**NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ INDEX NO\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SIGNATURE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3KNT FRATERNITY 2017**

**TERM II FORM IV EXAM**

**CHEMISTRY PAPER II**

**233/2**

**THEORY**

**TIME: 2HOURS**

**Instructions to candidates**

1. Write your name and index number in the space provided above
2. Sign and write the date of examination in the space provided above
3. All working must be clearly shown where necessary
4. Mathematical tables and electronic calculators may be used

**EXAMINERS USE ONLY**

|  |  |  |
| --- | --- | --- |
| Questions  | Maximum score | Candidate  |
| 1 | 9 |  |
| 2 | 13 |  |
| 3 | 13 |  |
| 4 | 13 |  |
| 5 | 12 |  |
| 6 | 9 |  |
| 7 | 11 |  |

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

The letters do not represent the actual symbols of the elements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | Q |  |  |  |
| O | T |  |  |  |  |  | R | S |
| V |  |  |  |  |  |  |  | U |
|  |  |  |  |  |  |  |  | Z |
|  |  |  |  |  |  |  |  |  |

1. Which element will require the least amount of energy to remove one of its outermost electrons? Explain (2mks)
2. Select the most reactive non metal (1mk)
3. What name is given to the family of element T (1mk)
4. Between element S and R. which element has a smaller atomic radius? Explain (2mks)
5. Which element has a higher tendency of forming covalent bond? Explain (1mk)
6. Write the formula of the compound formed when U and T reacts. And state the type of bond formed (2mks)

 Formula

 Bond

2. The diagram below shows some processes that take place during industrial manufacture of sulphuric acid

COnvertor

 Air pure dry gas

Heat exchanger

Purification

Lead sulphide

 Air

 Water escaping gas

G

--

 Liquid

 Storage

1. Write the equation for the reaction in which sulphur dioxide gas is produced (1mk)
2. Why is it necessary to keep the gas pure and dry (1mk)
3. Describe the process that take place in chamber G (1mk)
4. Name two gases that escape to the environment (2mks)
5. State and explain the harmful effects on the environment of one of the gases named above (2mks)
6. Give a reason why it is necessary to use pressure between 2-3 atmosphere (1mk)

bi. Complete the table below to show the observation made when conc sulphuric acid is added to the substances shown.(2mk)

|  |  |
| --- | --- |
| Substances | Observation  |
| Iron filligs |  |
| Crystals of sugar  |  |
|  |  |

ii. Give reasons for eh observation made using

1. Iron fillings (1mk)
2. Crystals of sugar (1mk)
3. Name one fertilizer made from sulphuric acid (1mk)

3a. you are provided with the following reagents, dilute HNO3, dilute H2SO4, and PbO. Describe how you would prepare a sample of lead II sulphate (3mks)

b.Given a mixture of PbCl2, Iodine, NH4Cl and NaCl crystals. Describe how you would separate all the solids using methylbenzene, a source of heat and water (hint; step one involves addition of methylbenzene) (3mks)

c).8.4g of NaHCO3 is completely decomposed by heat. Calculate

1. Mass of residue produced (11/2mk)
2. Volume of CO2 produced at s.t.p (H=1, C=12, O=16, Na=23 molar mass volume =22.4dm3) (11/2mk)

D.Study the reaction below and answer the questions that follow

 **J**

 Water vapour

Orange solid which turns yellow on cooling

 Heat **+**

 HNO3 aq

**White ppt T**

**Solution v**

 Excess

 NH3

1. Identify (2mks)
2. Solution V
3. White ppt T.

ii).Write an equation for the reaction forming solution V (1mk)

iii).Write an ionic equation to show how the white ppt T is formed (1mk)

4. Study the flow chart below and answer the questions that follow

 **Co2**

 **M**

**KMnO4 / H+ aq**

 **CH2 CH2**

 **J**

 **Ni/ H2 (g)**

 **Step 4**

 **K**

 **Reagent p**

 **Step 2**

 **Reagent Q**

 **L**

**CH2 CH2 OH**

**Ethyl Ethanoate**

 KMnO**4 /H+ aq**

 **Step 3**

a( i) .Name the following organic compounds

 M (1mk)

 L (1mk)

ii).Name the process in step

 Step 2 (1mk)

 Step 4 (1mks)

iii).Identify the reagent P and Q

 P (1mk)

 Q (1mk)

iv).Write an equation for the reaction between CH3CH2CH2OH and sodium (1mk)

b.A volatile liquid N is a compound of carbon, hydrogen and chlorine. 0.40 moles of N contains 9.6g carbon, 1.6g hydrogen and 28.4g chlorine.

Determine

1. The relative molecular mass of N (2mks)
2. The molecular formula of N (3mks)

C=12.0, H=1.0, Cl=35.5)

1. The systematic named of N (1mk)

5a.Define the standard enthalpy of formation of a substance (1mk)

b. Use the thermo chemical equation below to answer the questions that follows.

1. C2H6(g) + 7/2O2(g) \_\_\_\_\_\_\_\_\_\_\_\_\_2CO2(l) +3H2O(l) ΔH1=-1560KJ/mol
2. C graphite + O2(g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_CO2(g) ΔH2=-394kj/mol
3. H2 (g) + O2 (g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_H2O (l) ΔH3=-286KJ/mol.
4. Name two energy level diagram for the reaction represent by equation 1
5. Draw the energy level diagram for the reaction represent by equation 1
6. Calculate the standard enthalpy of formation of ethane
7. When a sample of ethane was burnt the heat produced raised the temperature of 500g of water by 21.5k. Specific heat capacity of water 4.2kj/kgk.
8. Calculate

 Heat change for the reaction (2mks)

1. Mass of ethane that was burnt. RMM of ethane =30.(2mks)

6.Excess marble drips (CaCO3) was put in a beaker containing 150cm3 of dilute hydrochloric acid. The beaker was put on a weighing balance and the total loss in mass recorded after every two minutes as shown below

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time (min) | 0 | 2 | 4 | 6 | 8 | 10 |
| Total loss in mass (g) | 0 | 1.8 | 2.45 | 2.95 | 3.2 | 3.3 |

1. Why was there loss in mass (1mk)
2. The average rate of reaction was faster between 0 and 2 minutes than between 6 and 8 minutes. Explain why? (2mks)
3. State one way in which the rate of reaction can be increased (1mk)
4. When aqeous sodium sulphate was added to contents of a beaker, white precipitate was formed.
5. Identify the white precipitate (1mk)
6. Name one use of the substance named in (IV) I above (1mk)

7. Faith a form four student, carried out an experiment to determine the solubility of salts P and Q and obtained the following results. Use them to answer the questions that follows.

Salt P

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Temp oC | 0 | 10 | 40 | 60 | 80 | 100 | 120 |
| Solubility, g/100g of water  | 36 | 33 | 30 | 28 | 26 | 23 | 18 |

Salt Q

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Temp oC | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
| Solubility, g/100g of water  | 10 | 21 | 36 | 50 | 63 | 81 | 97 |

1. On the same axes, plot the graphs for the solubility curves of the two salts (5mks)
2. From your graph, determine the temperature at which equal amount of P and Q dissolve in 100g of water (1mk)
3. Explain how to prepare a saturated solution containing 70g of Q in 100g of distilled water (1mk)
4. 12.5g of Q and 30g of P were dissolved in 50g H2O at 50oC. Describe how a pure sample of Q can be obtained. (2mks)
5. Give one practical application of the process in (d ) above and name the process (2mks)