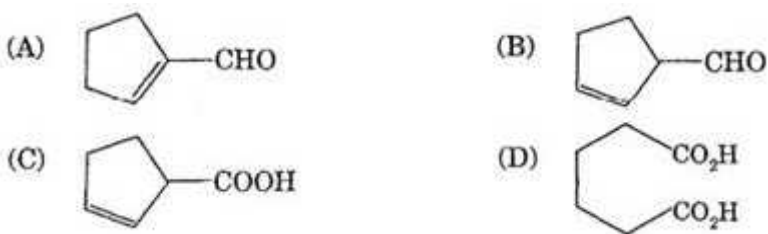


IIT-JEE-Chemistry-Paper 2-2007

Paper II

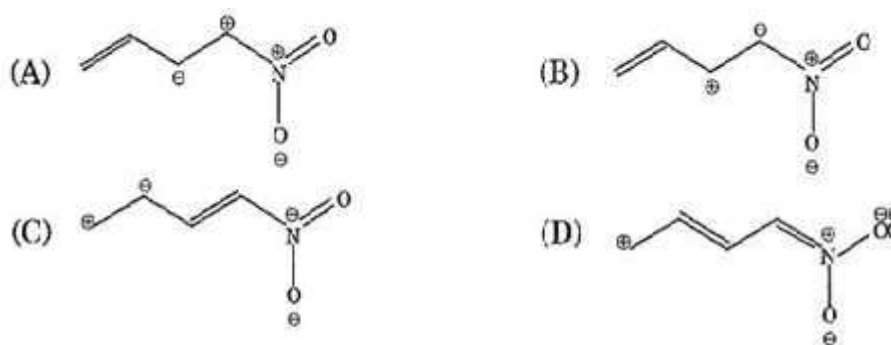
1. Consider a titration of potassium dichromate solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is
- (A) 3
(B) 4
(C) 5
(D) 6
2. Among the following metal carbonyls, the σ bond order is lowest in
- (A) $[\text{Mn}(\text{CO})_5]$
(B) $[\text{Fe}(\text{CO})_5]$
(C) $[\text{Cr}(\text{CO})_6]$
(D) $[\text{V}(\text{CO})_6]$
3. A solution of a metal ion when treated with KI gives a red precipitate which dissolves in excess K^+ to give a colourless solution. Moreover, the solution of metal ion on treatment with a solution of cobalt (II) thiocyanate gives rise to a deep blue crystalline precipitate. The metal ion is
- (A) Pb^{2+}
(B) Hg^{2+}
(C) Cu^{2+}
(D) Co^{2+}
4. Cyclohexene and ozonolysis followed by reaction with zinc dust and water gives compound E. Compound E on further treatment with aqueous KOH yields compound F. Compound F is



5. The number of stereoisomers obtained by bromination of *trans*-2-butene is

- (A) 1
 (B) 2
 (C) 3
 (D) 4

6. Among the following, the least stable resonance structure is



7. A positron is emitted from ${}^{23}_{11}\text{Na}$. The ratio of the atomic mass and atomic number of the resulting nuclide is

- (A) 22/10
 (B) 22/11
 (C) 23/10
 (D) 23/12

8. For the process $\text{H}_2\text{O}(\text{l}), (1 \text{ bar}, 373 \text{ K}) \rightarrow \text{H}_2\text{O}(\text{g}) (1 \text{ bar}, 373 \text{ K})$, the correct set of thermodynamic parameters is

- (A) $\Delta G = 0, \Delta S = +ve$
 (B) $\Delta G = 0, \Delta S =$

(C) $\Delta G = +ve, \Delta S = 0$

(D) ~~$\Delta G, \Delta S = +ve$~~

9. Consider a reaction $aG + bH \rightarrow$ Products. When concentration of both of the reactants G and H is doubled, the rate increases by eight times. However, when concentration of G is doubled keeping the concentration of H fixed, the rate is doubled. The overall order of the reaction is

(A) 0

(B) 1

(C) 2

(D) 3

10. STATEMENT 1 : Alkali metals dissolve in liquid ammonia to give blue solutions.

because

STATEMENT 2 Alkali metals in liquid ammonia give solvates species of the type $[M(NH_3)_n]^+$ (M = alkali metals).

(A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

(B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

11. STATEMENT 1: Glucose gives a reddish-brown precipitate with Fehling's solution.

Because

STATEMENT 2 Reaction of glucose with Fehling's solution gives CuO and gluconic acid.

(A) Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

(B) Statement-1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

12. STATEMENT1: Molecules that are not superimposable on their mirror images are chiral.

Because

STATEMENT2: All chiral molecules have chiral centers.

- (A) Statement1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement1 is True, Statement-2 is False
- (D) Statement1 is False, Statement-2 is True

13. STATEMENT1: Band gap of germanium is small.

Because

STATEMENT-2: The energy spread of each germanium atomic energy level is infinitesimally small.

- (A) Statement1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.
- (B) Statement1 is True, Statement-2 is True, Statement-2 is not a correct explanation for statement-1.
- (C) Statement1 is True, Statement-2 is False
- (D) Statement1 is False, Statement-2 is True

14. Among the following, identify the correct statement.

- (A) Chloride ion is oxidized by O_2
- (B) Fe^{2+} is oxidized by iodine
- (C) Iodide ion is oxidized by chlorine
- (D) Mn^{2+} is oxidized by chlorine

15. While Fe^{3+} is stable, Mn^{3+} is not stable in acid solution because

- (A) O_2 oxidises Mn^{2+} to Mn^{3+}
- (B) O_2 oxidises both Mn^{2+} to Mn^{3+} and Fe^{2+} to Fe^{3+}
- (C) Fe^{3+} oxidises H_2O to O_2
- (D) Mn^{3+} oxidises H_2O to O_2

16. Sodium fusion extract, obtained from aniline, on treatment with iron(II) sulphate and H_2SO_4 in presence of air gives a Prussian blue precipitate. The blue colour is due to the formation of

- (A) $4[\text{Fe}(\text{CN})_6]_3$
- (B) $3[\text{Fe}(\text{CN})_6]_2$
- (C) $4[\text{Fe}(\text{CN})_6]_2$
- (D) $3[\text{Fe}(\text{CN})_6]_3$

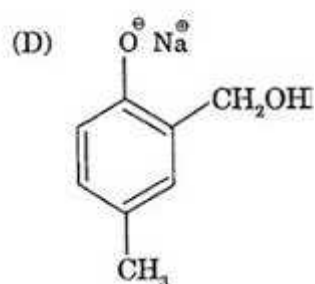
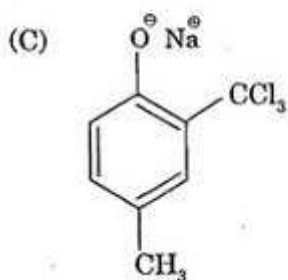
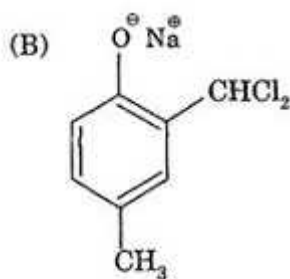
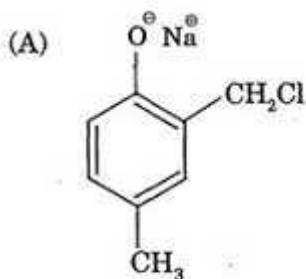
17. Which one of the following reagents is used in the above reaction?

- (A) aq. $\text{NaOH} + \text{C}_2\text{H}_5\text{Cl}$
- (B) aq. $\text{NaOH} + \text{C}_2\text{H}_5\text{Cl}$
- (C) aq. $\text{NaOH} + \text{CHCl}_3$
- (D) aq. $\text{NaOH} + \text{CCl}_4$

18. The electrophile in this reaction is

- (A) $:\text{CHCl}_2$
- (B) $+\text{CHCl}_2$
- (C) $:\text{CCl}_2$
- (D) $+\text{CCl}_2$

19. The structure of the intermediate I is



20. Match the reactions in Column I with nature of the reactions/type of the products in Column II.

Column I		Column II	
(A)	$O_2^- \rightarrow O_2 + O_2^{2-}$	(p)	redox reaction.
(B)	$CrO_4^{2-} + H^+$	(q)	one of the products has trigonal planar structure
(C)	$MnO_4^- + NO_2^- + H^+$	(r)	dimeric bridged tetrahedral metal ion
(D)	$NO_3^- + H_2SO_4 + Fe^{2+}$	(s)	disproportionation

21. Match the compounds/ions in Column I with their properties/reactions in Column II.

Column I		Column II	
(A)	C_6H_6CHO	(p)	Gives precipitate with 2, 4-dinitrophenylhydrazine
(B)	$CH_3C \equiv CH$	(q)	Gives precipitate with $AgNO_3$
(C)	CN^-	(r)	Is a nucleophile
(D)	I^-	(s)	Is involved in cyanohydrins formation

22. Match the crystal system/unit cells mentioned in Column I with their characteristic features mentioned in Column II.

Column I		Column II	
(A)	Simple cubic and face-centred cubic	(p)	Have these cell parameters $a = b = c$ and $\alpha = \beta = \gamma$
(B)	Cubic and rhombohedral	(q)	Are two crystal systems
(C)	Cubic and tetragonal	(r)	Have only two crystallographic angles of 90°
(D)	Hexagonal and monoclinic	(s)	Belong to same crystal system