

**COLLEGE OF SCIENCES**

**DEPARTMENT OF CHEMICAL SCIENCES**

 **1ST SEMESTER CHM 101 ASSIGNMENT ACADEMIC SESSION 2017/2018**

**INSTRUCTIONS:** ANSWER ALL QUESTIONS

1. If a proton changes into a neutron, a positron is emitted.
2. Write down a nuclear equation that shows the change
3. The isotope carbon-10C decays to positron emission with a half life of 19.20seconds, what is the product of the decay? Write down the nuclear equation.
4. In an experiment carried out by Taylor and Krist, hydrogen iodide was found to be 22.3% dissociated at 730.80K. Calculate Kc.
5. (a) From the following data, show that the decomposition of Hydrogen peroxide in aqueous solution is a first order reaction and hence calculate the half life

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time (minutes) | 0 | 5 | 10 | 20 |
| KMnO4 (cm3) | 46.1 | 37.1 | 29.8 | 19.6 |

(b) After 500 seconds, half of nitrogen (iv) oxide gas has reacted. How much of the gas will react after 800 seconds if the reaction is first order.

4. (a) Write the Henderson-Hasselbalch equation for a base buffer system.

 (b) Calculate the [H3O+] and pH of a buffer solution that is 0.2 M acetic acid and 0.15 M sodium acetate. [ Ka = 1.8 x 10-5].

 (c) Mathematically explain how you will obtain a buffer solution with high capacity.

5. (a )The reaction between aluminum and iron (iii) oxide can generate temperatures approximately 30000C and is used in welding metals

 2Al + Fe2O3 Al2O3 + 2Fe

In a process, 124g of Al are reacted with 601g of Fe2O3. (i) Calculate the mass in grams of Al2O3 formed. (ii) How much of the excess reagent is left at the end of the reaction?

1. In an experiment 46.0g of chlorobenzene were obtained from a 40g sample of benzene. Calculate the percentage yield.

(c ) 120g of propyne was combusted in the presence of excess oxygen. Calculated the mass of CO2 produced in the process.

1. Elements in the periodic table can be classified into four distinct classes based on their electronic configuration. Discuss.

6. Always protect your eyes with ……………………………. when working in the laboratory.

7. Why should weighing data or any other measurement data be recorded immediately in your laboratory manual and not on a scrap of paper?

8. Calculate the density of a solid if it has a mass of 8.47g and a volume of 3.24cm3. Please show your calculations with units.

 9. An excess of BaCl2 is added to 5.00ml of a 0.250M H2SO4 solution. What will be the mass of the resulting precipitate?

10. Cobalt (II) chloride is commonly obtained from chemical supply houses as a hydrate with the formula CoCl2.6H2O. An analysis showed that 25.0g of this hydrate contains 11.3g of water. What is the percent water by weight in this hydrate?