

JEE Main 30 January 2024 Shift 1 Answer Key

Chemistry

Q.1: What is the sum of the coefficients of all the species involved in the balanced equation: $2\text{MnO}_4 + \text{I}^- \rightarrow$ (in presence of alkaline medium) \rightarrow Product

A.1: 9

Q.2: What are the maximum number of hybrid orbitals formed when 2s and 2p orbitals are mixed?

A.2: 4

Q.3: Find out the work done in Joules for the cyclic process ABCA such that $P_A = 30 \text{ kPa}$, $V_A = 10 \text{ dm}^3$, $P_B = 10 \text{ kPa}$, $V_B = 30 \text{ dm}^3$, $P_C = 10 \text{ kPa}$, $V_C = 10 \text{ dm}^3$ (as per the given graph).

A.3: 200 J

Q.4: Find the final product when $\text{C}_6\text{H}_5\text{Br}$ reacts with

i. Mg, Dry Ether

ii. CO_2 , H^+

iii. NH_3 , heat

iv. Br_2 , KOH

A.4: $\text{C}_6\text{H}_5\text{NH}_2$

Q.5: Identify the following reaction.

$\text{C}_6\text{H}_5\text{C}(\text{Cl})=\text{O} \rightarrow$ (in the presence of H_2 , Pd/BaSO_4) \rightarrow Product

i. Etard Reaction

ii. Stephen's Reaction

iii. Wolff Kishner Reduction

iv. Rosenmund Reaction

A.5: Rosenmund Reaction

Q.6: Among the given compounds, which will not give the Fehling test?

- i. Lactose
- ii. Maltose
- iii. Sucrose
- iv. Glucose

A.6: Sucrose

Q.7: Which of the following sets comprises both diamagnetic ions?

- i. Ni^{2+} , Cu^{2+}
- ii. Eu^{3+} , Gd^{3+}
- iii. Cu^{+} , Zn^{2+}
- iv. Ce^{4+} , Pm^{3+}

A.7: Cu^{+} , Zn^{2+}

Q.8: Statement I: For hydrogen atoms, 3p and 3d are degenerate.

Statement II: Degenerate orbitals have the same energy.

- i. Both statements I and II are correct.
- ii. Both statements I and II are incorrect.
- iii. Statement I is correct and statement II is incorrect.
- iv. Statement I is incorrect and statement II is correct.

A.8: Both statements I and II are correct.

Q.9: What is the geometry of Aluminium chloride in an aqueous solution?

- i. Square planar
- ii. Octahedral
- iii. Tetrahedral
- iv. Square pyramidal

A.9: Octahedral

Q.10: The number of atoms in a silver plate having an area of 0.05 cm^2 and a thickness of 0.05 cm is $m \times 10^{19}$. If the density of silver is 7.9 g/cm^3 , what is the value of m ?

A.10: 11

Q.11: What is the group number of unununnium?

A.11: 11

Q.12: Match the following:

Column I: i. BrF_5 , ii. H_2O , iii. ClF_3 , iv. SF_4

Column II: a. Sea-Saw, b. T-Shape, c. Bent, d. Square Pyramidal

A.12: (A) –iv; (B) – iii; (C) – ii; (D) - i

Q.13: If a 250 mL solution of CH_3COONa of molarity 0.35 M is to be prepared, what is the mass of CH_3COONa required in grams? Find the nearest integer.

A.13: 7

Q.14: The K_{sp} of $\text{Mg}(\text{OH})_2$ is 1×10^{-12} . Find the limiting pH at 25°C at which 0.01 M Mg^{2+} ions will precipitate.

A.14: 9

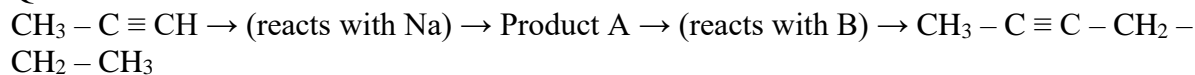
Q.15: Assertion (A): From N to P covalent radius increases significantly, but from As to Bi, only a small increase is observed.

Reason (R): For a particular oxidation state, covalent radii and ionic radii increase down the group.

- Both (A) and (R) are correct and (R) is the correct explanation of (A).
- Both (A) and (R) are correct but (R) is not the correct explanation of (A).
- (A) is correct but (R) is incorrect.
- (A) is incorrect but (R) is correct.

A.15: Both (A) and (R) are correct but (R) is not the correct explanation of (A).

Q.16: Find A and B if:



A.16: $\text{CH}_3 - \text{C} \equiv \text{CNa}$, $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Cl}$

Q.17: Find A and B if:

$\text{C}_6\text{H}_5\text{NH}_2 \rightarrow (\text{reacts with A}) \rightarrow \text{C}_6\text{H}_5\text{N}_2^+ \rightarrow (\text{reacts with B}) \rightarrow \text{Orange-Red Precipitate}$

A.17: NaNO_2/HCl , Phenol

Q.18: Match the following:

Column I: i. Mn^{2+} , ii. V^+ , iii. Cr^+ , iv. Fe^{2+}

Column II: a. $3d^34s^1$, b. $3d^54s^0$, c. $3d^64s^0$, d. $3d^4s^1$

A.18: a – ii, b – i, c-ii, d-iii

Q.19: What happens to the freezing point of benzene, when a small amount of naphthalene is added to benzene?

A.19: Decreases

Q.20: A mixture is heated with dilute H_2SO_4 and the lead acetate paper turns black by the evolved gas. The mixture contains:

- i. Sulphite
- ii. Sulphide
- iii. Sulphate
- iv. Thiosulphate

A.20: Sulphide

Q.21: $\text{A} \rightarrow \text{P}$

In a first-order reaction, the concentration of reactant A is 0.04 M at 10 mins and 0.03 M at 20 mins. Calculate the half-life of the first-order reaction in mins. [$\log 2 = 0.3$, $\log 3 = 0.48$]

A.21: 25