

4. Circle the letter corresponding to the correct answer for the following.

For which of the following complexes can a tetrahedral coordination geometry be unequivocally excluded based upon its magnetic properties?

- a) $\text{Cu}(\text{PPh}_3)_3\text{Cl}$ (diamagnetic) b) $\text{Pt}(\text{PPh}_3)_2\text{Cl}_2$ (diamagnetic)
c) $\text{Ni}(\text{PPh}_3)_2\text{Br}_2$ (paramagnetic) d) $\text{Co}(\text{PPh}_3)_2\text{Cl}_2$ (paramagnetic)

Which ion will undergo the greatest change in bond distance upon one-electron oxidation? (l.s. = low spin; h.s. = high spin)

- a) h.s. $[\text{Cr}(\text{OH}_2)_6]^{2+}$ b) $[\text{V}(\text{OH}_2)_6]^{2+}$ c) l.s. $[\text{Ru}(\text{OH}_2)_6]^{2+}$ d) l.s. $[\text{Ir}(\text{OH}_2)_6]^{3+}$

For which of the following compounds is the absorptivity of a 0.1 M solution expected to be lowest?

- a) $[\text{Mn}(\text{OH}_2)_6]^{3+}$ b) $[\text{Fe}(\text{OH}_2)_6]^{3+}$ c) $[\text{Mn}(\text{CN})_6]^{3-}$ d) $[\text{Fe}(\text{CN})_6]^{3-}$

Which of the following reactions will have the largest equilibrium constant? dien = $\text{H}_2\text{NCH}_2\text{CH}_2\text{NHCH}_2\text{CH}_2\text{NH}_2$

- a) $[\text{Ni}(\text{OH}_2)_6]^{2+} + 6 \text{NH}_3 = [\text{Ni}(\text{NH}_3)_6]^{2+} + 6 \text{H}_2\text{O}$
b) $[\text{Ni}(\text{OH}_2)_6]^{2+} + 2 \text{dien} = [\text{Ni}(\text{dien})_2]^{2+} + 6 \text{H}_2\text{O}$
c) $[\text{Ni}(\text{NH}_3)_6]^{2+} + 2 \text{dien} = [\text{Ni}(\text{dien})_2]^{2+} + 6 \text{NH}_3$
d) b & c are the same since the chelate effect is operative in both

The complex cations $[\text{Co}(\text{NH}_3)_5(\underline{\text{NCS}})]^{2+}$, and $[\text{Co}(\text{NH}_3)_5(\underline{\text{SCN}})]^{2+}$ are what type of isomers?

- a) diastereomers b) structural c) linkage d) ionization e) b & c

As a ligand to transition metal ions, O^{2-} (oxide ion) is

- a) a σ donor only
b) a σ donor and π donor
c) a σ donor and π acceptor
d) uses vacant p orbitals for its π acceptor interactions
e) uses filled p orbitals for its π donor interactions
f) c & d
g) b & e

Which of the following complexes contain d^2 metal ions (circle all correct answers)?

- a) $[\text{Re}_2\text{Cl}_4(\text{dppe})_2]$ (dppe is $\text{Me}_2\text{PCH}_2\text{CH}_2\text{PMe}_2$ a bidentate ligand, which, in this case connects the two metals across the metal-metal bond)
b) $[\text{V}(\text{O})(\text{acac})_4]$
c) $[\text{Os}(\text{O})_2\text{Cl}_4]^{2-}$
d) $[\text{Ti}(\text{OH}_2)_4\text{Cl}_2]$
e) $[\text{Re}_2\text{Cl}_8]^{3-}$