HOLA SECONDARY SCHOOL

CHEMISTRY TRIAL EXAM

PAPER 233/2

FORM 4

2 HOURS

NAME­­­­------------------------------------------------------- ADM----------------- CLASS---------------------------

INSTRUCTIONS

ANSWER ALL THE QUESTIONS IN THIS PAPER

ELECTRONIC CALCULATOR MAY BE USED

SHOW ALL YOUR WORKING IN THE SPACE PROVIDED

1.The grid below represents part of the periodic table, study it and answer the questions that follow.

a)With a reason select the element which is the strongest

i) Oxidizing agent (1mk)

ii) Reducing agent (1 mk)

b) (i) What type of structure would the oxide of element D have ?

 Give a reason for your answer (1 mk)

(ii) Draw a dot (.) and cross (x) diagram of the chloride of C. (1 mk)

(iii) Write the equation of reaction between chloride of I and water. (1 mk)

c) 3.6g B reacts with 9.0 x10 22 molecules of chloride (L=6.0 x10 22)

i) Write a balanced equation for the reaction between B and chlorine gas (1mk)

ii) Determine the relative atomic mass of B. (2 MK)

II. The table below shows some properties of substance P, Q and R. study it and answer the questions that follow.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Substance | M.P. o C | Solubility in water | Electrical conductivity |  |
|  |  |  | Solid | Liquid |
| P | -39 | Insoluble  | Good | Good |
| Q | 2300 | Insoluble | Poor | Poor |
| R | 801 | Soluble | Poor | Good |

a)What type of structures do the above substances have. (3mk)

b)What is the likely identity of substance P. (1MK)

2. Study the scheme below and answer the questions that follow

 Magnesium butanol warm

C

I

A

 Drops of coc. H2SO4

 H+(aq)

 Cr2O72-(aq)

H

Propanol

F

 H2O(g) sodium

 100oC

 60atm step I

Polymer D

 D

Propene

G

 HF(g) step II

E

B+

Soda lime

C9H20

 Step III

 Step IV

 a) a

a)Name the following compounds

 F I (2MK)

b) Name and draw the structural formula of compounds.

 G H (2MK)

c) Write the following chemical equations

ii) Reaction of compound A and butanol

ii) Reaction in step II

iii) Reaction in step iii (3mks)

d) Name the process that takes place in step iv (1mk)

e) Name the conditions necessary for propane to form compound E (1mk)

e)Name the conditions necessary for propane to form compound E (1MK)

f)Describe how you can distinguish between compound Aand propanol . (2mks)

3. The table below shows the volumes of nitrogen (IV) oxide gas produces when different volumes of

 IM nitric (v) acid were each reaction with 2.07g of lead at room temperature .

|  |  |
| --- | --- |
| Volume of IM nitric (v) acid (cm 3) | Volume of nitrogen (IV) oxide gas (cm3) |
|  5 |  60 |
|  15 |  180 |
|  25 |  300 |
|  35 |  420  |
|  45 |  480 |
|  55 |  480 |

a)Give a reason why nitric (v) acid is not used to prepare hydrogen gas (1mk)

b)Explain how the rate of the reaction between lead and nitric (v) acid would be affected if the temperature of the reaction mixture was raised. (2mks)

c)On the grid provided plot a graph of the volume of the gas produced against the volume of the acid .

 (1mk)

d)Using the graph , determine the volume .(i) nitrogen(v) oxide produced when 30cm3 of IM nitric acid were reacted with 2.0g of lead. (1mk)

 ii) IM nitric (v) acid which would react completely with 2.07g of lead. (1mk)

e) (i) Determine the volume of IM nitric (V) acid that would react completely with one mole of lead . (pb =207). (2 mks)

ii) The volume of nitrogen (IV) oxide gas produced when one mole of lead reacts with excess IM nitric (V) acid at room temperature. (IMK)

f) Calculate the number of moles of

 i) IM nitric (V) acid that reacted with one mole of lead. (IMK)

ii) Nitrogen (IV) oxide produced when one mole of lead were reacted with excess nitric (V) acid . (Molar gas volume is 24000cm3) (1mk)

g) Using the answers obtained in f (i) and (ii)above , write the equation for the reaction between lead and nitric (v) acid. (1mk)

4) a) State two environmental effects of fuel.

b) The diagram below represents a set up that was used to determine the molar heat of combustion of ethanol.

During the experiment the data given below was recorded.

Volume of water 450cm3

Initial temperature of water 25oC

Final temperature of water 46.5oC

Mass of ethanol + lamp before burning 125.5g

Mass of ethanol + lamp after burning 124.0g

Calculate

i)Heat evolved during the experiment.

Density of water =1g/cm3, specific heat capacity of water =4.2j-1k-1) (3mks)

ii) Molar heat of combustion of ethanol (2mks)

 (C=12.0 O=16.0 H=1.0)

c)Write the equation for the complete combustion of ethanol. (1mk)

d) The value of the molar heat of combustion of ethanol is -1368KJ/Mole.

i) State the meaning of the negative sign in the value above. (1mk)

ii) Why does the value calculated from experimental results differ from this. (1mk)

5 In the preparation of magnesium carbonate magnesium was burnt in air and the product collected. Dilute sulphuric acid was added and the mixture filtered and cooled. Sodium carbonate was added to the filtrate and the content filtered .The residue was washed and dried to give a white powder.

a)Give the chemical name of the product formed when magnesium burns in air (1mk)

b) Write a chemical equation for the formation of product . (1mk)

c) (i)Name filtrate collected after sodium carbonate was added (1mk)

ii) Name the white powder. (1mk)

6. a) A salt believed to contain chloride ions was dissolved in water to form a solution.

i) Describe how a sample of the solution could be tested to find out if it contained chloride ions.(2mks)

ii) Calculate the percentage by mass of chloride in potassium chloride.( K=39.0 CI=35.5 ) (1MK)

b) 20g of potassium chloride were placed in a glass beaker and 40.0cm3 of water were added. The beaker was heated until all the potassium chloride had dissolved and then allowed to cool. When a crystal first appears the temperature was noted. An extra 5.0 cm3 of water were added and the experiment were as shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment | Volume of water (cm3) | Temperature at which crystals formed | Solubility in g/100g of water |
| 123456 | 404550556065 | 77564026158 | -44.5-36.3-30.8 |

i)Calculate the values of solubility in g/100g of water which are missing from the table. (3mks)

ii)On the grid provided plot the graph of values of solubility (vertical axis) a giants temperature (horizontal axis). (3mks)

iii) What is the effect of temperature on solubility of potassium chloride in water? (1mk)

iv) From the graph

1. What is the solubility of potassium chloride at 60oC? (1MK)

11. At what temperature will solubility be 35g/100g of water? (1MK)

111. What is the mass of crystals deposited when the solution is cooled from 70oC to 40OC? (2mks)

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