

IIT JAM 2024 MSQ Model Questions

Subject - Chemistry (CY)

Q.1 The correct statement(s) is/are

- (A) The pK_{a1} of cis-cyclohexane 1,3-diol is greater than that of the trans isomer.
- (B) The trans-4-(tert-butyl)cyclohexylamine is more basic than its cis isomer.
- (C) 2,6-Dihydroxybenzoic acid is more acidic than salicylic acid.
- (D) 2,4,6-Trinitrophenol is more acidic than 2,4,6-trinitrobenzoic acid.

Q.2 The molecule(s) that follow(s) $I_a < I_b = I_c$ (I_a , I_b , and I_c are the principal moments of inertia) is/are

- (A) HCN
- (B) CH₃Cl
- (C) CH₃C≡CH
- (D) C₆H₆

Q.3 The role(s) of fluorspar in the electrolytic reduction of Al₂O₃ is/are to

- (A) decrease the melting point of Al₂O₃
- (B) improve the electrical conductivity of the melt
- (C) prevent the corrosion of anode
- (D) prevent the radiation loss of heat

Q.4 The correct statement(s) about the complexes I (K₃[CoF₆]) and II (K₃[RhF₆]) is/are

- (A) Both complexes are high spin.
- (B) Complex I is paramagnetic.
- (C) Complex II is diamagnetic.
- (D) The crystal field stabilisation energy of complex II is more than that of complex I.

Q.5 The diatomic molecule(s) that has/have bond order of one is/are

- (A) B₂
- (B) N₂²⁻
- (C) Li₂
- (D) O₂²⁻

Q.6 The CORRECT statement(s) about the species is (are)

- (A) CpMo(CO)₃ and CpW(CO)₃ are isoelectronic (where Cp is cyclopentadienyl)
- (B) CH₂⁻ and NH₂ are isolobal and isoelectronic
- (C) BH and CH are isolobal and isoelectronic
- (D) CH₃ and Mn(CO)₅ are isolobal

Q.7 The complex(es) that show(s) Jahn-Teller distortion is (are)

- (A) [Co(CN)₅(H₂O)]³⁻

- (B) $[\text{NiF}_6]^{2-}$
- (C) $[\text{Mn}(\text{CNMe})_6]^{2+}$
- (D) $[\text{Co}(\text{en})_2\text{F}_2]^+$

Q.8 The CORRECT statement(s) about sodium nitroprusside is (are)

- (A) It is a paramagnetic complex
- (B) Nitroprusside ion is formed in the brown ring test for nitrates
- (C) It is used for the detection of S^{2-} in aqueous solution
- (D) It contains nitrosyl ligand as NO^+

Q.9 The pigment responsible for the red colour in tomatoes has one functional group. The CORRECT statement(s) about this functional group is (are)

- (A) It decolorizes bromine water
- (B) It gives hydrazone derivative on reaction with 2,4-dinitrophenylhydrazine
- (C) It gets cleaved on reaction with ozone
- (D) It gives positive silver mirror test

Q.10 Hantzsch pyridine synthesis involves several steps. Some of those are

- (A) Aldol reaction
- (B) Darzens reaction
- (C) Mannich reaction
- (D) Michael addition

Q.11 The unit of the constant 'a' in van der Waals equation of state of a real gas can be expressed as

- (A) $\text{m}^6 \text{Pa mol}^{-2}$
- (B) $\text{m}^6 \text{J mol}^{-2}$
- (C) $\text{m}^3 \text{Pa mol}^{-2}$
- (D) $\text{m}^3 \text{J mol}^{-2}$

Q.12 Among the following, microwave active molecule(s) is/are

- (A) trans-dichloroethene
- (B) 1,2-dinitrobenzene
- (C) 3-methylphenol
- (D) para-aminophenol

Q.13 The true statement(s) regarding the brown ring test carried out in the laboratory for the detection of NO_3^- is/are

- (A) Brown ring is due to the formation of the iron nitrosyl complex.
- (B) Concentrated nitric acid is used for the test.
- (C) The complex formed in the reaction is $[\text{Fe}(\text{CN})_5\text{NO}]^{2-}$.
- (D) The brown coloured complex is paramagnetic in nature.

Q.14 The true statement(s) regarding the carbonic anhydrase enzyme is/are

- (A) It is involved in peptide bond cleavage.
 (B) Redox inactive Zn^{2+} ion is involved in the catalytic activity of this enzyme.
 (C) Activated $M-OH_2$ ($M =$ metal ion) acts as the nucleophile in the enzyme.
 (D) The metal ion is coordinated to the side chain of histidine residues.

Q.15 The correct statement(s) among the following is/are

- (A) Secondary structure of a polypeptide describes the number and type of amino acid residues.
 (B) Uracil is a pyrimidine nucleobase.
 (C) Natural fatty acids have an odd number of carbon atoms.
 (D) Reaction of (D)-glucose with $Ca(OH)_2$ gives a product mixture containing (D)- fructose, (D)-mannose, and (D)-glucose.

ANSWER KEY

Question No.	Question Type (QT)	Subject Name (SN)	Key/Range (KY)	Mark (MK)
1	MSQ	CY	A, C, D	2
2	MSQ	CY	A, B	2
3	MSQ	CY	A	2
4	MSQ	CY	A, B, C	2
5	MSQ	CY	A, B, D	2
6	MSQ	CY	A, B, D	2
7	MSQ	CY	A, C	2
8	MSQ	CY	C, D	2
9	MSQ	CY	A, C	2
10	MSQ	CY	A, D	2
11	MSQ	CY	A, D	2

12	MSQ	CY	B, C, D	2
13	MSQ	CY	A, D	2
14	MSQ	CY	B, C, D	2
15	MSQ	CY	B,D	2

