

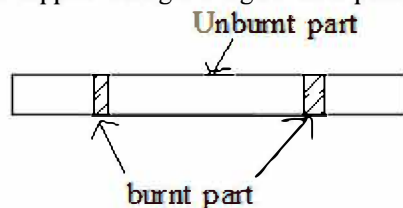
## GATANGA FORM FOUR END OF TERM II EXAMINATION 2016

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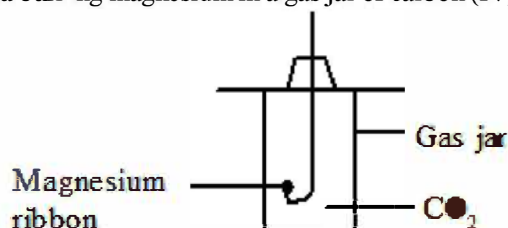
CHEMISTRY (THEORY)

PAPER 1

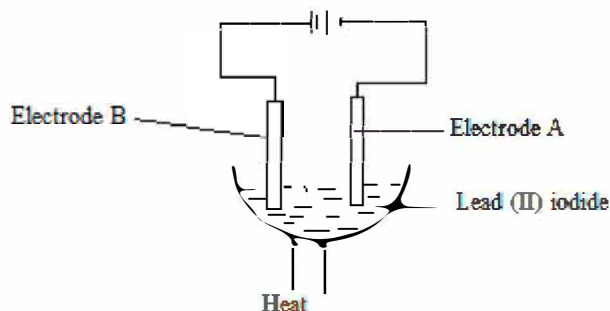
1. A wooden splint was slipped through a region of a particular flame in that laboratory and was burnt as shown in the diagram below.



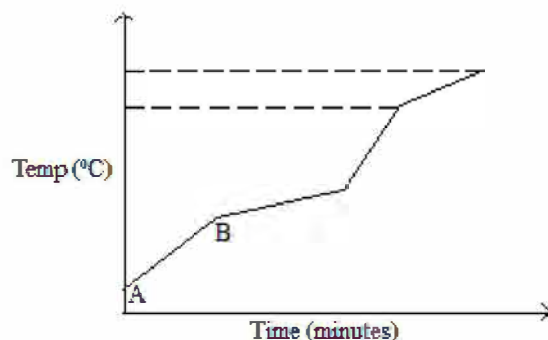
- a) Name the type of flame the splint was slipped through. (1mk)  
 b) Explain why the splint was burnt the way it is shown in the diagram. (1mk)
2. Elements A and B have atomic masses 23 and 24 respectively. Both of them have 12 neutrons each.
- a) Write the electron arrangement of A and B. (2mks)  
 b) Which of the elements has higher ionization energy? Explain. (2mks)
3. A student lowered burning magnesium in a gas jar of carbon (IV) oxide as shown in the diagram below.



- a) State and explain the observation made in the gas jar. (2mks)  
 b) Write the equation for the reaction that takes place in the gas jar. (1mk)
4. The figure below shows a set-up used in electrolysis of lead (II) iodide.



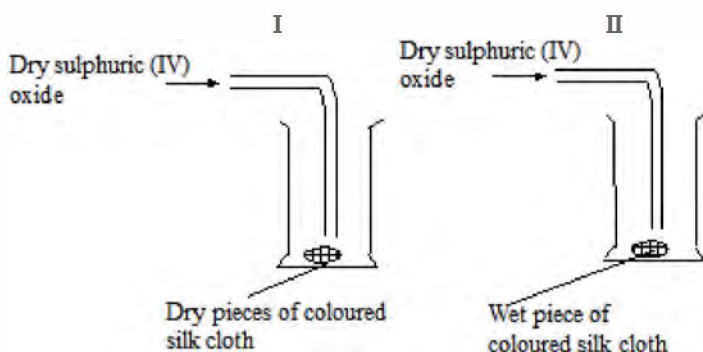
- a) Why is heating necessary? (1mk)  
 b) Write the equation for the reaction that occurs at the cathode. (1mk)  
 c) At which electrode does reduction occur? (1mk)
5. A mixture contains sodium chloride, ammonium chloride and copper (II) oxide. Describe how each substance can be obtained from the mixture. (3mks)
6. Study the diagram shown below and answer the questions that follow. The graph shows the heating curve of water.



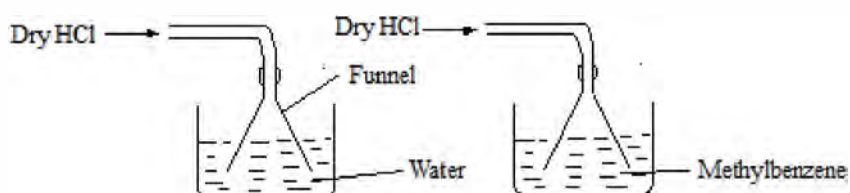
- a) Is the curve for pure water or impure water? Give a reason for your answer. (2mks)  
 b) State the role of each of the following parts during fractional distillation of a mixture of water and ethanol. (1mk)  
 i) Glass beads in the fractionating column.

ii) Fractionation column. (1mk)

7. The empirical formula of compound A is  $\text{CH}_2\text{Br}$ . Given that 0.470g of A occupies a volume of  $56\text{cm}^3$  at s.t.p, determine its molecular formula (H = 1.0, C = 12.0, Br = 80.0, Molar gas volume at s.t.p =  $22.4\text{dm}^3$ ) (3mks)
8. Using dots (•) and cross (X) to represent electrons, show the bonding in the following compounds.  
 (i)  $\text{OH}^-$  (O = 8, H = 1) (1mk)  
 (ii)  $\text{Li}_2\text{O}$  (Li = 3, O = 8) (1mk)
9. a) State Charles' law. (1mk)  
 b) A balloon contains  $80\text{cm}^3$  of gas at  $30^\circ\text{C}$  and 4 atmospheres. Calculate the volume of the balloon at  $50^\circ\text{C}$  and 2 atmospheres. (2mks)
10. Ethene and ethyne are unsaturated hydrocarbons.  
 a) Explain what is meant by unsaturation in hydrocarbons. (1mk)  
 b) Explain how you would distinguish between ethane and ethene in the lab. (1mk)  
 c) Write an equation for the complete combustion of ethane. (1mk)
11. Dry sulphur (IV) oxide was passed through two pieces of coloured silk cloth in a gas jar as shown in the diagram below.

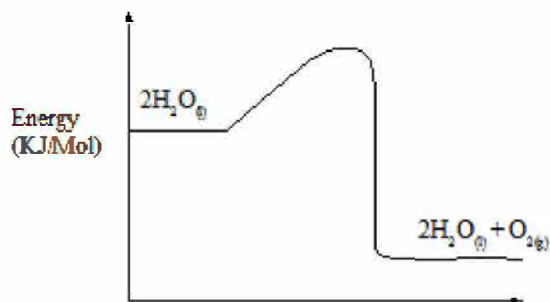


- a) State the observation made in the gas jar. (1 mark)  
 b) Write equations to explain your observations in gas jar II. (2mks)
12. In an experiment to determine the percentage of magnesium hydroxide in an anti-acid, a solution containing 0.05g of the anti-acid was neutralised by  $23\text{cm}^3$  of 0.01M hydrochloric acid. (R.F.M of Magnesium hydroxide = 58)  
 a) Calculate the mass of magnesium hydroxide in the anti-acid. (2mks)  
 b) Determine the percentage of magnesium hydroxide in the anti-acid. (1mk)
13. A student dissolved hydrogen chloride gas in water and methylbenzene as shown in the set-ups below.



- a) What is the purpose of the inverted funnel. (1mk)  
 b) A little zinc carbonate was placed in each solution. State and explain the observations that were made. (2 marks)
14. The table below shows pH values of some solutions.
- | Solution  | A  | B | C | D   |
|-----------|----|---|---|-----|
| pH values | 13 | 7 | 1 | 6.5 |
- a) Which solution reacts vigorously with magnesium metal? (1mk)  
 b) Which solution is likely to be lemon juice? (1mk)  
 c) Which solution forms complex ions with zinc (II) oxide? (1mk)
15. a) Define heat of solution. (1mk)  
 b) When 16g of ammonium nitrate was dissolved in  $100\text{cm}^3$  of water at  $25^\circ\text{C}$ , the temperature of the solution drops to  $19^\circ\text{C}$ . Calculate the molar enthalpy of solution of ammonium nitrate (N = 14, O = 16, H = 1, Specific heat capacity of water =  $4.2\text{kJK}^{-1}\text{g}^{-1}$  Take density =  $1\text{g/cm}^3$ ) (2mks)

16. The energy level diagram below shows non-catalysed decomposition of hydrogen peroxide.

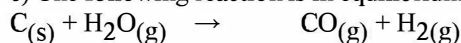


- a) On the same axis, sketch the graph for the decomposition of hydrogen peroxide when manganese (IV) oxide is added. (1mk)

Label the graph as (a)

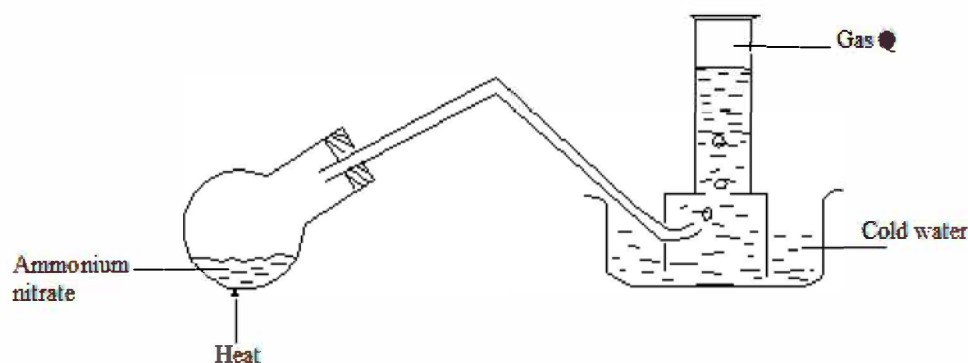
b) Define activation energy. (1mk)

c) The following reaction is in equilibrium in a closed container.



How would an increase in pressure affect the amount of hydrogen produced. (1mk)

17. The set up below was used by Form 3 students to prepare gas Q. Study it and answer the questions that follow.

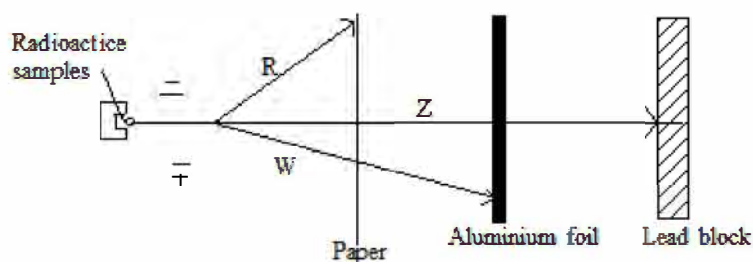


a) Identify one mistake made in the set up. (1mk)

b) Write an equation for the reaction leading to formation of gas Q. (1mk)

c) State one use of gas Q. (1mk)

18. The diagram below shows the radiation emitted by a radioactive sample.



a) Identify radiation W. (1mk)

b) Which of the three radiations would cause most damage to human tissues? Explain your answer. (1mk)

c) Explain why it is not safe to store radioactive substances in containers made of aluminium sheets? (1mk)

19. a) What is solubility? (1mk)

b) In an experiment to determine the solubility of solid X in water at 30°C, the following results were obtained.

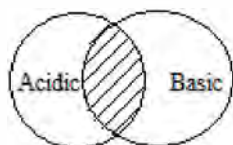
Mass of evaporating dish = 26.2g

Mass of evaporating dish + saturated solution = 42.4g

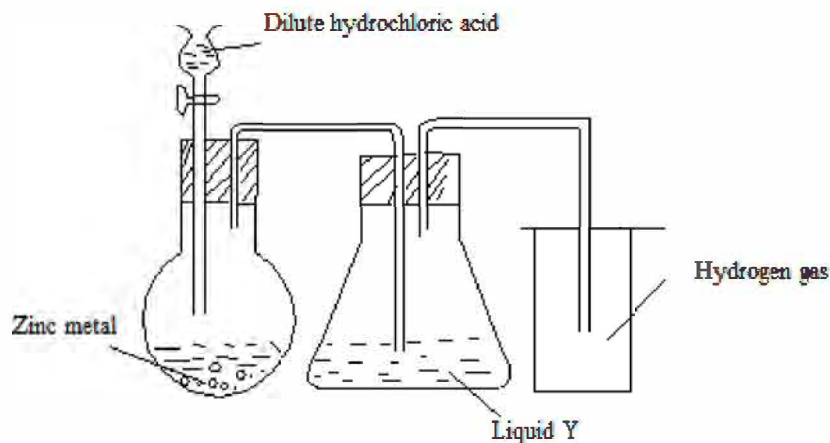
Mass of evaporating dish + dry solid X = 30.4g

Using the information, determine the solubility of solid X at 30°C in g/100g of water. (2mks)

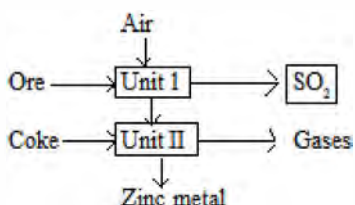
20. The diagram below shows acidic and basic oxides fitted into the general family of oxides.



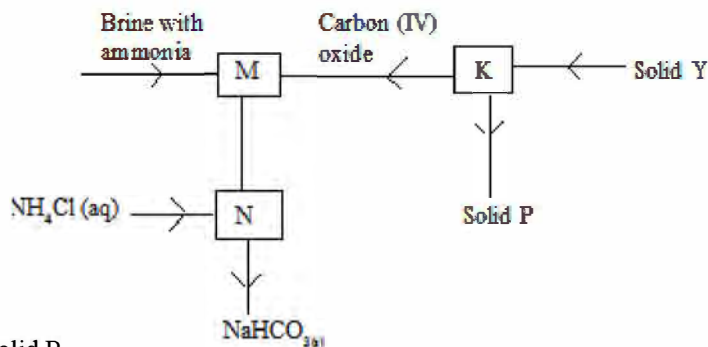
- a) Give the name of the type of oxides that would be placed in the shaded region. (1mk)  
 b) Name one oxide that would be placed in the region. (1mk)  
 c) State one factor that would accelerate the rate of rusting. (1mk)
21. The set up below was used to prepare dry hydrogen gas. Study it and answer the questions that follow.



- a) Identify one mistake in the set up (1mk)  
 b) Name liquid Y. (1mk)  
 c) Explain why helium gas is preferred in weather balloons to hydrogen gas. (1mk)
22. The flow chart below shows some processes involved in the industrial extraction of zinc metal.



- a) Name one ore from which zinc is extracted. (1mk)  
 b) Write the equation for the reaction taking place in Unit II. (1mk)  
 c) Name one use of zinc metal. (1mk)
23. i) The diagram below shows part of solvay process.



- i) Name solid P (1mk)  
 ii) Write the equation for the reaction that produces solid P. (1mk)  
 iii) What method of separation is used in chamber N? (1mk)

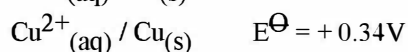
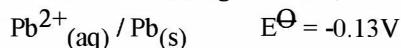
24. The table below gives some properties of compounds P, Q, R and S.

Compound	B.P.(°C)	M.P.(°C)	Conductivity in water
P	77	-22	Does not conduct
Q	74	-19	Does not conduct
R	-161	-85	Conducts
S	2407	714	Conducts

a) Which of the above compounds is ionic? Explain. (1mk)

b) Select the compound that is a gas at room temperature. Explain your answer. (1mks)

25. Given the following half cells;



i) Write the ionic equation for the half cell that undergoes oxidation. (1mk)

ii) Calculate the e.m.f. of the cell that would be made. (1mk)

iii) Determine the oxidation number of chlorine in  $\text{ClO}_3$ . (1mk)

26. A compound has empirical formula  $\text{C}_3\text{H}_6\text{O}$  and a relative formula mass of 116.

a) Determine its molecular formula. (2mks)

(H = 1.0, C = 12.0, O = 16.0)

b) Calculate the percentage composition of carbon by mass in the compound. (1mk)

27. The table below gives some bond energies of some bonds.

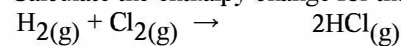
Bond            Bond energy  $\text{kJmol}^{-1}$

H – H            435

Cl – Cl          243

H – Cl          431

Calculate the enthalpy change for the reaction.



(2mks)

28. Name the class to which the following cleansing agents belong.

a)  $\text{R} - \text{COO} - \text{Na}^+$

A

b)  $\text{R} - \text{C}_6\text{H}_4 - \text{O} - \text{SO}_3 - \text{Na}^+$

c) Which cleaning agent is not environmentally friendly.