

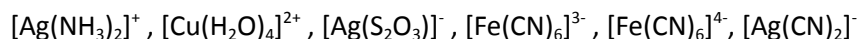
Chemistry 3

Set of exercises-2

Part 2: Complexation-redox reactions

Exercise 1

Determine the charges of complex ions, the complexation index, give the charge of the central atom and that of the ligand.



Exercise 2

In a molar solution of potassium hexacyano ferrate II, the concentration of cyanide ions is 1.7×10^{-6} mol/l. Calculate the instability constant of the complex $[\text{Fe}(\text{CN})_6]^{4-}$.

Exercise 3

Assuming that Fe^{3+} and SCN^- form one complex $[\text{Fe}(\text{SCN})]^{2+}$ with dissociation constant $K_d = 10^{-2}$. What are the concentrations of the different species if 10^{-3} mol/l of Fe^{3+} is mixed with 10^{-3} mol/l of SCN^- .

Exercise 4

I) Complete and balance the following reactions

In acidic medium	In basic medium
$\text{Cr}_2\text{O}_7^{2-} + \text{Fe}^{2+} \longrightarrow \text{Cr}^{3+} + \text{Fe}^{3+}$	$[\text{Cu}(\text{NH}_3)]^{2+} + \text{S}_2\text{O}_4^{2-} \longrightarrow \text{Cu} + \text{NH}_3 + \text{SO}_3^{2-}$
$\text{ClO}_3^{2-} + \text{Fe}^{2+} \longrightarrow \text{Cl}^- + \text{Fe}^{3+}$	$\text{IO}_3^- + \text{Cr}(\text{OH})_3 \longrightarrow \text{I}^- + \text{CrO}_4^{2-}$
$\text{IO}_3^- + \text{H}_2\text{S} \longrightarrow \text{I}^- + \text{S}$	$\text{ClO}^- + \text{Fe}(\text{OH})_3 \longrightarrow \text{Cl}^- + \text{FeO}_4^{2-}$
$\text{MnO}_4^{2-} \longrightarrow \text{MnO}_2^{2-} + \text{MnO}_4^-$	$\text{PbO}_2 + \text{Cl}^- \longrightarrow \text{ClO}^- + \text{Pb}(\text{OH})_3^-$
$\text{IO}_3^- + \text{I}^- \longrightarrow \text{I}_2$	

Exercise 5

Some redox potentials are given in the following table :

Pair	Ba^{2+}/Ba	Mg^{2+}/Mg	Zn^{2+}/Zn	Fe^{2+}/Fe	$\text{H}^+/1/2\text{H}_2$	Cu^{2+}/Cu	$\text{Fe}^{3+}/\text{Fe}^{2+}$	Ag^+/Ag
$E^\circ(\text{V})$	-2.2	-2.34	-0.76	-0.44	0.00	+0.34	+0.77	+0.80

1- One of the metallic ions is shifted by all other metals. Which one is it ? with which metal the reaction is complete ?

2-Which metals resist to the acids ?

3-A plate of copper is immersed in a solution containing ferrous sulfate and in other solution containing silver nitrate. What do you observe ?

4-Why do we obtain ferrous chloride et not ferric chloride by the action of HCl on iron (Fe).