SEAT NO:_____ No. of Printed Pages : 2

[92]
Eng.

SARDAR PATEL UNIVERSITY
BSc (Semester- 5) Examination
Physical Chemistry
US05CCHE23

Date: 28/12/2020 Time: 2:00 to 4:00 Pm
Day: Monday Total Marks: 70

Q:1 Answer the following questions: **[10]**

(1) In a spontaneous change of volume expansion, entropy change is
(a) Negative (b) zero (c) Positive (d) can't be decided

(2) Entropy is a measure of _____
(a) Arrangement (b) Disorder (c) Order (d) Energy

(3) The rate law for a reaction $2A+B \rightarrow A_2B$ which occuring in a single step is .....
(a) Rate = $K[A]^2[B]$ (b) Rate = $K[A]^2[B]/[A_2B]$ (c) Rate = $K2[A][B]$ (d) Rate= $K[A][B]$

(4) Which of the following factors does not influence the rate of chemical reaction?
(a) Nature of reactants (b) concentration of reactants (c) Molecularity (d) Temperature

(5) The activation energy is equal to _____ minus energy actually possessed by molecules.
(a) Chemical energy (b) Threshold energy (c) Mechanical energy (d) Thermal energy

(6) Beer's law explains the relation between intensity of light and _____
(a) concentration of solution (b) Thickness of medium (c) opacity (d) all of above

(7) For primary photochemical reactions quantum yield (Φ) = _____
(a) $\Phi > 1$ (b) $\Phi < 1$ (C) $\Phi = 1$ (d) $\Phi = 0$

(8) For adsorption the plot of log $x/m \rightarrow$ log p is linear with slope is equal to
(a) K (b) $1/n$ (c) log K (d) n

(9) The rate of physical adsorption increase with _____
(a) decrease in temperature (b) increase in temperature
(c) decrease in pressure (d) decrease in surface area

(10) How many layers are adsorbed in chemisorption
(a) two (b) three (c) one (d) Many

Q-2 Fill in the blank for the following . **[8]**

(1) concept of_____ is the result of study of second law of thermodynamics (Entropy/Heat capacity)

(2) Efficiency of carnot cycle is always_____ (more than one / less than one)
(3) For a complex reaction, rate determining step is always_____ (slow / fast)
(4) If at given temperature activation energy for a reaction is high, the rate of chemical reaction is _____ (high/ low)
(5) Radio Micrometer is the type of_____(filter/Detector)
(6) Factor affecting on quantum yield is_____ (Inert gases/ Catalyst)
(7) _____the critical temperature of the gas, the more readily will be adsorbed (lower / higher)
(8) Freundlich isotherm is not applicable at_____(high pressure/ lower pressure).

Q-3 Answer the following questions in short. (any 10) **[20]**

(1) Describe limitations of the first law of thermodynamics.
(2) Describe the cyclic process briefly
(3) Write a short note on the Carnot theorem.
(4) Can the activation energy of the reaction be zero or negative ? Explain
(5) Define the term (a) Activated complex (b) Temperature coefficient
(6) What is the catalyst? How does catalyst increase the rate of chemical reaction?
(7) Calculate energy in erg/mole for one Einstein for radiation having wave-length(λ)= 3000A^0
(8) Define: Fluorescence and Phosphorescence
(9) What is meant by Luminescence? Write types of Luminescence.
(10) Differentiate between adsorption and absorption.
(11) Discuss any two factors affecting adsorption.
(12) Define: (a) Adsorption isotherm (b) Adsorption isobar.

Q-4 Answer the following questions (Any four) **[32]**

(1) Write a note on change in entropy during phase transformation.
(2) Calculate the change in entropy for fusion of 1kg ice at 0^0C, Heat of fusion for ice is 334.72 $J.gm^{-1}$
(3) Derive an equation for rate constant for unimolecular reaction by Lindemann theory.
(4) The activation energy of a non-catalysed reaction at 310k is 83. 68 KJ mol^{-1} and the activation energy of the same reaction catalysed by an enzyme is 25.10 KJ mol^{-1} . Calculate the ratio of the rate constants of the enzyme catalysed and non-catalysed reaction (R=8.314 JK^{-1} $mole^{-1}$)
(5) Define: Quantum yield (Φ). Give reasons for low and high Quantum yield.
(6) The path length of solution of substance in water having concentration is 10^{-3} M is 1cm, which absorbs 10% of incident radiation. what should be the concentration of the solution in order to absorb 90% of the same incident radiation.
(7) Write down assumptions and derive Lungmuir adsorption isotherm giving proper mathematical equation.
(8) Discuss BET theory giving mathematical equations and its limitations.

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