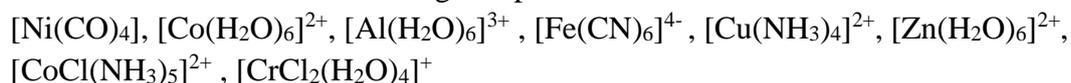


Tutorial N° 5

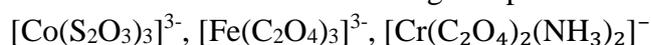
Exercise 1

Give the name of the following complex.



Exercise 2

Give the name of the following complex containing polydentate anionic ligands



Exercise 3

Give the structure of the following complex :

Diaqua(bis(ethylenediamine))nickel(II)ion, Dichloro(bis(ethylenediamine))cobalt(III) ion,
Dinitrato(bis(ethylenediamine))iron(II), Diaqua(bis(ethylenediamine))chromium(III) ion,
Diaqua(bis(ethylenediamine))manganese(II) ion

Exercise 4

Consider the following species: $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{Ag}(\text{CN})_2]^-$, $[\text{Fe}(\text{CN})_6]^{3-}$,
 Co^{3+} , Cu^{2+} , Fe^{3+} , Cu^+ , Co^{2+} , Ag^+ , Ag^{3+}

- 1) Form all possible donor-acceptor ligand pairs for the given species.
- 2) Provide the expression for the global formation constant K_f for each of the complexes.

Exercise 5

A solution contains 0.01 M of Cu^{2+} ions and an excess of NH_3 . The following stepwise formation constants are given for the reaction of Cu^{2+} with NH_3 : $K_1 = 10^4$, $K_2 = 10^3$, $K_3 = 10^2$

- 1) Give the stepwise reactions for the complexation of Cu^{2+} with NH_3 .
- 2) Write the overall formation constant (β_3) for the triammonia complex $[\text{Cu}(\text{NH}_3)_3]^{2+}$.
- 3) If the concentration of free NH_3 is 0.1 M, calculate the equilibrium concentration of $[\text{Cu}(\text{NH}_3)_3]^{2+}$ in the solution.

Exercise 6

Consider the Co^{2+} ion, which forms two different complexes with different ligands : one with oxalate $\text{C}_2\text{O}_4^{2-}$ to form $[\text{Co}(\text{C}_2\text{O}_4)_3]^{4-}$, with $\log \beta_3 = 19.2$, and the other with ethylenediamine (en) to form $[\text{Co}(\text{en})_3]^{2+}$, with $\log \beta_3 = 13.2$.

1. Write the formation equilibria of the two complexes and express the formation constants β_3 and β_3' .
2. Which of the two complexes is more stable ?

A 100 mL solution containing $[\text{Co}(\text{en})_3]^{2+}$ at a concentration of 0.02 mol/L is mixed with 0.02 moles of sodium oxalate ($\text{Na}_2\text{C}_2\text{O}_4$) without dilution.

- a. Write the equation for the reaction that takes place in the solution.
- b. Calculate the equilibrium constant for this reaction.
- c. Determine the composition of the system at equilibrium.