CH105 INORGANIC: TUTORIAL-3

Q-IV.1. Calculate the ground state Term symbols for the following ions.
a) Ni^{2+} b) Dy^{3+} c) Ti^{2+} d) C

Q-IV.2. The following complexes have the indicated effective magnetic moments. Describe the structure and bonding of the complexes on the basis of the μ_{eff} values (in B.M.)

(a) K_2NiF_6 (0.0); (b) $Ni(NH_3)_2Cl_2$ (3.3); (c) $Ni(PEt_3)_2Cl_2$ (0.0); (d) $Ni(Ph_3AsO)_2Cl_2$ (3.95)

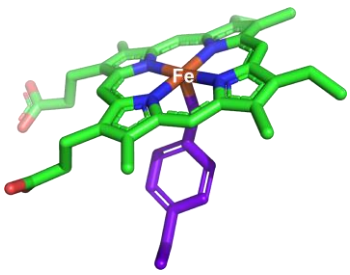
Q-IV.3. Identify the transition metal configurations both in the octahedral and tetrahedral environments which are expected to have an orbital contribution to the magnetic moment.

Octahedral (high spin)	Octahedral (low spin)	Tetrahedral
a) Fe^{3+}	a) Fe^{3+}	a) Cr^{3+}
b) Fe^{2+}	b) Fe^{2+}	b) Fe^{3+}
c) Ni^{2+}	c) Co^{2+}	c) Mn^{3+}
d) Ti^{3+}	d) Cr^{2+}	d) Fe^{2+}
e) Sc^{3+}	e) Zn^{2+}	e) Pt^{2+}

Q-IV.4. Which one would you expect to have a greater magnetic moment: $CoCl_4^{2-}$ or CoI_4^{2-}? Why?

Q-IV.5. 'Y' is a complex of nickel possessing water and ammonia as ligands, but not in equal in number. Complex 'Y' upon treatment with $AgNO_3$ gives two equivalents of AgCl; it gives a measured magnetic moment of 2.9 BM. Give the formula of the complex and draw its both the isomeric structures.

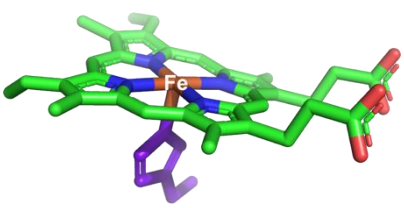
Q-V. 6. The principal difference observed in the metal active site of catalase, peroxidase, and cytochrome P-450 enzymes is the identity of the axial ligand (tyrosine, histidine, and cysteine, respectively, as shown in figure below). How the axial ligand→ Fe(heme) σ-donation property varies for these three enzyme active sites? (consider Fe(III) oxidation state as the resting site).



Catalase

Tyrosine

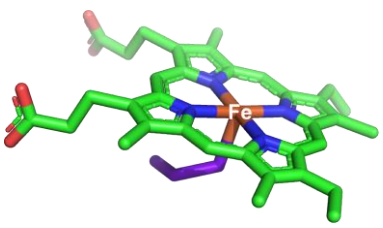
axial ligand



Peroxidase

Histidine

axial ligand



Cytochrome P-450

Cysteine

axial ligand

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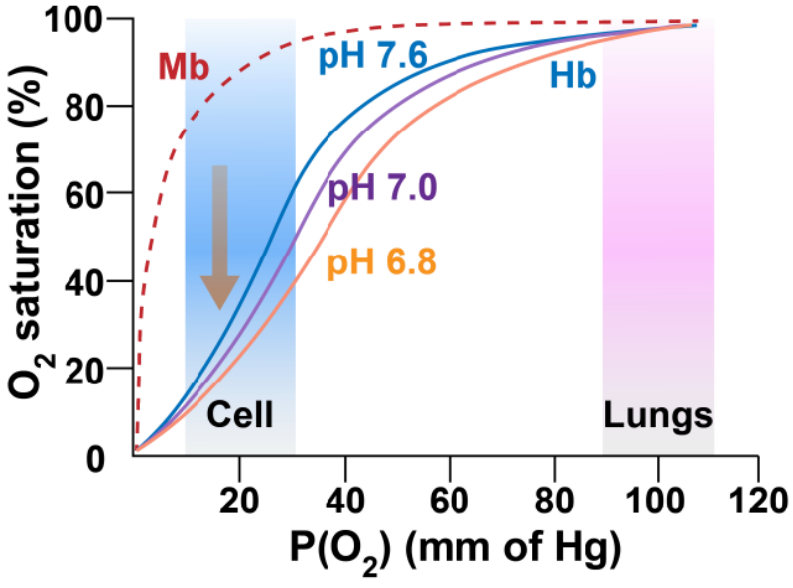
Q-V.7. Following is the O2-binding curve for Hemoglobin (Hb) at pH 6.8, 7.0, and 7.6 along with Myoglobin. If a cell is started to get saturated with CO_2, what will be the response from Hb and Mb?



Q-V.8. Why the Hemoglobin (Hb) preferably binds O_2 over CO despite better p-back-bonding properties of CO?