

4. a) What do you mean by heterogeneous catalysis? Discuss adsorption theory of Heterogeneous Catalytic reaction. [1+5]
b) What do you mean by promoters and inhibitors? Give one example. [1+1+1]
5. a) How will you determine the absolute entropy of a substance in gaseous state at temperature T starting from 0K ? [6]
b) Derive Gibb's - Helmholtz equation in terms of internal energy and work function at constant volume. [3]
6. a) State Grotthus - Draper law and Stark- Einstein law of photochemical equivalence. Prove that $E = 11.97 \times 10^{-5} / \lambda \text{ kJ mol}^{-1}$, where E is the Einstein of energy. [2+2+2]
b) What do you mean by photosensitization? How does photosensitization reaction take place during photosynthesis of carbohydrates? [3]
7. a) Show that the quantum yield in the photochemical combination of H_2 and Br_2 is very low at ordinary temperature. [5]
b) Differentiate between phosphorescence and fluorescence. [4]
8. Write short notes on any **Three**: [3x3]
a) Postulates of quantum mechanics
b) Enzyme catalysis
c) Difference between thermal and photo chemical reaction
d) Concept of residual entropy
e) Homogeneous catalysis