



9. The efficiency of  $Al^{3+}$  ion is \_\_\_\_\_ times more than  $Mg^{2+}$  ion in a negative sol

- a. 9  
b. 4  
c. 9/4  
d. 3/2

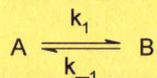
10. In enzyme kinetics,  $V$  represents the reaction velocity and  $S$  is the substrate. In a Lineweaver-Burk treatment of data, which of the following plots would give you a straight line of gradient  $K_M/V_{max}$  where  $K_M$  is the Michaelis constant and  $V_{max}$  is the maximum velocity?

- a.  $V$  against  $1/[S]$   
b.  $V$  against  $[S]$   
c.  $1/V$  against  $[S]$   
d.  $1/V$  against  $1/[S]$

11. The frequency factor in collision theory is

- a. Inversely proportional to  $T$   
b. Directly proportional to  $T$   
c. Directly proportional to  $\sqrt{T}$   
d. Inversely proportional to  $\sqrt{T}$

12. The relaxation time ( $\tau$ ) for the following reaction is



- a.  $\frac{1}{k_1 + k_{-1}}$   
b.  $\frac{1}{k_1 - k_{-1}}$   
c.  $k_1 + k_{-1}$   
d.  $k_1 - k_{-1}$

13. Which one of the following is NOT a key concept of the collision theory?

- a. Particles must collide in order to react  
b. particles must move slowly when they collide, otherwise they simply "bounce off" one another  
c. particles must collide with the proper orientation  
d. particles must collide with sufficient energy to reach the activated complex in order to react

14. Which of the following statements are true regarding enzyme inhibition?

- a. It may be reversible or irreversible  
b. Reversible can be competitive or non-competitive  
c. Both (a) and (b)  
d. It is always reversible

15. The indistinguishability correction in the Boltzmann formulation is incorporated in the following way: ( $N$ =total number of particles;  $f$ = single-particle partition function)

- a. Replace  $f$  by  $f/N!$   
b. Replace  $f^N$  by  $f^N/N!$   
c. Replace  $f$  by  $f/\ln(N!)$   
d. Replace  $f^N$  by  $f^N/\ln(N!)$

16. If  $g_i$  and  $n_i$  are respectively, the degeneracy and occupation number of the  $i$ th energy level, then the conditions under which M-B, F-D and B-E statistics give identical result is

- a.  $g_i/n_i \ll 1$   
b.  $g_i/n_i \gg 1$   
c.  $g_i/n_i$  is intermediate  
d.  $g_i/n_i < 0$

17. The possible number of ways of distributing 2 Bosons among 4 energy states is

- a. 4  
b. 16  
c. 10  
d. 6

18. An ensemble with constant  $V$ ,  $T$  and  $\mu$  is

- a. canonical  
b. microcanonical  
c. grandcanonical  
d. macrocanonical

19. Molar rotational energy of all linear molecules at a given temperature  $T$  is

- a.  $0.5RT$   
b.  $RT$   
c.  $1.5RT$   
d.  $2.0RT$

20. The rotational partition function of a diatomic molecule with energy levels corresponding to  $J=0$  and  $1$ , is (where,  $\epsilon$  is a constant)

- a.  $1 + e^{-2\epsilon}$   
b.  $1 + 3e^{-2\epsilon}$   
c.  $1 + e^{-3\epsilon}$   
d.  $1 + 3e^{-3\epsilon}$