

Adm no..... Name.....Class.....

**GATTU SECONDARY SCHOOL P.O. BOX 1030-327 ATUNDU
FORM 4 CHEMISTRY MID TERM EXAM TERM II 2015**

Time 2 hours

INSTRUCTIONS TO CANDIDATES:

- Write your name, admission number in the spaces provided above
- Sign and write the date of examination in the spaces above
- Answer ALL the questions in the spaces provided in the question paper
- Mathematical tables and silent electronic calculators may be used
- All working must be clearly shown where necessary

For examiner's use only

Questions	Maximum score	Candidate's score
1	8	
2	10	
3	12	
4	12	
5	12	
6	12	
7	13	
TOTAL	80	

1. Use the information in the table below to answer the questions that follow

Element	Atomic Radii (nm)	Tonic radii nm
D	0.231	0.133
E	0.181	0.099
F	0.160	0.065
G	0.195	0.114

a) i) Are the members in this group likely to be conductor or non – conductors? (1mk)

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ii) Which element would have the lowest atomic number? Explain. (1mk)

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b) The grid below represents part of the periodic table. Study it and answer the questions that follow.

(The letters are not the actual symbols of the elements)

V					W		
X	Y						Z

i) Select the element in period three which has the shortest atomic radius. Give a reason for your answer. (2mks)

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ii) Using dots (•) and crosses (x) to represent outermost electrons, draw a diagram to show the bonding in the compound formed when chlorine reacts with element X (1mk)

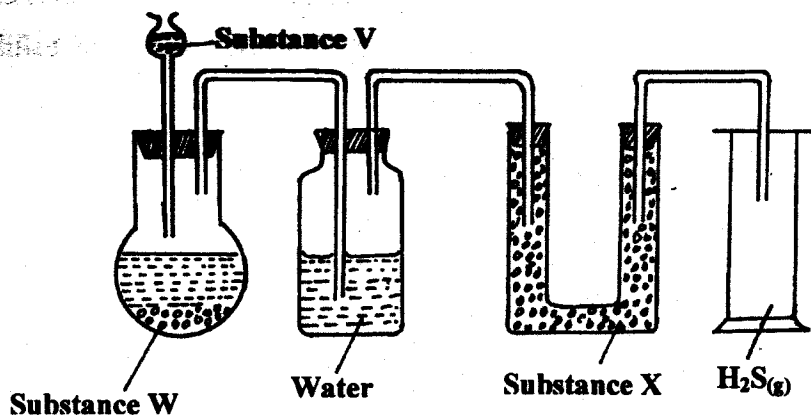
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iii) When three liters of chlorine gas were completely reacted with element Y, 11.85g of the product were formed. Calculate the relative atomic mass of element Y. (3mks)

(R.A.M of chlorine = 35.5, molar gas volume = 24 liters)

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The apparatus shown below were used for the preparation of hydrogen sulphide gas in the laboratory



a) Name;
i) Substance V (1mk)

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ii) Solid X (1mk)

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b) Write an equation for the preparation of hydrogen sulphide (1mk)

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c) What property of the gas enables it to be collected by the method shown in the diagram? (1mk)

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d) What is the purpose of the water in the second flask? (1mk)

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e) What precaution should be taken when preparing the gas? (1mk)

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f) Explain the observations made when dry hydrogen sulphide is exposed to wet Lead (II) acetate paper (2mks)

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g) State the observation that would be made when hydrogen sulphide gas is bubbled through acidified Potassium dichromate (VI) solution (1mk)

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h) Explain why it is not advisable to dispose off hydrogen sulphide gas by burning (1mk)

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3. The empirical formula of a hydrocarbon is (CH_2) . It has a density of $0.001167g/cm^3$ at room temperature and pressure. (Molar gas volume at r.t.p is $24dm^3$)

a) Determine the molecular formula of the hydrocarbon (3mks)

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b) Draw the structural formula of the hydrocarbon (1mk)

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c) Ethene gas burns in Oxygen to form Carbon (IV) oxide and water.

i) Write an equation for the reaction between ethane gas oxygen gas (1mk)

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ii) 15cm^3 of ethene gas were mixed with 50cm^3 of oxygen gas and the mixture was ignited into complete combustion. Calculate the volume of excess unreacted gas (3mks)

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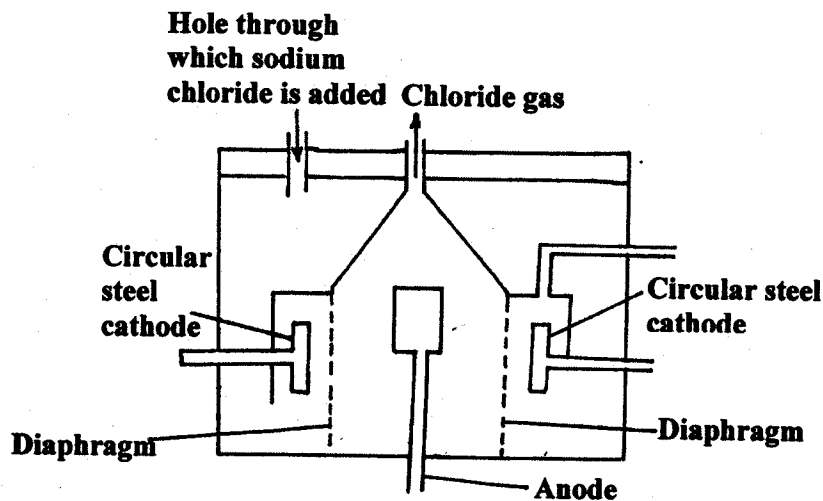
d) What happens when ethene gas is bubbled through bromine water? (2mks)

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e) Give any two uses of ethene gas (2mks)

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4. Below is a simplified diagram of a Down's cell used for the manufacture of Sodium metal. Study it and answer the questions that follow.



a) Name the substance the anode is made of (1mk)

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b) Explain your answer in (a) above (1mk)

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c) What is the role of the diaphragm in Down's cell (1mk)

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d) In Down's cell for the manufacture of Sodium metal, Calcium chloride salt is added to lower the melting point from 800°C to 600°C. Explain why it is necessary to lower the melting point

(1mk)

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e) Calculate the mass of sodium metal produced if a current of 50 amperes is passed through the molten Sodium chloride for two (2) hours (Na = 23, F = 96500C) (2mks)

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f) Below is a list of potential differences obtained when metal P, Q, R, S and T are used in the following electrochemical cell

Metal (s) / Metal ions // Copper (II) ions / copper (s)

Metal	Reduction Electrode Potential
P	- 1.10V
Q	- 0.46V
R	0.00
S	+ 0.45V
T	+ 1.16V

i) Which metal is likely to be Copper. Explain (2mks)

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ii) Identify the strongest reducing agent (1mk)

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iii) Which two half – cells would be combined to produce the highest voltage? (1mk)

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iv) Give a cell representation of the cell in F (iii) above. (2mks)

5. The table below gives the volume of hydrogen gas produced when different acids of 50cm³ were each reacted with 10cm piece of magnesium ribbon in a conical flask.

Time	Volume of the gas evolved in cm ³ using	
	1M Sulphuric (VI) Acid	1M ethanoic acid
10	35	2
20	56	4.5
30	73	7
40	85	11
50	91	13
60	97	15
70	100	17
80	100	20
90	100	23
100	100	26.5
120	100	30

a) On the graph paper provided, plot on the same axis, the graph of volume of gas produced against time (4mks)

b) From the graph, determine the rate of reaction of both acids at 55 seconds

i) 1M sulphuric (VI) acid (1mk)

ii) 1M ethanoic acid (1mk)

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c) Explain the difference in the rate of evolution of the gas as determined in (b) above (2mks)

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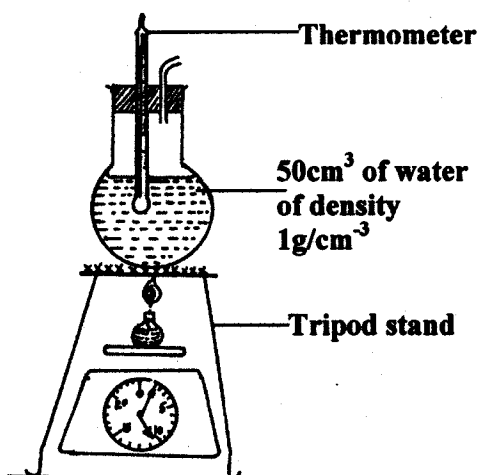
d) Calculate the number of moles of hydrogen gas produced when 10cm magnesium ribbon is completely reacted with 1M sulphuric (VI) acid. (Molar gas volume = 24dm^3 at r.t.p) (2mks)

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e) What mass of magnesium had therefore reacted? ($\text{Mg} = 24$) (2mks)

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6. The following set – up was made in an experiment by a group of form four students. The readings of the balance before and after experiment were indicated in the diagram below. Given that the initial temperature of water was 26.7°C respectively. The specific heat capacity of water is $4200\text{Jkg}^{-1}\text{k}^{-1}$



Determine:

a) Temperature change that occurred (1mk)

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b) Amount of ethanol used (1mk)

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c) Moles of ethanol used (2mks)

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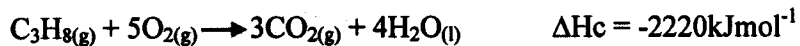
d) Amount of heat gained by water (2mks)

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e) Molar enthalpy of combustion of ethanol (2mks)

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f) Use the following thermochemical processes to answer the questions that follow;



i) Draw an energy level diagram representing the formation and combustion processes of propane, carbon and hydrogen (2mks)

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b) Name the processes involved in the following steps

i) Step I (1mk)

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ii) Step II (1mk)

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iii) Step III (1mk)

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c) Draw the structure of compound E (1mk)

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d) Write a chemical equation for the complete combustion of substance F (1mk)

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e) Name the condition and reagents in step III

i) Condition (1mk)

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ii) Reagent (1mk)

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f) Calculate the mass of salt Q that would be formed by using 21.9kg of G when it reacts with excess sodium hydroxide (2mks)

(C = 120, H = 1.0, Na = 23.0, O = 16.0)

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g) i) Draw the structure of polymer D (1mk)

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ii) State one use of the above polymer (1mk)

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