

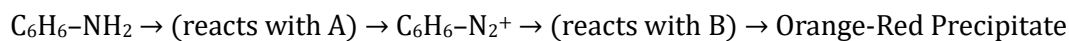
JEE MAIN 30 JANUARY 2024 SHIFT 1 QUESTION PAPER

CHEMISTRY

- Find out the sum of the coefficients of all the species involved in the balanced equation:
 $2\text{MnO}_4 + \text{I}^- \rightarrow$ (in the presence of a slightly alkaline medium) \rightarrow Product
- Find out the maximum number of hybrid orbitals formed when 2s and 2p orbitals are mixed.
- 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).
- Identify the given reaction.
 $\text{C}_6\text{H}_5\text{C}=\text{O}-\text{Cl} \rightarrow$ (in the presence of H_2 , Pd/BaSO_4) \rightarrow Product
 - Etard Reaction
 - Stephen's Reaction
 - Wolff Kishner Reduction
 - Rosenmund Reaction
- Which of the given compounds will not give the Fehling test?
 - Lactose
 - Maltose
 - Sucrose
 - Glucose
- Which of the following sets contain both diamagnetic ions?
 - Ni^{2+} , Cu^{2+}
 - Eu^{3+} , Gd^{3+}
 - Cu^+ , Zn^{2+}
 - Ce^{4+} , Pm^{3+}
- Identify the halogen which has allylic halogen. (A diagrammatic representation of compounds was given).
- 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, and iv. Br_2 , KOH
- Identify the correct structure for the compound named "3-Methylpent-2-enal" as per IUPAC nomenclature.

10. Identify the most stable compound/ion among the given options.
11. Statement I: For hydrogen atoms, 3p and 3d are degenerate.
Statement II: Degenerate orbitals have the same energy.
- Both statements I and II are correct.
 - Both statements I and II are incorrect.
 - Statement I is correct and statement II is incorrect.
 - Statement I is incorrect and statement II is correct.
12. What is the geometry of Aluminium chloride in an aqueous solution?
- Square planar
 - Octahedral
 - Tetrahedral
 - Square pyramidal
13. 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 , find the value of m .
14. What is the group number of unununnium?
15. 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
16. 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? Round off the answer to the nearest integer.
17. 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.
18. 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.
19. Find A and B if:
- $$\text{CH}_3 - \text{C} \equiv \text{CH} \rightarrow (\text{reacts with Na}) \rightarrow \text{Product A} \rightarrow (\text{reacts with B}) \rightarrow \text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$$

20. Find A and B if:



21. 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. $3d^4s^1$

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

23. 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

24. $A \rightarrow P$

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. [$\log 2 = 0.3$, $\log 3 = 0.48$]

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