**Name……………………………………………………………..ADMN NO………………………**

**SCHOOL………………………………………………………DATE…………..SIGN……………..**

**233/2**

**CHEMISTRY**

**Paper 2**

**TIME 2 HOURS**

**INSTRUCTIONS TO CANDITATES**

Write your name, admission number, Sign and write date of the examination in the spaces provided

All questions must be answered in English

Answer all the questions in the spaces provided .All working must be clearly shown where necessary.

Non programmable electronic calculators and logarithm tables may be used

 **FOR EXAMINERS USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM MARK** | **CANDIDATES SCORE** |
| **1** | **14** |  |
| **2** | **12** |  |
| **3** | **12** |  |
| **4** | **10** |  |
| **5** | **10** |  |
| **6** | **11** |  |
| **7** | **11** |  |
| **Total** | **80** |  |

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

**P**

**Q**

**R**

**S**

**T**

**U**

**V**

**W**

**X**

**Y**

 **Z**

**M**

(a) Write the general name given to the element P belong. **(1mark)**

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(b) An element N has an atomic number of 15. Write down its electronic arrangement and hence fix it in its right position on the grid above. **(2marks)**

Electronic arrangement …………………………………………………………………………

(c) Compare the size of the atom of R and that of its ion. Explain your answer. **(2marks)**

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(d) Give the formula of the compound formed between **(1mark)**

P and W …………………………………………………………………………

T and Y …………………………………………………………………………..

(e) Compare the melting points of element Q and S. Explain **(2marks)**

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(f) State the least reactive element in the grid. Give a reason for your answer **(2marks)**

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(g) Give two advantages that element S has over element Q in making electric cables**(2mks)**

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(h) Draw (a) dot (.) and cross (x) diagram to represent the bonding in compound formed between T and Y **(2 marks)**

...................................................................................................……………………………………………………………………………………………………………………………………………2 (a) Study the flow chart below and answer the questions that follow.

Long chain alkane

Ethanol

CH3CH2OH

 A

 Step II H2 (g)  Ni(s)  Step 1 Step VI

C

CH2 = CH2

 Step V

 Polymerize

Step III HCl(g)  Step IV

B

CO2(g) + H2O(l)

1. Name the process taking place in step (I). **(1mark)**

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II.Describe a chemical test that can be carried out to show the identity of organic compound **(2marks)**

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III. Give the name of the following: **(2marks)**

A:…………………………………………………………………………………

B:…………………………………………………………………………………

IV. Give the structural formulae of substance C. **(1mark)**

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

V. Name the type of reaction that occurs in:

Step IV **(2marks)**

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Step VI:

……………………………………………………………………………………………

VI. Give the reagent and the condition necessary for step VI. **(2marks)**

Reagent:…………………………………………………………………………………………………

Condition:………………………………………………………………………………………………

VII. Give the systematic names of the following compounds:

CH2CHCHCH2CH3  **(1mark)**

…………………………………………………………………………………………………

CH C CH3  **(1mark)**

3. The table below gives standard electrode potentials for the metals represented by the letters D, E, F and G. Study it and answer the questions that follow

|  |  |
| --- | --- |
| Metals | Standard electrode potential (volts) |
| D | -0.13 |
| E | -0.85 |
|  F | +0.34 |
| G | -0.76 |

1. Which metal can be displaced from a solution of its salts by all the other metals in the table. Give a reason (2mks

 b) i)Draw a cell diagram when metal G and F are connected to form a full(3mks)

ii) Indicate on the diagram the direction of flow of electrons(1mk)

c) Write an equation for the reaction that take place in G half cell(1mk)

d) State two functions of a salt bridge (2mks)

f) i) State Faradays first law of electrolysis (1mk)

ii) A current of 2A was passed through copper (ii) Sulphate solution 1hour 30 minutes. Calculate the quantity of electricity required to deposit 1 mole of copper (3mks)

 h)State two application of electrolysis (1mk)

4. a) Sodium metal is extracted using the downs cell.The anode is made of graphite and surrounded by a steel gauze cylinder. Describe briefly how this process is carried out. (3mks)

b)Explain why the anode is

i)Made of graphite (1mk)

ii) Surrounded by a steel gauze cylinder (1mk)

(c)State two properties of sodium metal that make it possible for it to be collected as shown in the diagram (2mks)

(d) Write an equation to show the products formed when sodium reacts with air (1mk)

5.Nitrogen forms 78% of air by volume. Nitrogen is one of the raw materials used in the Haber process.

(a)Describe how nitrogen is obtained from liquid air. (2mks)
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1. List TWO sources of obtaining large volumes of hydrogen for industrial use.(2mks)
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c) Burning magnesium continues to burn in a gas jar containing Nitrogen

i. Explain (1mk)

ii) Write an equation for the reaction taking place when the product is reacted with water (1mk)

(d) Name the catalyst used in the Haber process (1mk)

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e) A farmer has three plots each measuring 0.25 acres. He applied nitrogenous fertilizers as follows.
-plot A 250 kg of ammonium phosphate
-plot B 250 kg of urea CO(NH2 )2
- Plot C 250kg of ammonium nitrate
Which plot received the highest nitrogen content? (3mks)

 (H = 1, N = 14, 0 = 16. P = 31, C = 12.)

6.The table below shows the solubility of lead ii nitrate and potassium nitrate at different temperatures. Study it and answer questions that follow

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Temperature0C | 0 | 20 | 40 | 60 | 80 | 100 |
| Solubility of Pb(NO3) in g/100g of water | 37.5 | 52.5 | 69.0 | 87.5 | 110.0 | 131.0 |
| Solubility of KNO3 in g/100g of water | 12.5 | 32.5 | 62.5 | 110.0 | 137.5 |  |

1. On the same grid plot a graph of solubility of lead ii nitrate and potassium nitrate in g/100 of water against temperature in 0C(4mks)



(b)From the graph determine the point at which;

I. The solubility of the two salts is the same (1mk)

II. The solubility of lead ii nitrate is 58.0g/100g of water (1mk)

 c)The mass of the crystals that would be formed if the saturated solution was cooled from 800C to 300C (3mks)

d)A water sample is suspected to contain lead (ii) ions. Describe how the presence of lead ions would be confirmed using sodium hydroxide solution and potassium iodide solution(2mks)

7) A student set up the apparatus below for preparation and collection of dry hydrogen gas. Study it and use it to answer questions that follow



1. Complete the set up to show dry hydrogen can be collected (3mks)
2. The student identified substance K as Nitric V acid and L as zinc granules. Explain the student did not achieve the objective for experiment.(2mks)
3. State the correction the student should make to achieve the objective (1mk)
4. Hydrogen gas obtained was reacted with nitrogen gas as shown below

N2(g)+3H2(g)2 NH3(g)

1. State and explain two factors that can alter the equilibrium constant above(3mks)
2. Determine the number of moles of nitrogen gas used given that 300cm3 of hydrogen was used.(volume at STP =22.4L) (2mks)