



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Fall – 2024

Course Code: 0531-111
Section: A, B, C, D, E, F
Full Marks: 40

Course Title: Chemistry

Level-Term: L1-T1

Exam Date: December 24, 2024

Teacher's Initial: AAA

Time: 2 Hours

[Answer All the Questions]

- Q1. (a) **Define** Reversible & Irreversible reactions with example. CO-1 [2+2+4=8]
(b) **What** is chemical equilibrium? Visualize this with graphical presentation. (C1)
(c) $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 3\text{NH}_3 + 92\text{KJ}$
Describe the effect of changing temperature and pressure of the above reaction at equilibrium.
- Q2. (a) **What** is the difference between Molarity & Molality? CO-2 [2+4+2=8]
(b) **Determine** the number of molecules in 50g of barium hydroxide (C1) and 100g of MnO_2 . [Ba=137g, Mn=95g]
(c) **What** is the mass percentage of Glucose in a solution prepared by dissolving 20g of glucose in 250g of water?
- Q3. (a) **Differentiate** between Homogeneous Mixture & Heterogeneous Mixture. CO-2 [2]
(b) **Calculate** the mole fraction of HCl in a solution of Hydrochloric acid in water containing 30% HCl by weight. CO-2 [3+3=6]
(c) **Calculate** the weight of HCl present in 180 ml of a 0.3M solution. (C3)
- Q4. (a) **What** do you know about The Arrhenius Theory? Write down its limitations. CO-2 [2.5+2.5+3=8]
(b) **What** is a buffer solution? Describe the mechanism of acidic buffer with a diagram. (C1)
(c) **What** is the pH of a buffer 0.25 moles acetic acid and 0.200 moles acetate ion and the total volume is 2L when you add 0.5 moles HCl? [$K_a = 1.9 \times 10^{-5}$]
- Or**
- (a) **State** the Phase Rule and write down the merits and demerits of phase rule. CO-2 [2.5+1.5+4=8]
(b) **Explain** Phase, component and degree of freedom in brief. (C1)
(c) **Describe** the water system with a suitable phase diagram.

Q5. (a) **What** are amines? **Discuss** about the types of amines?

CO-3 [2]

(C1)

(b) **How** would you prepare toluene and phenol? **Write** down the reactions.

[3+3=6]

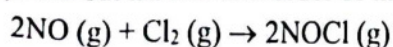
(c) **Write** down the mechanisms of S_N1 and S_N2 reactions.

Or

(a) **Find** out the rate and order of the following reaction

CO-3 [1+4+3=8]

(C1)



(b) **Establish** the relation between K_p & K_c with the help of the law of mass action.

(c) Some nitrogen and hydrogen gases are pumped into an empty five-litre glass bulb at 500°C . When equilibrium is established, 3 moles of N_2 , 2.1 moles of H_2 and 0.298 moles of NH_3 are found to be present. **Find** the value of K_c for the reaction.