GUJARAT TECHNOLOGICAL UNIVERSITY
B. Sc. HONORS/ HONORS WITH RESEARCH (BIOTECHNOLOGY) – SEMESTER - 1
EXAMINATION - WINTER - 2024

Subject Code:BS01001051   **Date: 27 Dec 2024**
Subject Name: Chemistry
Time:10:30 AM TO 01:00 PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat and clean diagrams as required.**

Q.1   **Write a note on the following.**   **(Marks-10X2=20)**

1. What is the order of a reaction, and how can it be determined using the rate law?
2. Provide an example of a reaction that involves homogeneous catalysis.
3. What is a buffer solution? Provide an example of its practical application.
4. State the Arrhenius theory of acids and bases.
5. Define qualitative analysis and explain how it differs from quantitative analysis.
6. Why are enzymes considered biological catalysts? Briefly explain their role in lowering activation energy.
7. Distinguish between the endpoint and equivalence point in a titration.
8. Explain the concept of ppm and its relevance in analytical chemistry.
9. Describe a reversible process and mention one criterion for reversibility.
10. Define absolute configuration and explain what is meant by R and S designations.

Q.2   **Answer the following (Any 2 out of 3)**   **(Marks-2X10=20)**

1. Explain the concept of the pH scale and its logarithmic nature. Discuss how the pH of a solution is calculated and its significance in various chemical processes.
2. Provide a detailed explanation of the First Law of Thermodynamics, including its mathematical representation and the principle of energy conservation. Give a real-world application as an example.
3. Explain the concept of symmetry in molecules. Describe the various symmetry elements, including the Centre of symmetry, plane of symmetry, and axis of symmetry, with molecular examples.

Q.3   **Answer the following (Any 6 out of 8)**   **(Marks-6X5=30)**

1. Describe a method to experimentally determine the half-life of a chemical reaction.
2. Explain the concepts of molarity, formality, and normality, with examples for each.

3. Define secondary standards in analytical chemistry. Discuss how they are prepared and their role in the calibration and standardization of analytical solutions.
4. Explain the Second Law of Thermodynamics and the concept of entropy.
5. Define heat capacity and differentiate between specific heat and molar heat capacity.
6. How are enantiomers separated, and why is this process important in chemistry and biology?
7. Distinguish between enantiomers and diastereomers. How are they classified?
8. Explain the principle of selective precipitation and its application in separating ions from a mixture.

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