



ELIZADE UNIVERSITY, ILARA – MOKIN, ONDO STATE, NIGERIA
DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCES
FIRST SEMESTER EXAMINATIONS: 2018/2019 ACADEMIC SESSION
COURSE CODE: CHM 101 COURSE TITLE: GENERAL CHEMISTRY I
HOD's SIGNATURE [Signature]

DURATION: 2 HOURS

INSTRUCTIONS: ATTEMPT THREE QUESTIONS FROM SECTION A AND ONE QUESTION FROM SECTION B

SECTION A

ATTEMPT THREE QUESTIONS FROM THIS SECTION

Question One

- a. Distinguish between each pair of the following:
 - i. Reaction Rate and Reaction Mechanism [4 marks]
 - ii. Order of Reaction and Molecularity of Reaction [4 marks]
- b. What is dynamic equilibrium [2marks]
- c. Given that $A + B \rightleftharpoons C + D$, show that $K_c = 4x^2/(a-x)(b-x)$ [5marks]
- d. Predict the effects of the following on the position of equilibrium in the chemical reactions below:



- i. Increase in temperature [1 mark]
- ii. Increase in pressure [1 mark]
- iii. Removal of O_2 [1 mark]
- iv. Addition of Pt as a catalyst [1 mark]
- v. Addition of SO_3 [1 mark]

Question Two

- a. State Faraday's first and second laws of electrolysis [4 marks]
- b. With the aid of examples, distinguish between weak electrolyte and strong electrolyte [4 marks]
- c. In the electrolysis of aqueous NaCl, how many liters of Cl_2 (at STP) are generated by a current of 5A for a period of 2 hours? [4 marks]
- d. A direct current of 10 mA flows for 3.5 hrs through three cells in series. They contain solutions of sodium chloride, magnesium sulphate and aluminium trioxonitrate (V). Calculate the mass of metal deposited in each cell [$K = 23.0$; $Mg = 24.0$; $Al = 27.0 \text{ g/mol}$] [8 mrks]

Question Three

- a) Define these terms
 - i. Activation energy [2 mark]
 - ii. Electrolysis [2 mark]
 - iii. Electrode [2 mark]
 - iv. Effective collision [2 mark]

- v. Catalyst [2 mark]
- b) A direct current of 5A flows for 5 hrs through sodium chloride solution. Calculate the mass of the metal deposited at the cathode [Na = 23.0 g / mol] [5 mrks]
- c) How much time in seconds is required to plate out 2.3 g sodium metal from a solution of sodium chloride when the current is 0.5 A [5 mrks]

Question Four

- a) What is pH of a solution? [2 marks]
- b) Distinguish between each pair of the following:
- Strong Acid and Weak Acid [4 marks]
 - Dilute Acid and Concentrated Acid [4 mark]
- c) Calculate the pH of 0.1M HCl solution [5 marks]
- d) Calculate the pH of 0.1 NaOH solution [5 marks]

SECTION B

ATTEMPT ONE QUESTION FROM THIS SECTION

Question One

- List out the theories that explain the shapes of molecules [5marks]
- Predict the shapes of molecules with 2, 3 and 4 electron pairs in their outermost shell [3marks]
- Explain why the chemical behavior of element changes across a period? [1mark]
- Mention the three types of molecular orbitals where the electrons in covalent compounds can be found? [3marks]
- What is intermolecular force of attraction? Mention the different types that exist in covalent compounds [3marks]
- Write the mathematical expression to show the relationship between atomic number and mass number of an element (1mark)
- Indicate the total number of orbitals and maximum no of electrons in the 4th energy levels of an atom [2marks]
- With suitable diagram differentiate between S-orbital and P-orbital. [2marks]

Question Two.

- Give a brief definition of the following terms: [5marks]
 - Isotopic abundance
 - Mass deficit
 - Spectrum
 - Mass number
 - Orbital
- Mention the five lines obtainable in the atomic emission spectra of Hydrogen. [5marks]
- What is intermolecular force of attraction? [1mark]
- Mention the different types of intermolecular force of attraction that exist in covalent compounds [3marks]
- Predict the number of electron pairs in the Molecular Bonding Orbital, Non-bonding orbital and antibonding orbitals of the following molecules:
 - O₂
 - Cl₂ [6marks]