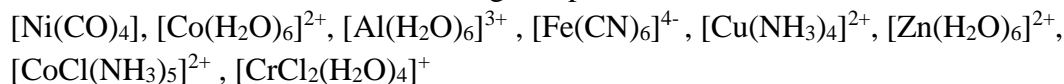


## Serie No. 5

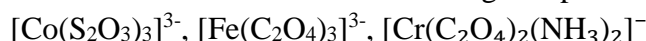
### Exercice 1

Give the name of the following complex.



### Exercice 2

Give the name of the following complex containing polydentate anionic ligands



### Exercice 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

### Exercice 4

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

- 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.

### Exercice 5

A solution contains 0.01 M of  $\text{Cu}^{2+}$  ions and an excess of  $\text{NH}_3$ . The following stepwise formation constants are given for the reaction of  $\text{Cu}^{2+}$  with  $\text{NH}_3$ :  $K_1 = 10^4$ ,  $K_2 = 10^3$ ,  $K_3 = 10^2$

- 1) Give the stepwise reactions for the complexation of  $\text{Cu}^{2+}$  with  $\text{NH}_3$ .
- 2) Write the overall formation constant ( $\beta_3$ ) for the triammonia complex  $[\text{Cu}(\text{NH}_3)_3]^{2+}$ .
- 3) If the concentration of free  $\text{NH}_3$  is 0.1 M, calculate the equilibrium concentration of  $[\text{Cu}(\text{NH}_3)_3]^{2+}$  in the solution.

### Exercice 6

Consider the  $\text{Co}^{2+}$  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  $\beta_3$  and  $\beta_3'$ .
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.