Single Correct

1. Which of the following pair of complex/complex-ion is **CORRECT** against to their indicated properties?

(A) $[Ni(CN)_4]^{2\ominus} > [NiF_6]^{4\ominus}$; C.F.S.E.

(B) $[Ni(CO)_4] < [Fe(CO)_5]$; Valence shell electrons on central metal ion

(C) $[Fe(CN)_6]^{3\ominus} > [FeF_6]^{3\ominus}$; Number of unpaired electrons of central metal ion

(D) $[Co(ox)_3]^{3\ominus} > [Co(CN)_6]^{3\ominus}$; Stability

2. Complex which does not follow sidwick EAN rule :-

(A) Ferrocene (B) Brown ring complex

(C) $K_2[PtCl_6]$ (D) $[Fe(CO)_2(NO)_2]$

3. Which wavelength of visible light can be absorbed by $[Cu(H_2O)_4]SO_4.H_2O$ and $[Fe(H_2O)_6]SO_4.H_2O$ complex respectively.

(A) Yellow and Voilet (B) Orange and Red

(C) Blue and Green (D) Green and Orange

4. Calculate CFSE value and spin only magnetic moment for $[RhF_6]^{3-}$

(A) $-2.4\ \Delta_0 + 2P$, 0 B.M. (B) $-2.4\ \Delta_0 + 3P$, $\sqrt{24}$ B.M.

(C) $-0.4\ \Delta_0 + 2P$, $\sqrt{24}$ B.M. (D) $-0.4\ \Delta_0 + 3P$, $\sqrt{24}$ B.M.

5. Which of the following complex is diamagnetic as well as inner orbital complex?

(A) $[Co(OH_2)_6]SO_4$ (B) $K_4[Fe(CN)_5(O_2)]$

(C) $[Mn(NCS)_6]^{-4}$ (D) $[Co(NH_3)_6]Cl_3$

6. Which of the following statements is/are **CORRECT**?

(A) $[CoF_6]^{3\Theta}$ ion is low spin complex due to pairing energy > Δ_0

(B) In Zeise's salt, back donation weakens the double bond of alkene.

(C) Among Ar, NaCl and HCl, the NaCl shows weakest inter ionic interaction.

(D) $O_2^{2\ominus}$ and $NO^{\oplus}$ have same bond order.

7. $\overset{(X)}{\text{Salt}} + Na_2[Fe(CN)_5\overset{\oplus}{N}O] \xrightarrow{\text{basic solution}}$ Purple Colour

Which of the following statement is **CORRECT** for purple colour complex?

(A) Denticity of new ligand formed is 3 (B) It's magnetic nature is paramagnetic

(C) It is low spin complex (D) Hybridisation of Fe is sp^3d^2

Multiple Correct

8. Which of the following statement is **CORRECT** against to the indicated properties?

(A) $[Pt(NH_3)_4]Cl_2 > K_2[PtCl_4]$; Crystal field splitting energy

(B) $[Co(NH_3)_3ClBr(NO_3)] > [Co(NH_3)_3Cl_3]$; Number of geometrical isomers

(C) $K_4[Fe(CN)_6] > K_3[Fe(CN)_6]$; Valence shell's electrons of central metal ion

(D) $[Fe(CO)_2(NO)_2] > [Fe(edta)]^{\Theta}$; Number of Fe–N linkages.

9. Which of following species is/are paramagnetic?

(A) NO^{Θ} (B) $[NiCl_4]^{2\Theta}$ (C) $[CuCl_4]^{3\Theta}$ (D) $O_2[AsF_6]$

10. Which of the following order is/are **CORRECT** for stability?

(A) $[CoF_6]^{-3} < [Co(C_2O_4)_3]^{-3} < [Co(CN)_6]^{-3}$

(B) $[Os(H_2O)_6]^{+2} < [Ru(H_2O)_6]^{+2} < [Fe(H_2O)_6]^{+2}$

(C) $[Co(H_2O)_6]^{+3} < [Co(CN)_6]^{-3} < [Ir(CN)_6]^{-3}$

(D) $[NiCl_4]^{-2} < [Ni(NH_3)_6]^{+2} < [Ni(CN)_4]^{-2}$

Paragraph

Paragraph for Q. No. 11 to 12

Addition compound those which retain their identity in solution are termed as co-ordination compound. The bonding in co-ordination compound is explained by VBT & CFT. Co-ordination compound also show both structure and stereoisomerism.

11. Which of the following complex having maximum number of optically active isomer.

(A) $[Ma_2bcde]^{n\pm}$ (B) $[M(AB)c_2d_2]^{n\pm}$ (C) $[Ma_2b_2c_2]^{n\pm}$ (D) $[M(AB)_2(CC)]^{n\pm}$

12. Identify the **INCORRECT** matching in the following.

Complex	Isomerism	Complex type
(A) $[Co(H_2O)_6]Cl_2$	Show structural isomersim	low spin
(B) $K_3[Co(ox)_3]$	Show optical isomerism	low spin
(C) $[Pt(NH_3)_2Cl_2Br_2]$	Form 6 stereo isomers	low spin
(D) $[Cu(NO_2)_4]^{2-}$	Show structural isomerism	square planar

Matching List

13. Match list I with list II and select the **CORRECT** answer?

List-I (Complex compound)		**List-II (Characteristics)**	
(P)	$[CoF_3(H_2O)_3]$	(A)	Hybridisation of central metal ion is sp^3d^2
(Q)	$[Co(NO_2)_6]^{-4}$	(B)	Paramagnetic
(R)	$[Cr(CN)_3(H_2O)_3]$	(C)	Inner orbital complex
(S)	$[Zn(NO_2)_4]^{-2}$	(D)	μ_m= 0 B.M.

The correct option is

(A) P →1, 3 ; Q → 3, 4 ; R → 2, 3 ; S → 2, 4

(B) P →1, 2 ; Q → 2 ; R → 2, 4; S → 4

(C) P →1, 2 ; Q → 2, 3 ; R → 2, 3 ; S → 4

(D) P →1, 4 ; Q → 2, 3 ; R → 2, 3 ; S → 4

Integer

1. Find the number of species which are diamagnetic and square planar geometry.
$[IrCl(PPh_3)_3]$, $[RhCl(PPh_3)_3]$, trans-platin, $[Co(edta)]^{\ominus}$, $[NiCl_4]^{2\ominus}$, $[Cu(CN)_4]^{3\ominus}$, $[Ni(CO)_4]$, $[AuCl_4]^{\ominus}$ [Z of Ir = 77, Rh = 45, Pt = 78, Co = 27, Ni = 28, Cu = 29, Au = 79]

2. Find the number of the paramagnetic and inner orbital complex in the following :-
$[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[Co(H_2O)_6]^{3+}$, $[Cu(NH_3)_4]^{2+}$, $[Cr(NH_3)_6]^{3+}$, $[Fe(CN)_6]^{3-}$

3. The total number of electrons in t_{2g} orbital of Sodium nitropruside i.e. $Na_2[Fe(CN)_5NO]$ = X and the total number of electrons in t_{2g} orbital of brown ring complex i.e. $[Fe(H_2O)_5NO]^{+2}$ = Y

then find value of $\frac{X+Y}{2}$

4. $[Fe(H_2O)_6]^{3+}_{(aq.)} + \underset{(excess)}{SCN^{\ominus}_{(aq.)}} \longrightarrow \underset{\text{(Blood red colour solution)}}{[Fe(H_2O)_3(SCN)_3]} \xrightarrow{+\ \underset{(excess)}{F^{\ominus}_{(aq.)}}}$ Colourless complex [Y]

The spin magnetic moment of hexa fluoro complex (Y) is :

5. "Crystal field splitting energy" (CFSE = "Δ_O") for $[Ti(H_2O)_6]^{3+}$ is 242 KJ/mol. Then the "Crystal field stabilisation energy" (CFSE) in KJ/mol will be