

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

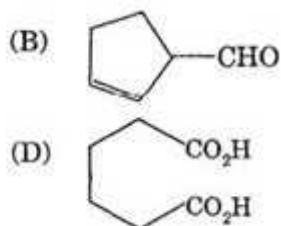
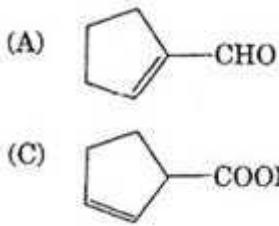
2. Among the following metal carbonyls, the CO bond order is lowest in

- (A) $[\text{Mn}_6\text{CO}]$
- (B) $[\text{Fe}_5\text{CO}]$
- (C) $[\text{Cr}_6\text{CO}]$
- (D) $[\text{V}_6\text{CO}]$

3. A solution of a metal ion when treated with KI gives a red precipitate which dissolves in excess KI 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) $^{2+} \text{Pb}$
- (B) $^{2+} \text{Hg}$
- (C) $^{2+} \text{Cu}$
- (D) $^{2+} \text{Co}$

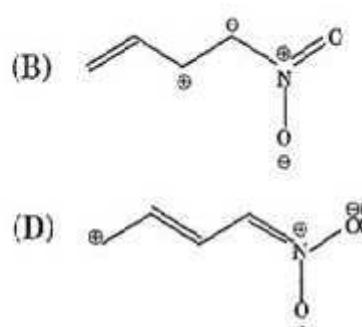
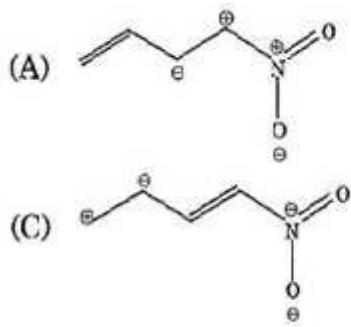
4. Cyclohexene and ozonysis followed by reaction with zinc dust and water gives compound E. Compound E on further treatment with aqueous KOH yields compound F. Compound F is



5. The number of stereoisomers obtained by bromination of *trans*- β -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 $^{23}\text{Na}_{11}$. 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 $\text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{O(g)}$ (1 bar, 373 K), the correct set of thermodynamic parameters is

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

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

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

9. Consider a reaction $aG + bH \rightarrow \text{Products}$. 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 : Alkali metals dissolve in liquid ammonia to give blue solutions.

because

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

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

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

Because

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

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

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

Because

STATEMENTAll chiral molecules have chiral centers.

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

13. STATEMENTI: Band gap is germanium is small.

Because

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

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

14. Among the following, identify the correct statement.

- (A) Chloride ion is oxidized by O₂
- (B) $^{2+}$ Fe oxidized by iodine
- (C) Iodide ion is oxidized by chlorine
- (D) $^{2+}$ Mn oxidized by chlorine

15. While Fe³⁺ is stable, Mn³⁺ is not stable in acid solution because

- (A) $_2$ oxidises Mn^{2+} to Mn^{3+}
- (B) $_2$ oxidises both Mn^{2+} to Mn^{3+} and Fe^{2+} to Fe^{3+}
- (C) $^{3+}$ oxidizes H_2O to O_2
- (D) $^{3+}$ oxidizes H_2O to O_2

16. Sodium fusion extract, obtained from aniline, on treatment with iron(II) sulphate and HSO_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) $_3[\text{Fe}(\text{CN})_6]_3$

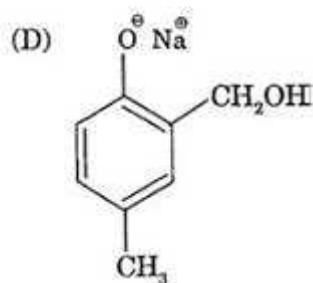
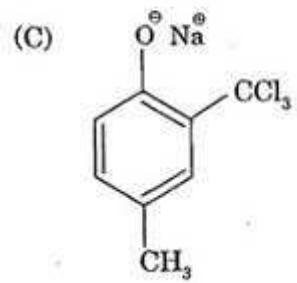
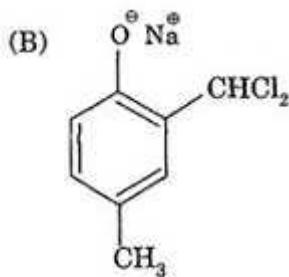
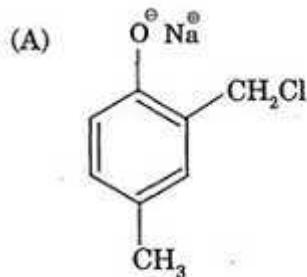
17. Which one of the following reagents is used in the above reaction?

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

18. The electrophile in this reaction is

- (A) $:\text{CHCl}$
- (B) $+\text{CHCl}$
- (C) $_2:\text{CCl}$
- (D) $_3.\text{CCl}$

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)	$O_2^- \quad O_2 + O_2^{2-}$	(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)	$CH_3C\text{---}CH$	(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 $a = b = g$
(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