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

**SCHOOL:……………………………………………………SIGNATURE……………………………… DATE…………….……………………………….**

**233**

**CHEMISTRY**

**(Theory)**

**TIME: 2 HOURS**

**SET 3**

**FORM TWO**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and Adm. number in the spaces provided.
* Answer ALL the questions in the spaces provided,

**FOR EXAMINERS USE ONLY**

|  |  |  |
| --- | --- | --- |
| Question | Maximum score | Candidates score |
| 1-10 | 70 |  |

*This paper consists of 7 printed pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.*

**1**. When sodium metal is left exposed to the atmosphere it may undergo the following processes.

**(a) ( b) ( c)**

Na Na2O NaOH Na2CO3

**(d)**

Na2CO3**.**H2O **(e)** Na2CO3**.**10H20

1. What substances are absorbed in
2. ---------------------------------------------------------------------------- **(1 mark)**
3. ---------------------------------------------------------------------------- **(1 mark)**
4. ---------------------------------------------------------------------------- **(1 mark)**
5. Name process **(5 marks)**
6. ---------------------------------------------------------------------------
7. ---------------------------------------------------------------------------
8. ---------------------------------------------------------------------------
9. --------------------------------------------------------------------------
10. ---------------------------------------------------------------------------
11. Give examples of **two** substances that undergo process

**a).** --------------------------------------------------------------------------- **(2 marks)**

**b).** ------------------------------------------------------------------------- - **(2 marks)**

**c).** --------------------------------------------------------------------------- **(2 marks)**

1. The following is an outline of one of the methods for the preparation of crystals of copper (II) sulphate
   1. Dry the crystals between filter papers or sunshine
   2. Filter off the excess carbonate and collect the filtrate
   3. Pour 50cm3 of dilute sulphuric acid into a beaker.
   4. Continue to add the carbonate a little at a time stirring until no more carbonate reacts with the acid.
   5. Heat the filtrate to evaporate excess water and test to see whether the solution is saturated with a glass rod, leave it for several days.
   6. Place the beaker on the tripod stand and warm the acid gently but do not boil.
   7. When good crystals form, pour off the “mother” liquor.
   8. Add copper (II) carbonate to the to the hot acid a little at time until no more reacts.
2. Arrange the steps above in the correct sequence. Use the numerals  **(4 marks)**

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1. Why was the dilute acid warmed **(1 mark)**

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1. State **three** ways one can tell that the reaction has come to completion. **(3 marks)**

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1. Why is the filtrate not evaporated to dryness **(1 mark)**

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1. Explain why copper (II) sulphate crystals cannot be prepared by the method of metal and dilute acid **(2 marks)**

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**3.** Magnesium steam  gas P + Solid R copper (II) oxide

Heat

Solid T + Liquid S

Use the chart above to answer the following questions. **(4 marks)**

**i)** Identify

Gas P --------------------------------------------------------------------

Solid T ------------------------------------------------------------------------

Solid R -------------------------------------------------------------------------------

Liquid S -----------------------------------------------------------------------------------------------

**ii)** Write a chemical equation to show the reaction between copper (II) oxide and gas P in presence

of heat **(1 mark)**

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**4.** Balance the following equations. **(7 marks)**

**I i.** Cl2 (g)+ NaOH (aq) NaCl (aq)+ NaOCl(aq) + H2O(l)

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**ii.** Cl2(g) + KOH(aq) KCl(aq) + KClO3(aq) + H2O(l)

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**iii.** Fe Cl2(aq) + Cl2( g) FeCl3(aq)

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**iv**. NaHCO3(aq) + H2SO4(aq) Na2SO4(aq)+ CO2(aq) + H2O(l)

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**v.** Pb (NO3)2 (aq)+NaCl (aq) NaNO3(aq) + PbCl2(s)

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**vi**. Mg(s) + Cu SO4(aq) MgSO4(aq) + Cu(s)

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**vii**. KOH(aq) + H2SO4(aq) K2SO4aq + H2O(l)

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**II**. Write ionic equations for each reaction in (I) above **(7 marks)**

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**III.** Give the general names referred to reactions (e), (f) and (g) **(3 marks)**

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**5.** **i.** What is basicity of an acid **(1 mark)**

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**ii**. Give the basicity of the following acids **(3 marks)**

1. Hydrochloric acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Sulphuric acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Phosphoric acid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.** If sodium was to react with dilute phosphoric acid in controlled conditions. Give the formulae of

**three** salts that could be formed **(6 marks)**

**Salt Name**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7.** Select two substances or salts that could be used to prepare the following salts

**i. a)** Lead (II) iodide **(2 marks)**

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**b)** Silver chloride **(2 marks)**

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**c)** Barium sulphate **(2 marks)**

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**ii**. Write an ionic equation to show the reaction taking place in

**a)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(2 marks)**

**b)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **(2 marks)**

**c)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(2 marks)**

**8.** Describe how you would prepare copper (II) carbonate crystals if provided with the following,

copper (II) oxide , sodium carbonate solid, distilled water and dilute sulphuric acid. **(4 marks)**

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**9.** Study the table below and answer the questions that follow

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| substance | M.pt oC | B.pt oC | Electrical  In solid | conductivity  in molten |
| J | 365 | 463 | Nil | Nil |
| K | 1323 | 2773 | Good | Good |
| L | 1046 | 1680 | Nil | Good |
| M | 2156 | 2776 | Nil | Nil |

Place J,K, L and M in the appropriate categories from the following.

1. Metallic solid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 mark)**
2. Covalent network solid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 mark)**
3. Ionic solid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 mark)**
4. Covalent molecular solid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(1 mark)**

**10**. The table below gives the energy required to remove the outermost electron for some group (I) elements.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | 1 | II | III | IV |
| Energy Kj mol-I | 494 | 418 | 518 | 376 |

Arrange the elements in decreasing reactivity **(2 marks)**

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***SET 3***

CHEMISTRY MARKING SCHEME

1**. i.**

1. Oxygen
2. Moisture
3. Carbon (IV) oxide
4. Oxidation
5. Deliquescence
6. Neutralization
7. Hygroscopy
8. Efflorescence
9. Copper nitrate, Zinc chloride
10. Anhydrous copper sulphate, Cobalt chloride
11. Sodium carbonate, Sodium sulphate

**2. i.** iii, vi, viii, iv, ii, v, vii,i

**ii.** To increase rate of reaction

**iii.** – Effervescence stops

-- Excess carbonate is unreacted

-- With blue litmus paper no change

**iv**. Not to lose water of crystallization

1. Copper is below hydrogen in the reactivity series, therefore, will not react with acid/will not displace

Hydrogen

1. **i.** Gas P — Hydrogen

Solid T – Copper

Solid R – Magnesium oxide

Liquid S – Water

**ii.** CuO(s) + H2(g) Cu(s) + H2O(g)

**4. I,II**

**i.** 2Cl2 (g) + 4NaOH (aq) 2 NaCl (aq) + 2NaOCl(aq) + 2H2O(l)

1. 3Cl2(g) + 6KOH(aq) 5KCl(aq) + KClO3(aq) +34 H2O(l)
2. 2Fe Cl2(aq) + Cl2( g) 2FeCl3(aq)
3. 2NaHCO3(aq) + H2SO4(aq) Na2SO4(aq) + 2CO2(aq) + 2H2O(l)
4. Pb (NO3)2 (aq) + 2NaCl (aq) 2 NaNO3(aq) + PbCl2(s)
5. Mg(s) + Cu SO4(aq) MgSO4(aq) + Cu(s)
6. 2KOH(aq) + H2SO4(aq) K2SO4aq + 2H2O(l)

**III.**

**e)** Precipitation

**f)** Displacement

**g)** Neutralisation

**5. i**. Number of the replaceable Hydrogen atom/ions in one molecule of an acid

**ii**. **a)** 1

**b)** 2

**c)** 3

**6.**

**Salt Name**

1. Na3PO4 Sodium Phosphate
2. Na2HPO4 Disodium hydrogen phosphate
3. NaH2PO4  Sodium dihydrogen phosphate

**7. i**.

1. Lead nitrate and Potassium iodide
2. Silver nitrate and Sodium chloride
3. Barium nitrate and zinc sulphate

**ii.**

1. Pb2+(aq) + I-(aq) PbI(s)
2. Ag+(aq) + Cl-(aq) AgCl(s)
3. Ba2+(aq) + SO42-(aq) BaSO4(s)

**8.** – React copper (II) oxide with dilute sulphuric acid to get copper sulphate solution

-- Dissolve sodium carbonate in distilled water to form sodium carbonate solution

-- React copper (II) sulphate solution and sodium carbonate solution

-- Filter to get copper carbonate as residue and dry between two filter papers

**9.**

1. K
2. M
3. L
4. J

10. iv, ii, I, iii