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**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR CERTIFICATE IN AGRICULTURE

**CHE 0100: CHEMISTRY**

**DATE: AUGUST, 2016 TIME: 1 ½ HOURS**

**INSTRUCTIONS:** *Answer questions* ***one******Compulsory*** *and any other* ***two*** *questions*

**QUESTION ONE - (30 MARKS)**

1. (i) What is an isotope? (1 Mark)

(ii) An element X contains 90% of and 10% of . Calculate the relative atomic mass of x. (3 Marks)

1. (i) An element has an atomic number 19. Write its electronic and ionic configuration.

(2 Marks)

 (ii) What kind of bonding is expected in b(i) above and chlorine gas. Explain your answer. (3 Marks)

1. Study the part of the periodic table below and answer the questions that follow. The letters do not represent actual chemical symbols of elements.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| A |  |  | B |  | C |  |  | D |
|  | E |  |  |  |  |  | J |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

(i) Name the elements which are alkali metal and an inert element. (2 Marks)

(ii) Write the electronic arrangement of E and J (2 Marks)

(iii) Explain why the atomic radius of C is smaller than that of B. (2 Marks)

(iv) The ionic radius of A is smaller than that of its atomic radius. (2 Marks)

(v) The ionic radius of J is greater than its atomic radius. (2 Marks)

1. Briefly explain the following observations;
2. Alkaline earth metals are generally less reactive than alkali metals. (3 Marks)
3. The order of reactivity increases down group I but decreases down group VII.

(3 Marks)

1. The electronic arrangement of ions of  and  are 2:8 and 2:8:8 respectively.
2. Write the electron arrangement of their atoms. (3 Marks)
3. Write the formular of the compound formed by X and Y. (2 Marks)

**QUESTION TWO (15 MARKS)**

1. Explain the meaning of oxidation and reduction in terms of electron transfer. (2 Marks)
2. The following stoichometric equations represent redox reactions. In each case elucidate the fundamental oxidation and reduction process in the light of (a) above.
3. $Zn\_{\left(g\right)}+H\_{2}SO\_{4(aq)}\rightarrow ZnSO\_{4(g)}+H\_{2(g)}$ (2 Marks)
4. $2AlBr\_{3(s)}+Cl\_{2(g)}\rightarrow 2AlCl\_{3(S})+Br\_{2(g)}$ (2 Marks)
5. (i) Define oxidation number and explain how it is applied in redox reactions(2 Marks)

(ii) State the oxidation numbers of the following species;

 $Fe^{3+}$ (1 Mark)

 $S^{2-}$ (1 Mark)

$ N\_{2 (g)}$ (1 Mark)

1. Calculate the oxidation numbers of;
2. S in $SO\_{4}^{2-}$ (2 Marks)
3. Fe in $Fe\_{2}\left(SO\_{4}\right)\_{3}$ (2 Marks)

**QUESTION THREE (15 MARKS)**

1. (i) What is molar mass? (1 Mark)

(ii) How many moles of KOH are there in 5.6 (g) of anhydrous KOH? (2 Marks)

(iii) How many molecules of KOH are there in the amount of KOH in (a) above. (K = 39, O=16, H= 1, L = 6.02 x$ 10^{23}$. (2 Marks)

1. A compound containing iron and chlorine was analysed and found to contain 2.8g of iron and 3.55g of chlorine. Calculate the empirical formula of the compound (Fe = 56,

Cl = 35.5) (3 Marks)

1. (i) Define the term molar solution. (1 Mark)

(ii) What is the percentage of phosphorous in one mole of H4P2O7 (P= 31, O= 16, H = 1) (3 Marks)

1. What is the concentration of the resulting solution of HCl when 100cm3 of 0.1M HCl are mixed with 100cm3 of 1M HCl. (3 Marks)

**QUESTION FOUR (15 MARKS)**

1. Differentiate between the following terms;
2. An acid and a base (2 Marks)
3. A formula equation and ionic equation (2 Marks)
4. Complete the following equation;
5.  (1 Marks)
6.  (1 Marks)
7. Write ionic equation for the above reactions. (3 Marks)
8. (i) What is the difference between hard water and soft water? (2 Marks)

(ii) What chemical substances cause permanent and temporary hardness of water?(2 Marks)

(iii) State one advantage and one disadvantage of hard water. (2 Marks)

(iv) State one method used to remove water hardness. (1 Mark)

**QUESTION FIVE (15 MARKS)**

1. Name two main types of isomerism and describe one example of each. (3 Marks)
2. Write down the structure of the following compounds;
3. 2, 2- dimethyl butane (1 Mark)
4. 3 – methyl pent-1-ene (1 Mark)
5. Name the following compounds according to the IUPAC rules.
6.  (1 Mark)
7.  (1 Mark)
8. Give the product in each of the following reactions;
9.  (1 Mark)
10.  (1 Mark)
11.  (1 Mark)
12.  (2 Mark)
13. Give one use of each of the following group of compounds;
14. Alkanes (1 Mark)
15. Alkenes (1 Mark)
16. Alkynes (1 Mark)