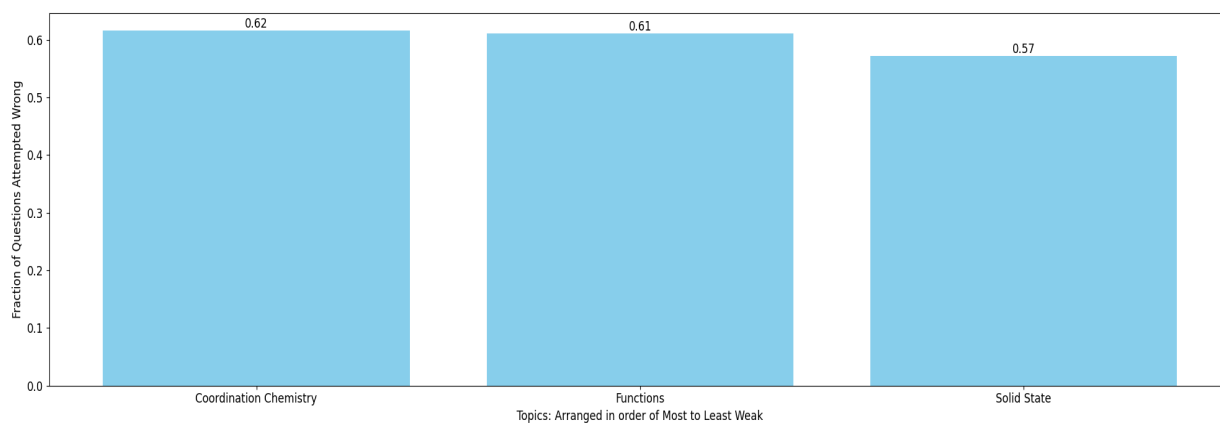


Kalikant Tripathi Total MLAssist - Personalised DPP

Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Coordination Chemistry:

4. Which of the following forms with an excess of CN^- , a complex having coordination number two ?
(A) Cu^{2+} (B) Ag^+ (C) Ni^{2+} (D) Fe^{2+}
25. The magnetic moment (spin only) of $[\text{NiCl}_4]^{2-}$ is :- [AIEEE-2011]
(1) 2.82 BM (2) 1.41 BM (3) 1.82 BM (4) 5.46 BM
79. Complex X of composition $\text{Cr}(\text{H}_2\text{O})_6\text{Cl}_n$ has a spin only magnetic moment of 3.83 B.M. It reacts with AgNO_3 and shows geometrical isomerism/ The IUPAC nomenclature of X is: [JEE MAIN 2020]
(1) Tetraaquadichlorido chromium (IV) chloride dihydrate
(2) Dichloridotetraaqua chromium (IV) chloride dihydrate
(3) Tetraaquadichlorido chromium (III) chloride dihydrate
(4) Hexaaqua chromium (III) chloride
81. The number of geometrical isomers for octahedral $[\text{CoCl}_4(\text{NH}_3)_2]^-$, square planar $[\text{AuBr}_2\text{Cl}_2]^-$ and $[\text{PtCl}_2(\text{en})]$ are
(A) 2, 2, 2 (B) 2, 2, no isomerism (C) 3, 2, 2 (D) 2, 3, no isomerism

19. In which of the following pairs, both the complexes have the same geometry but different hybridisation
- (A) $[\text{NiCl}_4]^{2-}$, $[\text{Ni}(\text{CN})_4]^{2-}$ (B) $[\text{CoF}_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$
 (C) $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$ (D) $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{Ni}(\text{NH}_3)_6]^{2+}$

Comprehension (Q.20 to Q.22)

The crystal field theory (C.F.T.) is now much more widely accepted than the valence bond theory. It assumes that the attraction between the central metal and the ligands in a complex is purely electrostatic. According to C.F.T., ligands are treated as a point charge and crystal field splitting energy (CFSE) increases the thermodynamic stability of the complexes. Value of CFSE depends upon nature of ligand and a spectrochemical series has been made experimentally. For tetrahedral complexes, Δ is about $4/9$ times to Δ_0 (CFSE for octahedral complexes). This energy lies in the visible region and i.e. why electronic transitions are responsible for colour.

Functions:

35. Let α , β and γ be three positive real numbers, let $f(x) = \alpha x^5 + \beta x^3 + \gamma x$, $x \in \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ be such that $g(f(x)) = x$ for all $x \in \mathbb{R}$. If $a_1, a_2, a_3, \dots, a_n$ be in arithmetic progression with mean zero, then the value of $f\left(g\left(\frac{1}{n} \sum_{i=1}^n f(a_i)\right)\right)$ is equal to [JEE - Main 2022]
- (A) 0 (B) 3 (C) 9 (D) 27
13. Compute the inverse of the functions:
- (a) $f(x) = \ln(x + \sqrt{x^2 + 1})$
 (b) $f(x) = 2^{\frac{x}{x-1}}$
 (c) $y = \frac{10^x - 10^{-x}}{10^x + 10^{-x}}$
6. The value of $(a + b)$ is equal to
- (A) -2 (B) -1 (C) 0 (D) 1

2. Find the domain & range of the following functions. (Read the symbols $[*]$ and $\{*\}$ as greatest integers and fractional part functions respectively.)

(i) $y = \log_{\sqrt{5}} (\sqrt{2}(\sin x - \cos x) + 3)$

(ii) $y = \frac{2x}{1+x^2}$

(iii) $f(x) = \frac{x^2 - 3x + 2}{x^2 + x - 6}$

(iv) $f(x) = \frac{x}{1+|x|}$

(v) $y = \sqrt{2-x} + \sqrt{1+x}$

(vi) $f(x) = \frac{\sqrt{x+4}-3}{x-5}$

16. If the function $f: \mathbf{R} - \{1, -1\} \rightarrow A$ defined by $f(x) = \frac{1}{1-x^2}$, is surjective, then A is equal to

[JEE - Main 2019]

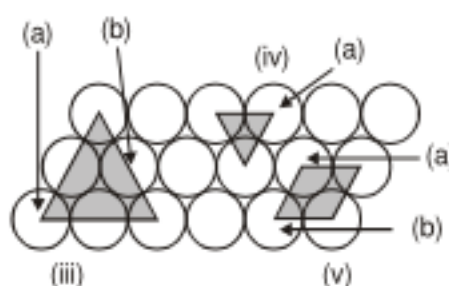
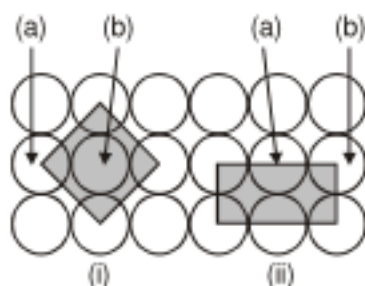
- (A) $\mathbf{R} - \{-1\}$ (B) $[0, \infty)$ (C) $\mathbf{R} - [-1, 0)$ (D) $\mathbf{R} - (-1, 0)$

Solid State:

32. If x = radius of Na^+ & y = radius of Cl^- & a is the unit cell edge length for NaCl crystal, then which of the given relation is correct?

- (A) $x + y = a$ (B) $2x + 2y = a$ (C) $x + y = 2a$ (D) $x + y = a\sqrt{2}$

4. Given below are two dimensions lattices with nicely shaded regions. You just have to find the contributions (in fractions) of particles marked to the shaded regions and the total number of particles in the regions.



10. An element with molar mass $2.7 \times 10^{-2} \text{ kg mol}^{-1}$ forms a cubic unit cell with edge length 405 pm. If its density is $2.7 \times 10^3 \text{ kg m}^{-3}$, the radius of the element is approximately $__\times 10^{-12} \text{ m}$ (to the nearest integer). **[Jee Main, 2020]**

8. Which of the following statements is/are correct?

- (A) In an anti-fluorite structure anions form FCC lattice and cations occupy all tetrahedral voids.
- (B) Number of nearest Na^+ ions of another Na^+ in Na_2O crystal will be 8.
- (C) Each sphere is surrounded by six voids in two dimensional hexagonal close packed layers
- (D) 8 Cs^+ ions occupy the second nearest neighbour locations of a Cs^+ ion

10. Which statements are correct about HCP and CCP lattice

- (A) Number of tetrahedral voids are twice of octahedral holes
 - (B) 2 tetrahedral and 1 octahedral voids are present in HCP unit cell per atom.
 - (C) Tetrahedral voids = $2 \times$ octahedral voids, is valid for ccp and hcp.
 - (D) Distance between two hexagonal planes in CCP or HCP arrangement is same for a metal exist in both forms.
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