Rate law and Rate constant

1. Which of these does not influence the rate of reaction

(a) Nature of the reactants

(b) Concentration of the reactants

(c) Temperature of the reaction

(d) Molecularity of the reaction

2. The rate law for reaction $A + 2B = C + 2D$ will be

(a) Rate $= K[A][B]$

(b) Rate $= K[A][2B]$

(c) Rate $= K[A][B]^2$

(d) Rate $= K\frac{[C][D]^2}{[A][B]^2}$

3. In the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$, initial pressure is $500 atm$ and rate constant K is $3.38 \times 10^{-5}\, sec^{-1}$. After 10 minutes the final pressure of N_2O_5 is

(a) 490 atm (b) 250 atm

(c) 480 atm (d) 420 atm

4. The rate law for the reaction

Sucrose + Water $\xrightarrow{[H^+]}$ Glucose + Fructose is given by

(a) Rate $= K$ [sucrose] [water]

(b) Rate $= K$ [sucrose] [water]0

(c) Rate $= K$ [sucrose]0 [water]

(d) Rate $= K$ [sucrose]$1/2$ [water]$1/2$

5. $A + 2B \rightarrow C + D$. If $-\frac{d[A]}{dt} = 5 \times 10^{-4} moll^{-1}s^{-1}$1, then $-\frac{d[B]}{dt}$ is

(a) $2.5 \times 10^{-4} moll^{-1}s^{-1}$

(b) $5.0 \times 10^{-4} moll^{-1}s^{-1}$

(c)$2.5 \times 10 - 3 moll^{-1}s^{-1}$

(d)$1.0 \times 10^{-3} moll^{-1}s^{-1}$

6. The data for the reaction $A + B \rightarrow C$ is

Exp.	$[A]_0$	$[B]_0$	Initial rate
(1)	0.012	0.035	0.10
(2)	0.024	0.070	0.80
(3)	0.024	0.035	0.10
(4)	0.012	0.070	0.80

The rate law corresponds to the above data is

(a) Rate $= k[B]^3$

(b) Rate $= k[B]^4$

(c) Rate $= k[A][B]^3$

(d) Rate $= k[A]^2[B]^2$

7. The experimental data for the reaction $2A + B_2 \rightarrow 2AB$ is

Exp.	$[A]_0$	$[B]_0$	Rate (mole s^{-1})
(1)	0.50	0.50	1.6×10^{-4}
(2)	0.50	1.00	3.2×10^{-4}
(3)	1.00	1.00	3.2×10^{4}

The rate equation for the above data is

(a) Rate $= k[B_2]$

(b) Rate $= k[B_2]^2$

(c) Rate $= k[A]^2[B]^2$

(d) Rate $= k[A]^2[B]$

8. The reaction $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$ is of first order. If volume of reaction vessel is reduced to 1/3, the rate of reaction would be

(a) 1/3 *times* (b) 2/3 *times*

(c) 3 *times* (d) 6 *times*

9. For a reaction $2A + B \rightarrow$ Products, doubling the initial concentration of both the reactants increases the rate by a factor of 8, and doubling the concentration of *B* alone doubles the rate. The rate law for the reaction is

(a) $\gamma = k[A][B]^2$

(b) $\gamma = k[A]^2[B]$

(c) $\gamma = k[A][B]$

(d) $\gamma = k[A]^2[B]^2$

10. For a reactions $A + B \rightarrow$ product, it was found that rate of reaction increases four times if concentration of '*A*' is doubled, but the rate of reaction remains unaffected. If concentration of '*B*' is doubled. Hence, the rate law for the reaction is

(a) rate $= k[A][B]$

(b) rate $= k[A]^2$

(c) rate $= k[A]^2[B]^1$

(d) rate $= k[A]^2[B]^2$

11. Velocity constant K of a reaction is affected by

(a) Change in the concentration of the reactant

(b) Change of temperature

(c) Change in the concentration of the product

(d) None of the above

12. Point out the wrong statement :

For a first order reaction

(a) Time for half-change $(t_{1/2})$ is independent of initial concentration

(b) Change in the concentration unit does not change the rate constant (K)

(c) Time for half-change $\times$ rate constant $= 0.693$

(d) The unit of K is $mole^{-1}\,min^{-1}$

13. The rate constant of a reaction depends on

(a) Temperature (b) Mass

(c) Weight (d) Time

14. In a first order reaction the concentration of reactant decreases from $800 mol/dm^3$ to $50 mol/dm^3$ is $2 \times 10^2 sec$. The rate constant of reaction in sec^{-1} is

(a) 2×10^4 (b) 3.45×10^{-5}

(c) 1.386×10^{-2} (d) 2×10^{-4}

15. For a reaction $A \rightarrow B$, the rate of reaction quadrupled when the concentration of A is doubled. The rate expression of the reaction is $r = K(A)^n$. when the value of n is

(a) 1 (b) 0

(c) 3 (d) 2

16. The velocity constant of a reaction is *K*. Which of the following statements is not true regarding *K*

(a) *K* is a constant for a reaction at a given temperature

(b) The value of *K* changes when the temperature changes

(c) *K* is the velocity of the reaction at unit concentrations of the reactant

(d) *K* is a constant for all reactions

17. For the following reaction scheme (homogeneous), the rate constant has units : $A + B \xrightarrow{K} C$

(a) sec^{-1} $mole$

(b) sec^{-1}

(c) $sec^{-1}\, litre\ mole^{-1}$

(d) *sec*

18. Which of the following oxides of nitrogen will be the most stable one

(a) $2NO_2(g) \rightleftharpoons N_2(g) + 2O_2(g); K = 6.7 \times 10^{16} moll^{-1}$

(b) $2NO(g) \rightleftharpoons N_2(g) + O_2(g); K = 2.2 \times 10^{30} moll^{-1}$

(c) $2N_2O_5(g) \rightleftharpoons 2N_2(g) + 5O_2(g); K = 1.2 \times 10^{34} moll^{-5}$

(d) $2N_2O(g) \rightleftharpoons 2N_2(g) + O_2(g); K = 3.5 \times 10^{33} mollitre^{-1}$

19. The rate of reaction is determined by slow step reaction. The step is called

(a) Reaction rate

(b) Activation step

(c) Rate determining step

(d) None of the above

20. The rate of the reaction $CCl_3CHO + NO \rightarrow CHCl_3 + NO + CO$ is given by Rate $= K[CCl_3CHO][NO]$. If concentration is expressed in moles/litre, the units of *K* are

(a) $litre^2 mole^{-2}\, sec^{-1}$

(b) $molelitre^{-1}\, sec^{-1}$

(c) $litremole^{-1}\, sec^{-1}$

(d) sec^{-1}

21. Rate constant for a reaction $H_2 + I_2 \rightarrow 2HI$ is 49, then rate constant for reaction $2HI \rightarrow H_2 + I_2$ is

(a) 7 (b) 1/49

(c) 49 (d) 21

(e) 63

22. The reaction

N_2O_5(inCCl_4solution) $\rightarrow 2NO_2$(solution) $+\frac{1}{2}O_2(g)$

is of first order in N_2O_5 with rate constant $6.2 \times 10^{-1} s^{-1}$. What is the value of rate of reaction when $[N_2O_5] = 1.25 mol el^{-1}$

(a) $7.75 \times 10^{-1} mol el^{-1} s^{-1}$

(b) $6.35 \times 10^{-3} mol el^{-1} s^{-1}$

(c) $5.15 \times 10^{-5} mol el^{-1} s^{-1}$

(d) $3.85 \times 10^{-1} mol el^{-1} s^{-1}$

23. A reaction that is of the first order with respect to reactant *A* has a rate constant $6\, min^{-1}$. If we start with $[A] = 0.5 moll^{-1}$, when would $[A]$ reach the value 0.05*mol* l^{-1}

(a) 0.384 *min* (b) 0.15 *min*

(c) 3 *min* (d) 3.84 *min*

24. The rate constant for the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ is $3 \times 10^{-5}\, sec^{-1}$. If the rate is $2.40 \times 10^{-5} mollitre^{-1}\, sec^{-1}$. Then the concentration of N_2O_5 (in *mol litre*$^{-1}$) is

(a) 1.4 (b) 1.2

(c) 0.04 (d) 0.8