1 Mark Questions

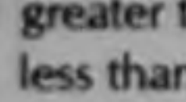
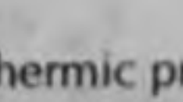
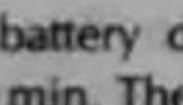
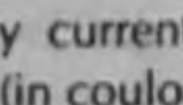
1. For a spontaneous process, the total entropy change ($\Delta S_{system} + \Delta S_{surroundings}$) is
   (a) equal to zero
   (b) greater than zero
   (c) less than zero for endothermic process
   (d) less than zero for exothermic process

2. A battery delivers a steady current of 1.25 A for 90 min. The total charge Q (in coulomb units) is
   (a) 6750 (b) 1012.5
   (c) 112.5 (d) 12.5

3. Molecule that has no lone pair of electrons on the central atom (among the choices) is
   (a) XeF_4 (b) PF_3
   (c) ClF_5 (d) BF_3

4. The oxidation state of nickel atom in the coordination compound $[Ni(NH_3)_3 Cl]Cl$ is
   (a) -1 (b) 0
   (c) $+1$ (d) $+2$

5. The compound that is aromatic, among the choices, is

   (a) 
   (b) 
   (c) 
   (d) 

2 Marks Questions

6. Consider the following equilibrium reaction,

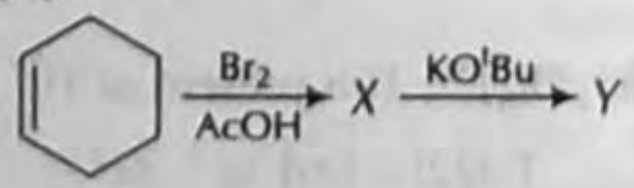
$$CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$$

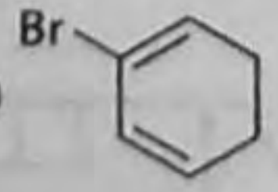
   0.60 atm of CO and 1.10 atm of Cl_2 were mixed in a constant volume reaction vessel at a particular temperature. After the equilibrium was established, 0.10 atm of $COCl_2$ was observed. The equilibrium constant for the reaction is
   (a) 0.02 (b) 0.15
   (c) 0.2 (d) 6.6

7. For a particular reaction, the use of a catalyst reduces the activation energy (E_n) to one-third its original value. The ratio of rate constants ($k_{catalyzed}/k_{uncatalyzed}$) is
   (a) 1 (b) $\frac{1}{3}$
   (c) $\exp\left(\frac{2E_a}{3RT}\right)$ (d) $\exp\left(\frac{E_a}{3RT}\right)$

8. Among heptan-1-ol, heptan-2-ol, heptan-3-ol and heptan-4-ol compounds those exhibit optical activity are
   (a) heptan-2-ol and heptan-3-ol
   (b) heptan-2-ol and heptan-4-ol
   (c) heptan-3-ol and heptan-4-ol
   (d) heptan-1-ol and heptan-4-ol

9. Structure of the compound Y in the following reaction sequence is



   (a) 
   (b) 
   (c) 
   (d) 

10. The ionisation energy follows the order
    (a) $O_2^+ > O_2 > O_2^- > O_2^{2-}$
    (b) $O_2 > O_2^+ > O_2^{2-} > O_2^-$
    (c) $O_2^- > O_2^{2-} > O_2^+ > O_2$
    (d) $O_2^{2-} > O_2 > O_2^- > O_2^+$

11. Reaction of Na_2SO_3 with 2 equivalents of HCl produces a gas *X*. Solution of *X* in water is acidic in nature. *X* is

(a) O_2 (b) Cl_2

(c) SO_2 (d) H_2S

Common Data for Questions 12 and 13

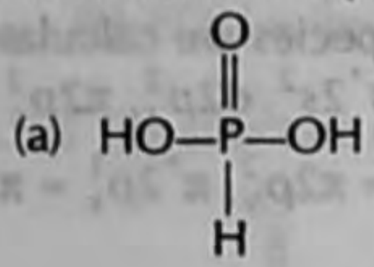
The ionisation constants of phosphorous acid (H_3PO_3) are $K_{a_1} = 3 \times 10^{-2}; K_{a_2} = 1.7 \times 10^{-7}$.

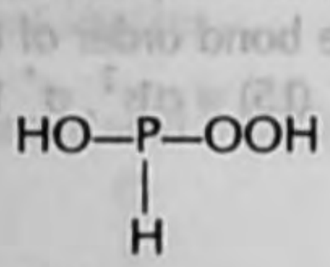
12. For a dilute solution of phosphorous acid in a pH-5 buffer, the predominant species is

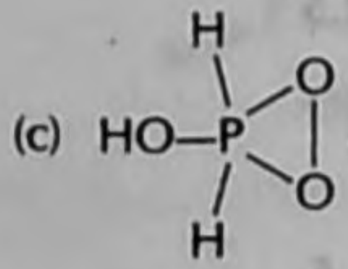
(a) H_3PO_3 (b) $H_2PO_3^-$

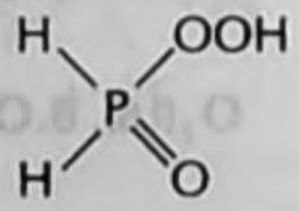
(c) HPO_3^{2-} (d) PO_3^{3-}

13. The structure of phosphorous acid is

(a) 

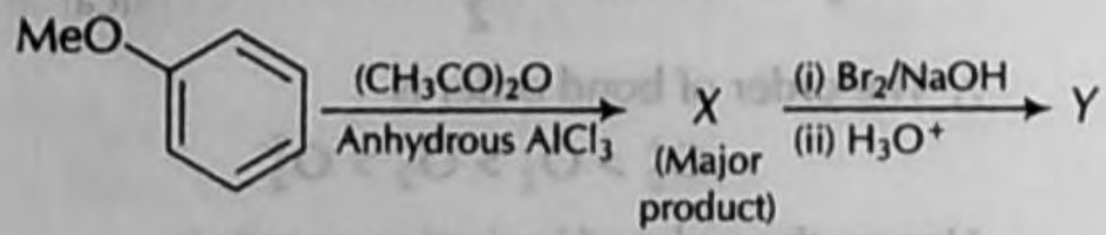
(b) 

(c) 

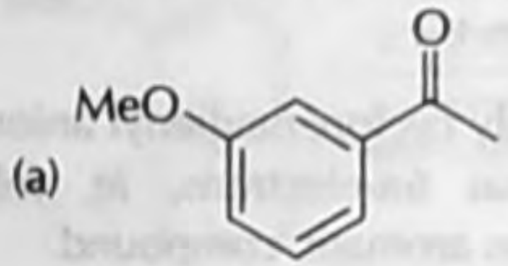
(d) 

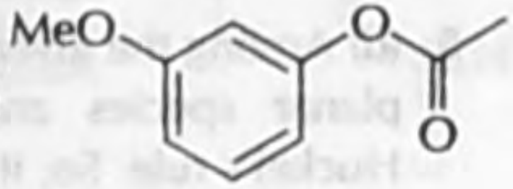
Statement for Linked Answer Questions 14 and 15

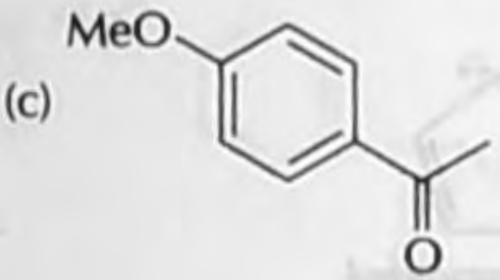
Consider the reaction sequence

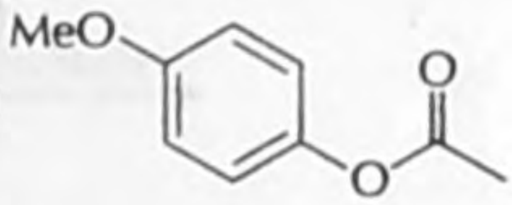


14. The structure of *X* in the given reaction sequence is

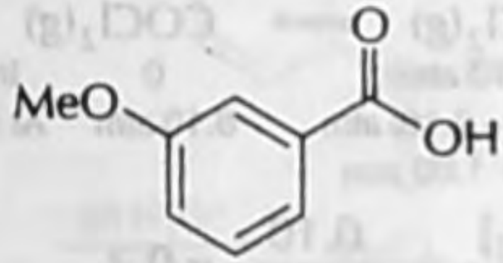
(a) 

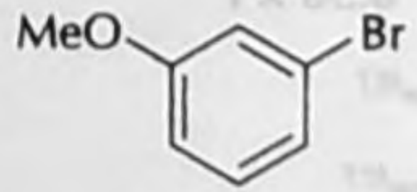
(b) 

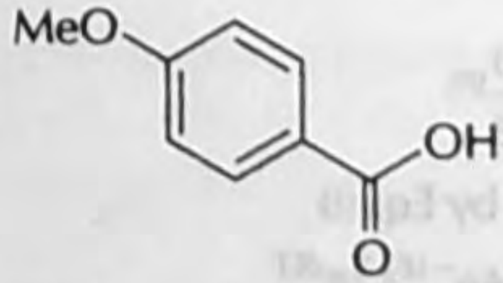
(c) 

(d) 

15. The structure of *Y* in the above reaction sequence is

(a) 

(b) 

(c) 

(d)