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

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**FORM FOUR**

**END TERM 1 2021 EXAM**

**TIME:**

**INSTRUCTIONS:**

1. (a) - You are provided with solutions M and N.

 - Solution M is acidified potassium manganite VII containing 3.16g/litre of solute.

 - Solution N was prepared by dissolving 4.17g of solid N.

- FeSO4.XH2O is distilled water to make 250cm3 of solution.

 You are required to determine the value of X in formula FeSO4.XH2O

 **Procedure**

 Place solution M in a burette. Pipette 25cm3 of solution N into a 250cm3 conical flask.

 Titrate solution N with solution M until a permanent pink colour just appears. Record your

 results in the table below.

 Repeat the above procedure two more times.

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of solution M below (cm3) |  |  |  |

 (4 mks)

 (b) Calculate the average volume of solution M used. (1 mk)

 (c) Determine the:

 (i) Concentration of potassium manganite VII in moles per litre.

 (K = 39, Mn = 55, O = `16) (2 mks)

 (ii) The number of moles of potassium (VII) used. (2 mks)

 (d) Calculate the concentration of solution N in grams per litre. (2 mks)

 (e) Given the ionic equation for the above equation reaction is:

 MnO-4(aq) + 5Fe2+(aq) + 8H+(aq) Mn2+(aq) + 5Fe3+(aq) + 4H2O(l)

 Determine the number of moles of FeSO4.XH2O in:

 (i) 25cm3 of solution N. (1 mk)

 (ii) 100cm3 of solution N. (1 mk)

 (f) Using the values, calculate in (d) and (e) (ii) above, determine:

 (i) The Relative formula mass of FeSO4.XH2O (2 mks)

 (ii) The value of X in the formula FeSO4.XH2O given (Fe = 56, S = 32, O = 16, H = 1)

 (2 mks)

2. You are provided with:

 - About 1.5gd of metal P – Magnesium powder

 - About 1.6g of metal Q – Zinc powder

 - Exactly 0.5M FeSO4, solution

 - Exactly 0.5 CUSO4, solution T

 You are required to determine the molar enthalpy of displacement of Copper II ions using

 metal P.

 **Procedure I**

 Place exactly 25cm3 of solution in 100ml plastic beaker. Measure the initial temperature of

 the solution and record it in table II below. Add all of the metal P at once. Stir the mixture

 carefully with the thermometer. Record the highest temperature reading in the table below.

 (1 mk)

 (a)

|  |  |
| --- | --- |
| Final temperature oC |  |
| Initial temperature oC |  |

 (b) Determine the change in temperature, $∆T$1. (1 mk)

 (c) Calculate the:

 (i) Heat change for the above reaction.

 (Assume the specific heat capacity of the solution is 4.2j/g/k, and density of solution

 is 1g/cm3) (2 mks)

 (ii) The molar enthalpy of displacement of Fe2+ with P; $∆H$1. (1 mk)

 (d) Write thermochemical equation for this reaction. (1 mk)

**Procedure II**

Place exactly 25cm3 of solution T in 100mly plastic beaker. Measure the initial temperature of the solution and record it in the table III below. Add all of the metal Q at one. Stir the mixture carefully with the thermometer and record the highest temperature reached in the table III below.

 (a)

|  |  |
| --- | --- |
| Final temperature oC |  |
| Initial temperature oC |  |

(b) Determine the change in temperature, $∆$T2. (1 mk)

 (c) Calculate the:

 (i) Heat change for the above reaction.

 (Assume the specific heat capacity of solution is 4.2j/g/k, density is (g/cm3)(1 mk)

 (ii) Molar heat of displacement of Cu2+ with metal Q ($∆$H2) (2 mks)

(d) Write the thermochemical equation for this reaction. (1 mk)

(e) Using the two thermochemical equations above, determine the heat change for the

 determine the heat change for the reaction. (2 mks)

 Mg(s) + Cu2+(aq) Mg2+(aq) + Cu(s) $∆H$ =

3. You are provided with solution U, carry out tests below. Write your observations and

 inferences in the spaces provided.

 Divided the solution into five portions.

 (a) To the first portion add aqueous Sodium hydroxide dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (1mk) | (1mk) |

 (b) To the 3rd portion add aqueous ammonium hydroxide dropwise until in excess.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (½ mk |  (½ mk) |

 (c) To the 3rd portion add 2.3 drops of 1M HCl

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (½ mk |  (½ mk |

 (d) To the 4th portion, add 2 – 3 drops of Barium Nitrate.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (1 mk) |  (1 mk) |

 (e) To the 5th portion, add 2 – 3 drops of Lead II Nitrate solution then warm the mixture.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
| (½ mk |  (½ mk) |

You are provided with solid S. Carry out the tests below. Record your observations and inferences in the tables below.

Place all solid S into a boiling tube. Add about 5cm3 of distilled water and shake well.

Divide it into three portions.

(a) To the first portion, add 2 – 3 drops of bromine water.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (½ mk) |  (½ mk) |

(b) To the second portion, add 2 – 3 drops of acidified potassium dichromate VI solution and shake well.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (½ mk) |  (½ mk) |

(c) To the third portion, add a small amount of solid Sodium hydrogen carbonate.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (½ mk) |  (½ mk) |