

## Chapter 6 Reaction Kinetics

1. Which of the following observations are CORRECT about the order of a reaction?  
(A) Order of a reaction is always a whole number  
(B) The stoichiometric coefficient of the reactants doesn't affect the order  
(C) Order of reaction is the sum of power to express the rate of reaction to the concentration terms of the reactants  
(D) Order can only be assessed experimentally
2. A catalyst is one which speeds up the reaction by  
(A) lowering the energy of the transition state  
(B) lowering the free energy of the reaction  
(C) decreasing the activation energy of the reaction  
(D) increasing the kinetic energy of the reactants
3. Among the following statements which are TRUE for a zero-order reaction?  
(A)  $t_{1/2}$  is directly proportional to the initial concentration of the reactant  
(B) the time taken for 75% reaction is 1.5 times that of  $t_{1/2}$   
(C) the rate constant has the dimension of conc. time<sup>-1</sup>  
(D) the concentration of the reactant decreases exponentially with time
4. 'A harmful substance persists in the environment for a very long period of time'. The CORRECT statements for this fact are  
(A) the substance degrades by second-order kinetics  
(B) the substance degrades by first-order kinetics  
(C) the substance is not biodegradable  
(D) the substance has long half-life
5. Given that a reaction absorbs energy and has an activation energy of 50 kJ/mol, which of the following statements are CORRECT?  
(A) The reverse reaction has an activation energy equal to 50 kJ/mol  
(B) The reverse reaction has an activation energy less than 50 kJ/mol  
(C) The reverse reaction has an activation energy greater than 50 kJ/mol  
(D) The change in internal energy is greater than zero
6. Most reactions are more rapid at high temperatures than at low temperatures. This is consistent with  
(A) an increase in the activation energy with increasing temperature  
(B) an increase in the rate constant with increasing temperatures  
(C) an increase in the percentage of "high energy" collisions with increasing temperature  
(D) an increase in the kinetic energy with increasing temperature
7. Which items CORRECTLY complete the following statement?  
A catalyst can act in a chemical reaction to  
(A) increase the equilibrium constant  
(B) lower the activation energy

- (C) decrease  $\Delta E$  for the reaction  
(D) provide a new path for the reaction
8. Which statements are CORRECT?  
(A) If a reaction is thermodynamically spontaneous it may occur rapidly  
(B) If a reaction is thermodynamically spontaneous it may occur slowly  
(C) Activation energy is a kinetic quantity rather than a thermodynamic quantity  
(D) If a reaction is thermodynamically spontaneous, it must have a low activation energy
9. Which of the following statements are TRUE?  
(A) Reactions with more negative values of  $\Delta G^\circ$  are spontaneous and proceed at a higher rate than those with less negative values of  $\Delta G^\circ$   
(B) The activation energy,  $E_a$ , is usually about the same as  $\Delta E$  for a reaction  
(C) The activation energy for a reaction does not change significantly as temperature changes  
(D) Reactions usually occur at faster rates at higher temperatures
10. Which of the following are characteristic of a zero-order drug decomposition reaction?  
(A) The rate of reaction is constant  
(B) The rate of reaction is independent of the concentration of any of the reactants  
(C) The half-life of the drug decomposition is directly proportional to the initial concentration of API  
(D) The units of the rate constant ( $k$ ) are time<sup>-1</sup>

**Answer**

1. (A), (B), (C)  
2. (A), (C)  
3. (A), (B), (C)  
4. (A), (C), (D)  
5. (B), (D)  
6. (B), (C)  
7. (B), (D)  
8. (A), (B) (C)  
9. (C), (D)  
10. (A), (B), (C)