

# Week 7 Worksheet

Chem 11300-2: Section 33

May 10, 2022

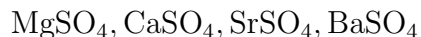
**Problem 1:** Lets practice naming these compounds. Give the IUPAC name for the following complexes.

- $[\text{Cr}(\text{OH}_2)_6]^{3+}$
- $\text{K}[\text{FeCl}_4]$
- $[\text{Ag}(\text{NH}_3)_2]^+$
- $[\text{Ni}(\text{CN})_4]^{2-}$
- $\text{Ru}(\text{py})_4\text{Cl}_2$

For the following, give the complex formula.

- Tris(1,2-diaminoethane)cobalt(III)
- Tris(2,2'-bipyridyl)ruthenium(III)

**Problem 2:** Predict the order of solubility in water for the following series, and explain the factors involved.



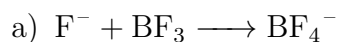
**Problem 3:** Is  $\text{OH}^-$  or  $\text{S}^{2-}$  more likely to form insoluble salts with 3+ transition-metal ions? Which is more likely to form insoluble salts with 2+ transition-metal ions?

**Problem 4:** Using HSAB characteristics, answer the following questions.

- Will  $\text{Cu}^{2+}$  react more strongly with  $\text{OH}^-$  or  $\text{NH}_3$ ? With  $\text{O}^{2-}$  or  $\text{S}^{2-}$ ?
- Will  $\text{Fe}^{3+}$  react more strongly with  $\text{OH}^-$  or  $\text{NH}_3$ ? With  $\text{O}^{2-}$  or  $\text{S}^{2-}$ ?
- Will  $\text{Ag}^+$  react more strongly with  $\text{NH}_3$  or  $\text{PH}_3$ ?
- Will  $\text{Fe}$ ,  $\text{Fe}^{2+}$ , or  $\text{Fe}^{3+}$  react more strongly with  $\text{CO}$ ?

The following problems are written by Professor Mcleod or Head TA Miah Turke. They may mimic homework problems closely, but will be highly beneficial for the midterms and final.

**Problem 5:** In the following reactions, identify the Lewis acid and the Lewis base.



- b)  $\text{O}^{2-} + \text{SO}_3 \longrightarrow \text{SO}_4^{2-}$
- c)  $\text{B}(\text{OH})_3 + \text{H}_2\text{O} \longrightarrow (\text{HO})_3\text{BOH}_2$
- d)  $2 \text{NH}_3 + \text{Ag}^+ \longrightarrow [\text{Ag}(\text{NH}_3)_2]^+$

**Problem 6:** Using hard-soft acid/base theory, determine whether the following reactions favor reactants, products, or neither.

- a)  $2 \text{TlF} + \text{K}_2\text{S} \longrightarrow \text{Tl}_2\text{S} + 2 \text{KF}$
- b)  $\text{CH}_3\text{HgI} + \text{HCl} \longrightarrow \text{CH}_3\text{HgCl} + \text{HI}$
- c)  $\text{Fe}_2\text{O}_3 + 3 \text{Ag}_2\text{S} \longrightarrow \text{Fe}_2\text{S}_3 + 3 \text{Ag}_2\text{O}$
- d)  $2 \text{HF} + (\text{CH}_3\text{Hg})_2\text{S} \longrightarrow 2 \text{CH}_3\text{HgF} + \text{H}_2\text{S}$

**Problem 7:** If the formula is given, please provide the name and if the name is given, please provide the formula for each of the following coordination complexes. What is the oxidation state of the transition metal in each complex? What is the *d*-electron count for the transition metal in each complex?

- a) Silver hexacyanoferrate(II)
- b) Triaquabromoplatinum(II) chloride
- c)  $[\text{Ni}(\text{OH}_2)_4(\text{OH})_2]$
- d)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{NO}_3$