement of the
(i) Atom of Y (½ mark)

……

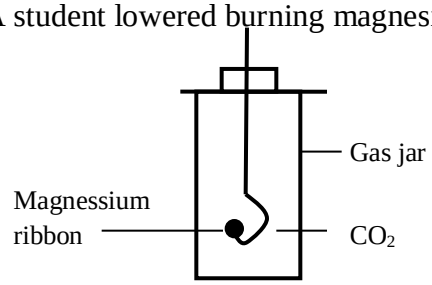
(ii) Ion of X (½ mark)

…….

(b) Compare the ionic radius of Y with its atomic radius (2 marks)

……..

7. A student lowered burning magnesium in a gas jar of carbon (IV) oxide as shown in the diagram.



a) State and explain the observation made in the gas jar (2 marks)

…….

…….

b) Write the equation of the reaction that takes place in the gas jar (1 mark)

……..

…….

8. (a) Using a dot (•) and cross (x) to represent the outer most electrons, draw diagrams to show the bonding in magnesium sulphide. (1½ marks)

……

……

(b) State the structure of the above compound. (½ mark)

……..

(c) Give two properties of substances with the above structure (1 mark)

……

……

9. Given sodium carbonate solid, lead (II) nitrate solid and water, explain how you can obtain a solid sample of Lead (II) carbonate. (3 marks)

……

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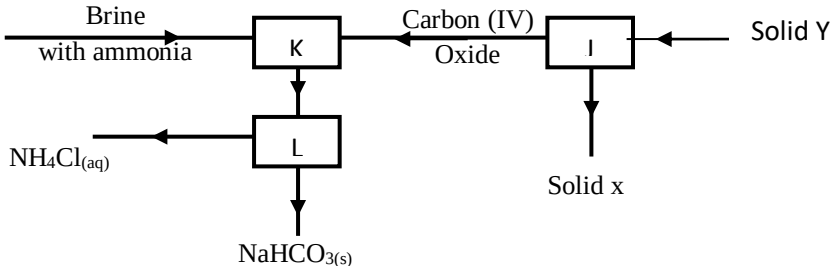
……

10. The diagram below shows part of Solvay process.



(a) Name solid X (1 mark)

……

(b) State the process taking place in chamber L (1 mark)

……..

(c) State two uses of sodium carbonate (2marks)

……

……..

11. The electron arrangement of ions X^{3+} and Y^{2-} are 2, 8 and 2, 8, 8 respectively.

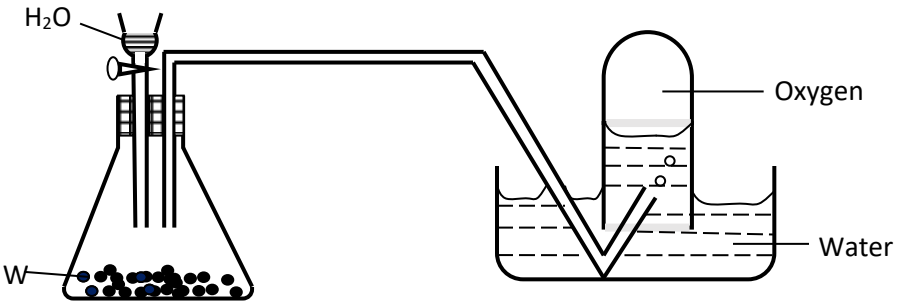
a) In which groups do X and Y belong to? (1 mark)

……..

b) State the atomic numbers of X and Y. (1 mark)

……..

12. The diagram below shows the arrangement used in the laboratory during preparation of oxygen gas.



(i) Name the substance labeled W. (1 mark)

……

(ii) Write an equation showing the preparation of oxygen in the above arrangement. (1mark)

……...

(iii)Name two solids which may be heated to obtain oxygen gas. (1mark)

……

13. The table below shows solutions and their PH values.

Solution	PH value
P	2.0
R	7.0
S	14.0

Select two solutions that would react with zinc hydroxide. Explain your answer (1mark)

……

……..

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

Element	**Atomic radii (nm)**	**Ionic radii (nm)**
Flourine	0.071	0.136
Chlorine	0.099	0.181
Bromine	0.114	0.195

a) Explain why

(i) Atomic radius increases from fluorine to bromine (2 marks)

……

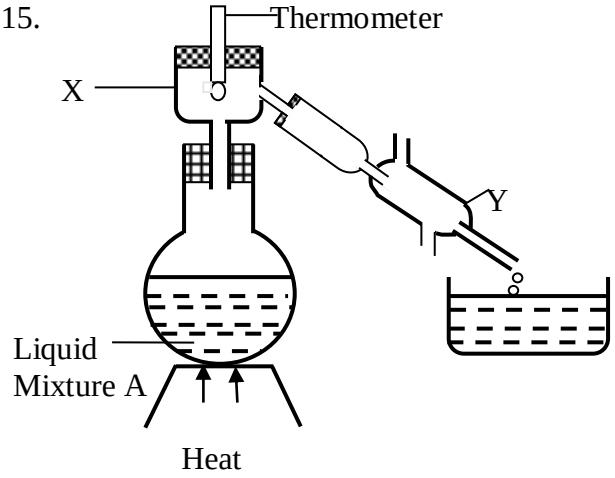
……

(ii) The ionic radius is larger than the atomic radius. (2 marks)

……

……

15.



(i) Name X and Y (1 mark)

……

(ii) What is the purpose of apparatus X? (1 mark)

……

(iii) Show the direction of flow of cold water used for cooling the vapour formed. (½ mark)

……

(iv) What name is given to the above method of separating mixtures? (½ mark)

……..

16. Solid P when heated gives a black powder Q and a colourless gas that forms a white precipitate in lime water.When dilute Sulphuric (VI) acid is added to the powder Q, a pale blue solution is formed.
    a) Give the chemical formula of
    (i) Solid P (1mark)

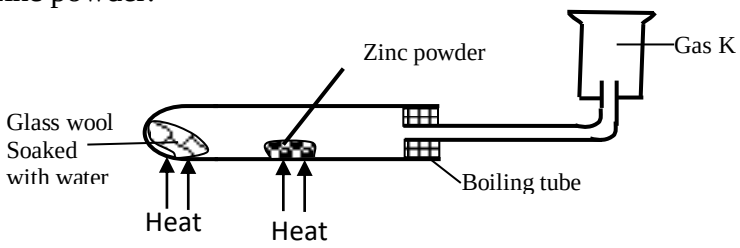
    …….
    (ii) Solid Q (1 mark)

    ……..

    b) Write an equation for the reaction leading to the formation of the pale blue solution.(1mark)

    ……

17. A student set-up the experiment below to collect gas K. The glass wool was heated before heating the zinc powder.



    a) Why was it necessary to heat the moist glass wool before heating the zinc powder? (1 mark)

    ……

    b) What observation was made in the boiling tube? (1 mark)

    ……..
    c) Identify gas K. (1 mark)

    ……

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

Particle	Atomic number	Ionic configuration	Formula of oxide	Atomic radius (nm)	Ionic radius (nm)
P	4			0.110	0.031
Q		2.8.8	QO	0.200	0.099
R		2.8.8	R_2O	0.230	0.133
S	17	2.8.8	S_2O_7	0.099	0.181
T	16			0.104	0.231

    a) Complete the table above. (3marks)

    ….....

b) From the table choose the most reactive metal. Explain. (2marks)

……

……

c) What is the bond type present in the oxide of the metal mentioned in (b) above. (1mark)

……..

d) Using dots (.) and crosses (X) to represent electrons show the bonding in the chloride of Q. (2marks)

……

……

e) Explain the solubility of element **T** in water. (1mark)

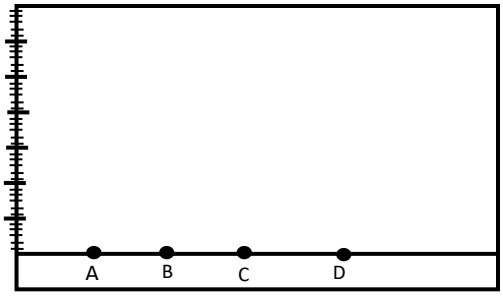
……...

f) Which element is the most electronegative? Explain. (2marks)

……

……

19. a) The diagram below shows spots of pure substances A, B and C on a chromatography paper. Spot D is that of a mixture.



After development A, B and C were found to have moved 7cm, 3cm and 5cm respectively. D had separated into two spots which moved 5cm and 7cm.

On the diagram

(i) Label the baseline (1 mark)

……

(ii) Show the position of the all the spots after development (2 marks)

……

……

(iii) Identify the substances present in mixture D. (1 mark)

……

b). Describe how solid ammonium chloride can be separated from a solid mixture of ammonium chloride and sodium chloride. (2 marks)

……

……

c). The table below shows liquids that are miscible and those that are immiscible.

Liquid	Y	Z
W	Miscible	miscible
X	Miscible	Immiscible

Use the above information to answer the questions that follow.

(i) Name the method that can be used to separate W and Y of a mixture of the two (½ mark)

……

(ii) Describe how a mixture of X and Z can be separated. (2 marks)

……

……..

d). Crude oil is a source of many compounds that contain carbon and hydrogen only.

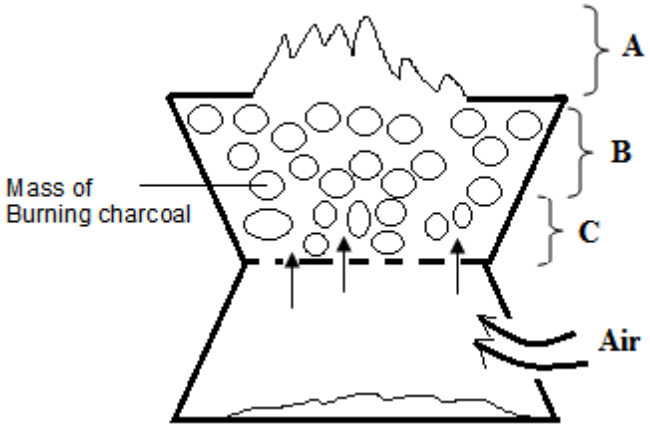
(i) Name the processes used to separate components of crude oil. (½ mark)

……

(ii) On what physical property of the above components does the separation depend? (1 mark)

……

20. (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)

……

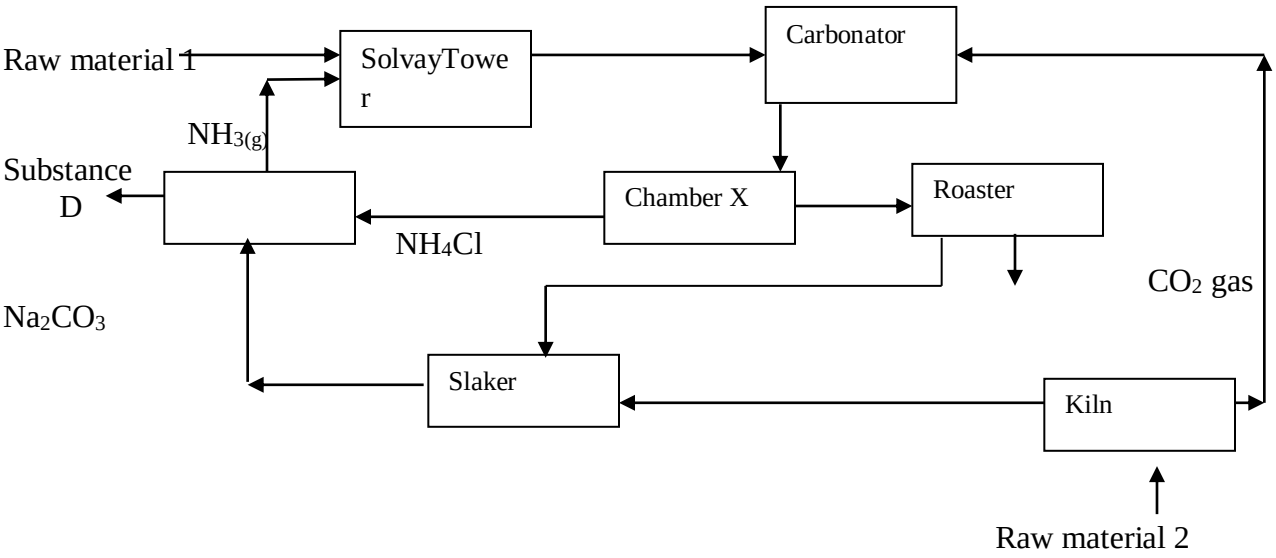
(b) Name the type of reaction taking place in region B. (1mark)

……

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

……

(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. (1mark)

…….

(b) In the Solvay tower alot of heat is produced. State how the heat produced is controlled. (1mark)

……..

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

…… (1mark)

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

…….

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

…….

(f) State the property of sodium hydrogen carbonate that enables it to be separated from ammonium chloride.
(1mark)

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

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

……

(i) Identify substance D. (½mark)

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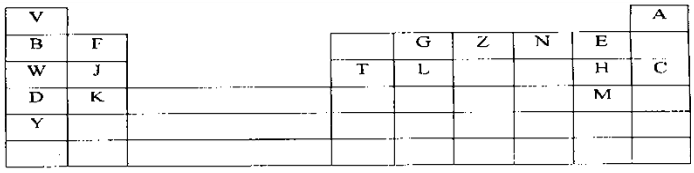
21. The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters do not represent the actual symbols of the elements.



a) What name is given to the family of the;

(i) Elements to which E, H and M belong? (1mark)

……

(ii) Elements to which F,J and K belong? (1mark)

……

b) Write the chemical formula of the;

(i) Sulphate of T. (1mark)

……..

(ii) Nitrate of J. (1mark)

……

c) Name the type of bond and structure formed between reactions of:

(i) D and N. (1mark)

…….

(ii) T and H. (1mark)

……

…….

d) i)Ionic radius of element E is bigger than its atomic radius. Explain. (2marks)

……

……

ii) The Oxide of G has a lower melting point than the Oxide ofL.Explain. (1marks)

…….

iii) Explain in terms of bonding and structure the following observation
There is an increase in melting and boiling points from W to T.(2marks)

……

…….

…….

22. Pieces of blue and red litmus papers were placed into a beaker containing water into which Aluminium Chloride had been dissolved.

    (i) Is dissolving of aluminium chloride in water a physical or chemical process? Explain.(1mark)

    ……

    (ii) State the observations made on the papers. Explain your answer. (2marks)

    ……

    ……

23. Use the information in the table below to answer the questions that follow. (The letters do not represent the actual symbols of the elements.

Element	P	Q	R	S	T
Atomic number	20	8	18	8	19
Mass number	40	16	40	18	39

    (i) Which **<u>two</u>** letters represent the same element? Give a reason. (2marks)

    ……..

    …….

    (ii) Give the number of neutrons in an atom of element T. (1mark).

    ……

    …….