

35. For the reaction system :

$2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$ volume is suddenly reduced to half its value by increasing the pressure on it. If the reaction is of first order with respect to O_2 and second order with respect to NO , the rate of reaction will

- (a) diminish to one-eighth of its initial value
(b) increase to eight times of its initial value
(c) increase to four times of its initial value
(d) diminish to one-fourth of its initial value
36. In the reaction of formation of sulphur trioxide by contact process $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$ the rate of reaction was measured as

$\frac{d[\text{O}_2]}{dt} = -2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. The rate of reaction in terms of $[\text{SO}_2]$ in $\text{mol L}^{-1} \text{ s}^{-1}$ will be:

- (a) -1.25×10^{-4} (b) -2.50×10^{-4}
(c) -3.75×10^{-4} (d) -5.00×10^{-4}
37. A reactant (A) forms two products :



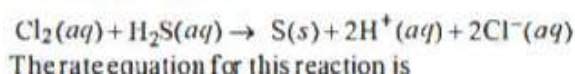
If $E_{a2} = 2 E_{a1}$, then k_1 and k_2 are related as :

- (a) $k_2 = k_1 e^{E_{a1}/RT}$ (b) $k_2 = k_1 e^{E_{a2}/RT}$
(c) $k_1 = A k_2 e^{E_{a1}/RT}$ (d) $k_1 = 2 k_2 e^{E_{a2}/RT}$
38. Consider an endothermic reaction $\text{X} \rightarrow \text{Y}$ with the activation energies E_b and E_f for the backward and forward reactions, respectively. In general

- (a) there is no definite relation between E_b and E_f
(b) $E_b = E_f$
(c) $E_b > E_f$
(d) $E_b < E_f$
39. Which of the following influences the rate of a chemical reaction performed in solution?

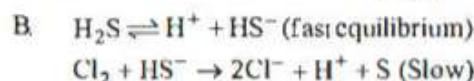
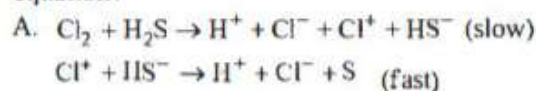
- (a) Temperature
(b) Activation energy
(c) Presence of a catalyst
(d) All of the above influence the rate
40. The rate of a reaction quadruples when the temperature changes from 300 to 310 K. The activation energy of this reaction is : (Assume activation energy and pre-exponential factor are independent of temperature; $\ln 2 = 0.693$; $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$)

- (a) $107.2 \text{ kJ mol}^{-1}$ (b) 53.6 kJ mol^{-1}
(c) 26.8 kJ mol^{-1} (d) $214.4 \text{ kJ mol}^{-1}$
41. Consider the reaction :



$$\text{rate} = k[\text{Cl}_2][\text{H}_2\text{S}]$$

Which of these mechanisms is/are consistent with this rate equation?

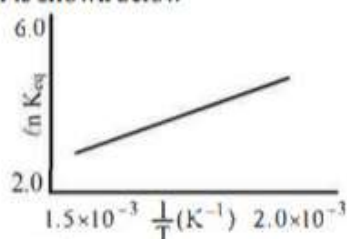


- (a) B only (b) Both A and B
(c) Neither A nor B (d) A only

42. The slope in Arrhenius plot, is equal to:

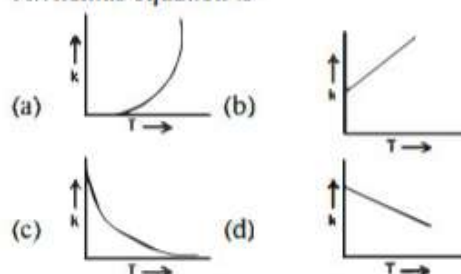
- (a) $-\frac{E_a}{2.303R}$ (b) $\frac{E_a}{R}$
(c) $\frac{R}{2.303E_a}$ (d) None of these

43. A schematic plot of $\ln K_{eq}$ versus inverse of temperature for a reaction is shown below



The reaction must be

- (a) highly spontaneous at ordinary temperature
(b) one with negligible enthalpy change
(c) endothermic
(d) exothermic
44. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows Arrhenius equation is



45. The reaction $2\text{N}_2\text{O}_5(\text{g}) \rightarrow 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$ follows first order kinetics. The pressure of a vessel containing only N_2O_5 was found to increase from 50 mm Hg to 87.5 mm Hg in 30 min. The pressure exerted by the gases after 60 min. will be (assume temperature remains constant) :
- (a) 106.25 mmHg (b) 150 mmHg