**NAME:……..CLASS……SCHOOL:……..ADM.NO ……**

233/1

CHEMISTRY PAPER 1

THEORY

2 HOURS

# SCHOOL -BASED EXAMINATION

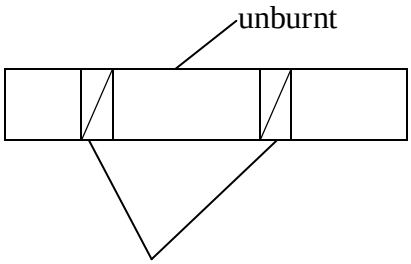
## INSTRUCTIONS

- 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 |
|---|---|---|
| 1-25 | 80 | |

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




a) Name the type of flame the splint was slipped through: (1mk)

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b) Explain why the splint was burnt the way it is shown in the diagram(2mks)

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2. The electron arrangement of ion $x^{3+}$ and $Y^{2-}$ are 2.8 and 2.8.8 respectively.
   a) In which group do X and Y belong (1mk)

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

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   c) Write the formula of compound formed when X and Y react. (1mk)

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3. a)State Gay Lussacs law(1mk)

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b) $10cm^3$ of a gaseous hydrocarbon $C_2H_x$ required $30cm^3$ of oxygen for complete combustion . If steam and $20cm^3$ of carbon (IV) oxide gas were produced what is the value of X (2mks)

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4. Some average bond energies are given below

| Bond | Energy in KJ/Mol |
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| C-C | 348 |
| C-H | 414 |
| CL-CL | 243 |
| H-CL | 340 |
| C-CL | 432 |

a) Calculate the energy change for the reaction below : (3mks)

$C_2H_6 + CL_2 \longrightarrow CH_3H_2CL_{(g)} + HCL_{(g)}$

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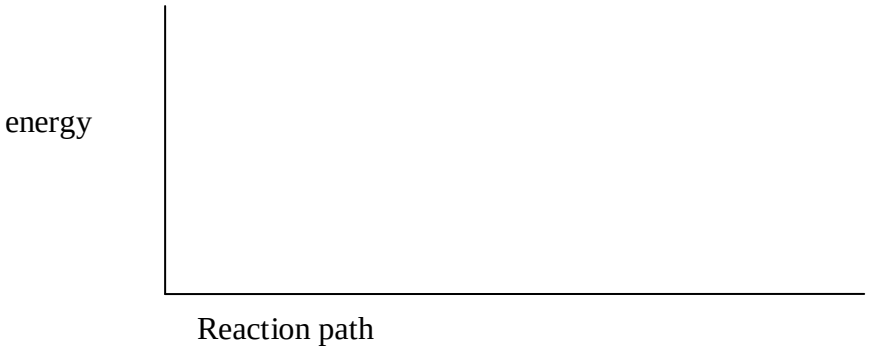
b) Draw an energy level diagram for the above reaction (1mk)




5. The equation below shows a reversible reaction.

$H_3O + + HSO_4^-$ $\rightleftharpoons$ $H_2O + H_2SO_4$)

i) Identify the acid in the forward reaction and explain. (2mks)

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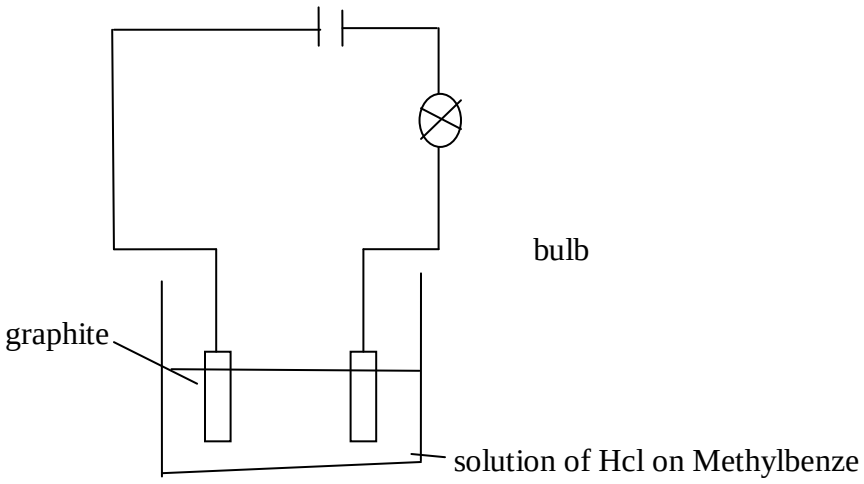
ii) Study the diagram below and answer the questions that follow:



a) What observation was made during the experiment? Explain ($1^1/_2$ mk)

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b) What observation would be made if the solution of hydrogen chloride in methylbenzene was replaced with a solution of hydrogen chloride in water? Explain ($1^1/_2$ mk)

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6. Use the equation below to answer the questions that follow:

$K^{+(g)} + Cl_{-(g)} \longrightarrow KCl_{(s)} \quad \Delta H_1 = -701 \text{ KJ /Mol}$

$KCL_{(s)} \xrightarrow{H_2O} K^+_{(aq)} + CL^- \quad \Delta H_2 = +15 \text{KJ/mol}$

i) What is the name of $\Delta H_1$ (1mk)

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ii) Draw an energy cycle and use it to calculate the heat change for the process. (3mks)

$K +_{(g)} + Cl-_{(g)} \xrightarrow{H_2O} K+ (aq) + Cl^-_{(aq)}$

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7. A sample of water is suspected to contain sulphate ions .Describe an experiment that can be earned out to determine the presences of sulphate ions. (3mks)

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8. A water trough, aqueous sodium hydroxide, burning candle, watch glass and a graduated gas jar were used in an experimental set up to determine the percentage of active part of air. Draw a well labeled diagram of the set up at the end of the experiment. (3mks)

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9. 5g of calcium carbonate were allowed to react with $25cm^3$ of 1m Hcl until there was no further reaction. Calculate the mass of calcium carbonate that remained unreacted. (3mks)

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10. Solutions can be classified as acids, bases or neutral. The table below shows solutions & their PH values.

| Solution | PH value |
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| K | 1.5 |
| L | 7.0 |
| M | 14.0 |

a) Select any pair that would react to form a solution of PH 7 (1mk)

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b) Identify two solutions that would react with Aluminium hydroxide. Explain. (2mks)

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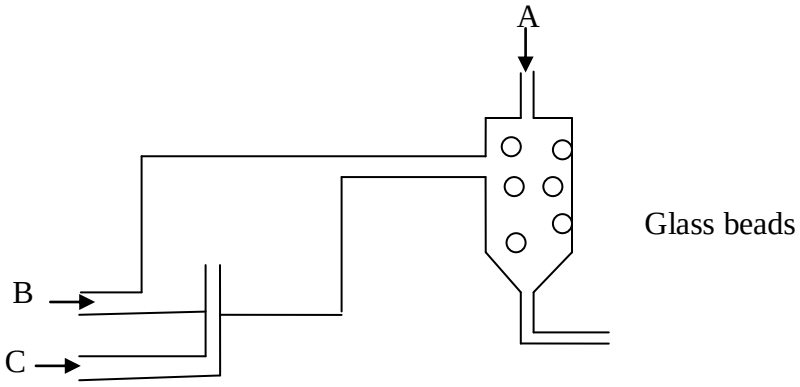
11. The Diagram below shows industrial manufacture of hydrochloric acid.




a) Name substance A , B and C (3mks)

A.....

B.....

C.....

b) What is the purposes of glass beads.(1mk)

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12. Some sodium chloride was found to be contaminated with copper (II) oxide. Describe how a sample of sodium chloride can be obtained from the mixture. (2mks)

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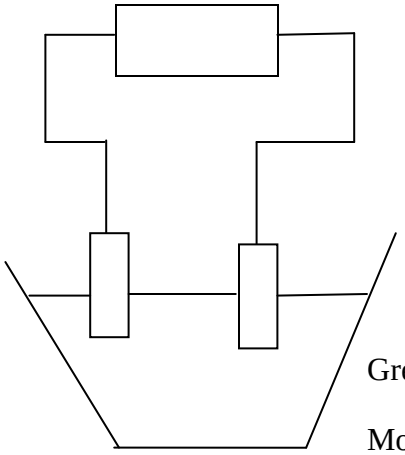
13. Use the set up below to answer the questions that follows



Green yellow fumes

Molten pb $cl_2$

a) On the diagram label the cathode (1mk)

b) Write the equation of the reaction on the anode. (1mk)

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14. In the Haber process, the industrial manufacture of ammonia is given by the following equation.

$N_{2(g)} + 3H_{2\,(g)} \quad 2\,NH_{3\,(g)} \quad \Delta H = -92KJ/Mol$

i) Name the catalyst used in this process (1mk)

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ii) What is the effect of the following in the yield of ammonia.

i) Increase in temperature (1mk)

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ii) Decrease in pressure (1mk)

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15. The set up below was used to prepare hydrogen chloride gas and salt T.

Identify the following

Liquid M - ($^1/_2$mk)

Gas V – ($^1/_2$mk)

Salt T - ($^1/_2$mk)

a) Write balanced chemical equations for reaction that occur at f

i) Flask I (1mk)

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ii) Combustion tube (1mk)

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b)Name the process that formed salt T as shown in the diagram (1mk)

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16. Give equation to show the reaction that take place when.

a) Iron react with steam ( 1mk)

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b) Magnesium reacts with dilute Hydrochloric acid (1mk)

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c) Give two industrial uses of the gas produced in the reaction in a & B above (1mk)

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17. In an experiment carbon (IV) oxide gas was passed over heated coke and the gas produced collected as shown in the diagram below.

i) Write an equation that cook place in the combustion tube. (1mk)

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ii) Name another substance that can be used instead of potassium hydroxide. (1mk)

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iii) Describe a simple chemical test that can be use to distinguish carbon (II) oxide and carbon (IV) oxide (2mk)

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iv) Give one use of carbon (II) oxide.(1mk)

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18. Name the process which take place when (3mks)

a) Iodine changes directly from solid to gas.

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b) $Fe^{2+}_{(aq)}$ changes to $Fe^{3+}_{(aq)}$

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c) White sugar changes to black when mixed with excess conc. Sulphuric acid.

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19. a) Using a dot (0) and cross (x) to represent the outermost electrons, draw diagrams to show the bonding in magnesium sulphide. ($1^1/_2$mks)

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b) State the structure of the above compound ($^1/_2$mks)

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c) Give two properties of substance with the above structure. (1mk)

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20. $10cm^3$ methane of gas diffuses through porous portions in 40 seconds. How long would it take 90 $cm^3$ of ozone to diffuse through the same partition (C=12, H=1, O=16) (3mks)

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21. a) What is meant by solubility (1mk)

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b) In an experiment to determine the solubility of solid X in water at $30^0$C the following results were obtained

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| 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 $30^0$ C in g/ 100 water. (2mks)

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22. An element g has relative atomic mass of 69.39. Given that the element has two isotopes of atomic masses 60.15 and 70.15, calculate the relative abundances of each of the isotopes. (3mks)

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23. Draw the open structures of the following substance (3mks)

i) 2,3-dimethylbutane

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ii) 1-bromo-2-dichlorobut-2 ene

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iii) 3-iodopropyne

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24. Define the following terms as used in chemistry. (2mks)

i) Activation energy

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ii) Efflorescence.

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25. Starting with copper (II) oxide describe how copper (II) sulphate crystals can be prepared. (2mks)

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