CHEMISTRY

51. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $K = A.e^{-\frac{E^*}{RT}}$. Activation energy (E^*) of the reaction can be calculated by plotting

(1) $\log k$ vs $\frac{1}{\log T}$ (2) k vs T

(3) k vs $\frac{1}{\log T}$ (4) $\log k$ vs $\frac{1}{T}$

52. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$, rate is expressed as

(1) $-3\frac{d[N_2]}{dt} = -\frac{d[H_2]}{dt} = \frac{2}{3}\frac{d[NH_3]}{dt}$

(2) $-\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$

(3) $-\frac{d[N_2]}{dt} = -\frac{3d[H_2]}{dt} = \frac{2d[NH_3]}{dt}$

(4) $-\frac{d[N_2]}{dt} = -\frac{d[H_2]}{dt} = \frac{d[NH_3]}{dt}$

53. In the reaction $3A \rightarrow 2B$, rate of formation $+\frac{d[B]}{dt}$ is equal to

(1) $-\frac{1}{3}\frac{d[A]}{dt}$ (2) $-\frac{2}{3}\frac{d[A]}{dt}$

(3) $+2\frac{d[A]}{dt}$ (4) $-\frac{3}{2}\frac{d[A]}{dt}$

54. If the rate of reaction between A and B is given by rate = $k[A][B]^2$, then the reaction is

(1) first order in A

(2) second order in B

(3) third order overall

(4) all are correct

55. The rate of the first order reaction, $A \rightarrow$ Products, is 7.5×10^{-4} mol L^{-1} s^{-1}, when the concentration of A is 0.2 mol L^{-1}. The rate constant of the reaction is

(1) 2.5×10^{-5} s^{-1}

(2) 8.0×10^{-4} s^{-1}

(3) 6.0×10^{-4} s^{-1}

(4) 3.75×10^{-3} s^{-1}

56. 75% of a first order reaction was completed in 32 minutes; when was 50% of the reaction completed?

(1) 4 min (2) 8 min

(3) 24 min (4) 16 min

57. The chemical reaction, $2O_3 \rightarrow 3O_2$ proceeds as follows

$O_3 \rightarrow O_2 + O$ (fast)

$O + O_3 \rightarrow 2O_2$ (slow)

The rate law expression should be

(1) $r = k[O_3]^2$

(2) $r = k[O_3]^2[O_2]^{-1}$

(3) $r = k[O_3][O_2]$

(4) $r = [O_3][O_2]^2$

58. The rate of a reaction can be increased in general by all the following factors except

(1) by increasing the temperature

(2) using a suitable catalyst

(3) by increasing the concentration of reactants

(4) by an increase in activation energy

59. For the following reaction $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$ If the rate of formation of NO is 3.6×10^{-3} mol L^{-1} s^{-1}, then what is the rate of formation of H_2O?

(1) 3.6×10^{-3} mol L^{-1} s^{-1}

(2) 5.4×10^{-3} mol L^{-1} s^{-1}

(3) 7.2×10^{-3} mol L^{-1} s^{-1}

(4) 2.4×10^{-3} mol L^{-1} s^{-1}

60. Consider the following data for the reaction, $A + B \rightarrow$ Products

Expt	Initial conc. [A]	Initial conc. [B]	Initial rate (mol s^{-1})
1	0.10 M	1.0 M	2.1×10^{-3}
2	0.20 M	1.0 M	8.4×10^{-3}
3	0.20 M	2.0 M	8.4×10^{-3}

The rate equation of the reaction is

(1) $r = k[A]^2$

(2) $r = k[B]^2$

(3) $r = k[A]^2[B]^1$

(4) $r = k[A]^1[B]^1$

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