**NAME…………………………………………………..…INDEX NO……………………………..**

**DATE:……………………………………….**

**SIGN**

**MWAKICAN JOINT EXAMINATION FORM 4**

**232/2**

**CHEMISTRY**

**PAPER 2**

**THEORY**

**END OF TERM ONE EXAMINATION**

**2 HOURS**

**Instructions to candidates.**

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. Answer all the questions in the spaces provide.
4. KNEC mathematics tables and silent electronic calculators may be used.
5. All working must be clearly shown where necessary.
6. This paper consists of printed 10 pages.
7. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
8. Candidates should answer the questions in English.

**FOR EXAMINERS USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAXIMUM SOCRE** | **CANDIDATES SCORE** |
| **1** | **13** |  |
| **2** | **13** |  |
| **3** | **12** |  |
| **4** | **10** |  |
| **5** | **11** |  |
| **6** | **12** |  |
| **7** |  |  |
| **TOTAL SCORE** | **80** |  |

1. (a)Name the method that can be used to obtain pure iron(III) chloride from a mixture of iron(III) chloride and sodium chloride.(1mk)

(b) A student was provided with a mixture of sunflower flour, common salt and a red dye. The characteristics of three substances in the mixture are given in the table below.

|  |  |  |
| --- | --- | --- |
| **substance** | **Solubility in water** | **Solubility in ethanol** |
| Sunflower flour | Insoluble | Insoluble |
| Common salt | Soluble | Insoluble |
| Solid red dye | soluble | soluble |

The student was provided with ethanol and any other materials needed.

Describe how the student can separate the mixture into its three components.(3mks)

(c)The diagram below shows a part of a periodic table .The letters do not represent the actual symbols of elements .Use the diagram to answer the question that follow.

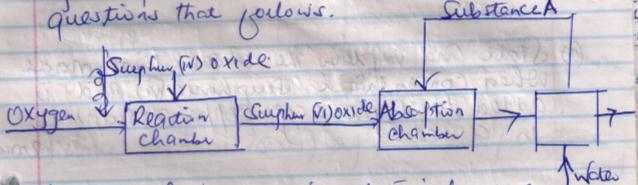
|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | | | | Q |
| R |  |  |  |  | T |  |  |  |  |
|  |  | N |  | V |  | W |  |  |
| Y |  |  |  |  |  |  | X |  |  |

1. Explain why the oxidizing power of W is more than that of x.(2mks)
2. How do the melting points of R and T compare? Explain.(2mks)
3. Select an element that could be used
4. In weather balloons(1mk)
5. For making a cooking pot.(1mk)

(d) (i) Classify the substances water, iodine ,diamond and candle wax into elements and compound.(2mks)

|  |  |
| --- | --- |
| Element | Compound |
|  |  |
|  |  |
|  |  |

(ii) Give one use of diamond.

1. The flow chart below shows some of the processes involved in larger scale production of sulphuric (vi) acid. Use it to answer the questions that follow.
2. Describe how oxygen is obtained from air in large scale.(3mks)
3. (i) Name substance A.(1mk)

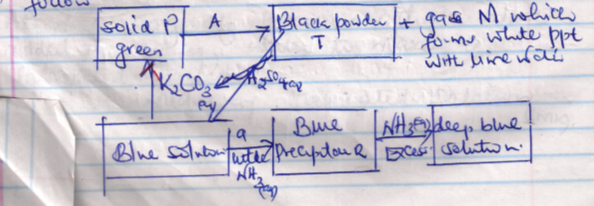
(ii)Write an equation for the process that takes place in the absorption camber.(1mk)

1. Vanadium (V) oxide is commonly used catalyst in the contact process.
2. Name another catalysts which can be used for this process.(1mk)
3. Give two reasons why vanadium (v) oxide is the commonly used catalyst.(2mks)
4. State and explain the observation made when concentrated sulphur(vi) acid is added to crystals of copper (II) sulphate in a beaker.(2mks)
5. The reaction of concentrated sulphuric (VI) acid with sodium chloride produces hydrogen chloride gas. State the property of concentrated sulphuric (VI) acid illustrated in this reaction.(1mk)
6. Name two types of sulphuric (vi) acid.(2mks)
7. At 25˚ C 50g of potassium nitrate were added to 100g of water to make a saturated solution.
8. What is meant by saturated solution.(1mk)
9. The table below gives the solubility of potassium nitrate at different temperatures.

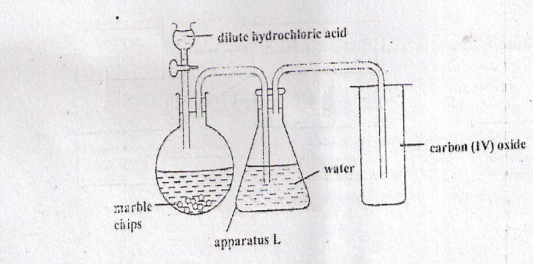
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Temp˚c | 12 | 20 | 28 | 36 | 44 | 52 |
| Solubility g/100g of water | 22 | 31 | 42 | 55 | 70 | 90 |

1. Plot a graph of the solubility of potassium nitrate (vertical axis) against temperature.(3mks)
2. Use the graph.
3. Determine the solubility of potassium nitrate at 15˚ c.(1mk)
4. Determine the mass of potassium nitrate that remained un dissolved given that 80g of potassium nitrate were added to 100cm3 of water and warmed to 40˚C.(2mks)
5. Determine the molar concentration of potassium nitrate at 15˚ C.(Assume there is no change in density of water at this temperature).

(K=39.0 N=14.0 O = 16.0)3mks)

1. (i) Study the chart below and answer the questions that follow.
2. Name substance
3. P (1mk)
4. Colourless gas M (1mk)
5. Write an ionic equation for the reaction producing solid p..(1mk)
6. (i) Write the chemical formula of the complex ion in solutions.(1mk)

(Ii) In the preparation of carbon (iv) oxide in the laboratory dilute hydrochloric acid was added to marble chips (CaCO3) as shown in the diagram below.



1. What observation is made when the acid is added to the marble chips.(1mk)
2. Why is dilute hydrochloric acid preferred to dilute sulphuric (vi) acid in the above reaction.(2mks)
3. Explain why the gas was passed through water in apparatus L.(1mk)
4. Calcium hydroxide is used to test carbon(iv) oxide but not sodium hydroxide .Explain(2mks)
5. (a)The combustion of propane can be represented by the following equation.

C3H8(g)  + 502(g) 3CO2(g)  + 4H2O(L)

1. Define the molar enthalpy of combustion of a compound.(1mk)
2. Use the thermo chemical equations below to answer the following question.
3. C(graphite ) + O2(g) CO2  H 1=-393.5 Kj Mol-1
4. H2(g)  + ½ O2(g)  H2 O (L) H2 = - 285.8 Kj mol -1
5. 3C + 4H 2 C3 H8 H3 = 103.7 kg mol-1

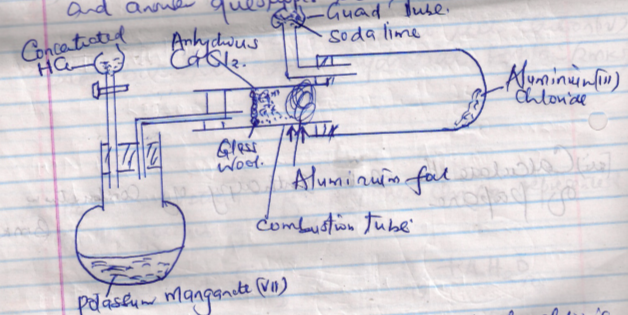
(b) (i) Name the type of enthalpy change represented by H2.(1mk)

1. Draw an energy level diagram for the reaction represented by equation 1.(3mks)
2. Calculate the molar enthalpy of combustion of propane.(3mks)
3. The enthalpy information of ethanol (CH3 CH2 OH) is 3239 KjMol-1.Use the bond energies given below to calculate the bond energy of formation of O-H.

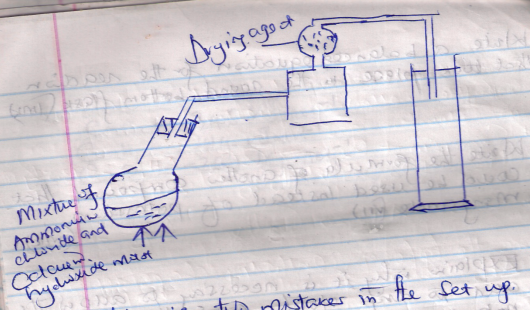
C-C = -346 KJ mol-1

C-H=-414 kJ mol-1

C-O = -360 KJ mol-1 (3mks)

1. (a)The diagram below shows a set up in a experiment to prepare chlorine gas and react it with aluminum foil. Study it and answer questions that follow.
2. In the experiment, concentrated hydrochloric acid and potassium manganate (VII) were used to prepare chlorine gas. State two precautions that should betaken in carrying out this experiment.(2mks)
3. Write a balanced equation for the reaction that took place in the round bottom flask.(1mk)
4. Write the formula of another compound that could be used instead of potassium manganate(VII).(1mk)
5. Explain why it is necessary to allow the acid to drip slowly onto potassium manganate (VII) before the aluminium foil is heated.(1mk)
6. Write a balanced chemical equation for reaction taking place in combustion tube.(1mk)
7. State the property of the formed in the combustion tube that makes it possible for it to be collected in the receiver.(1mk)

(b) A student set-up apparatus as shown to prepare and collect dry ammonia gas



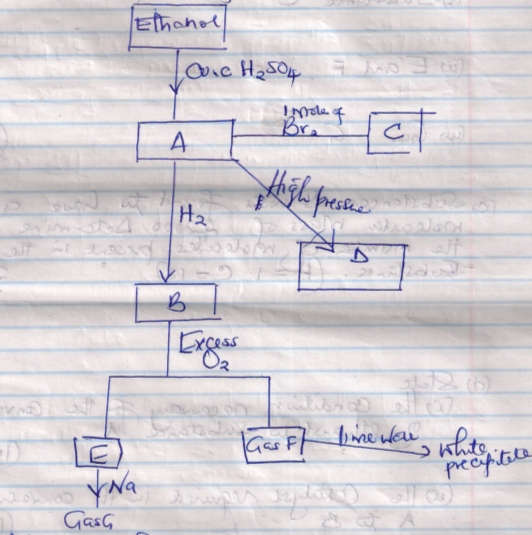
1. Identify two mistakes in the set-up.

(I)Mistake

Reason

(II)Mistake

Reason

1. Name a suitable drying agent of Ammonia(1mk)
2. Write a balanced chemical equation for the formation of ammonia gas.(1mk)
3. Describe a chemical test for ammonia gas.(1mk)
4. Study the flow chart below and answer the questions that follow.
5. Identify substances

A

B

F

G 4mks

1. Write down the equation for the formation

i. Substance C

ii.E and F

iii.Gas G 3mks

1. Substance D was found to have a molecular mass of 42000.Determine the number of molecules present in the substance (H=1=12) 2mks
2. State ;
3. The condition necessary for the conversion of ethanol to substance A.(1mk)
4. The catalyst required in the conversion A and B.(1mk)