LC23

Diagrammes potentiel-pH

Rappels

Réactions acidobasique

Couple acide-base engageant un proton:

$$CH_3COOH_{(aq)} = CH_3COO_{(aq)} + H_{(aq)}$$

Réactions d'oxydoréduction

Couple oxydant-réducteur engageant un ou plusieurs électrons:

$$Fe^{3+}_{(aq)} + e^{-} \rightarrow Fe^{2+}_{(aq)}$$

$$E = E0 + \frac{RT}{2F} \ln \left(\frac{a(Fe^{3^+})}{a(Fe^{2^+})} \right) \simeq E0 + \frac{0.06}{2} \log \left(\frac{[Fe^{3^+}]_{eq}}{[Fe^{2^+}]_{eq}} \right)$$

Diagramme de prédominance en solution aqueuse : Diagramme de prédominance en solution aqueuse :

$$\begin{array}{c|c}
 & CH_3COOH_{(aq)} & CH_3COO_{(aq)} \\
\hline
 & pKa = 4,8
\end{array}$$

$$\begin{array}{c|c}
 & Fe^{2+}_{(aq)} & Fe^{3+}_{(aq)} \\
\hline
 & E_0 = 0,77V
\end{array}$$

Diagramme Pourbaix Fer

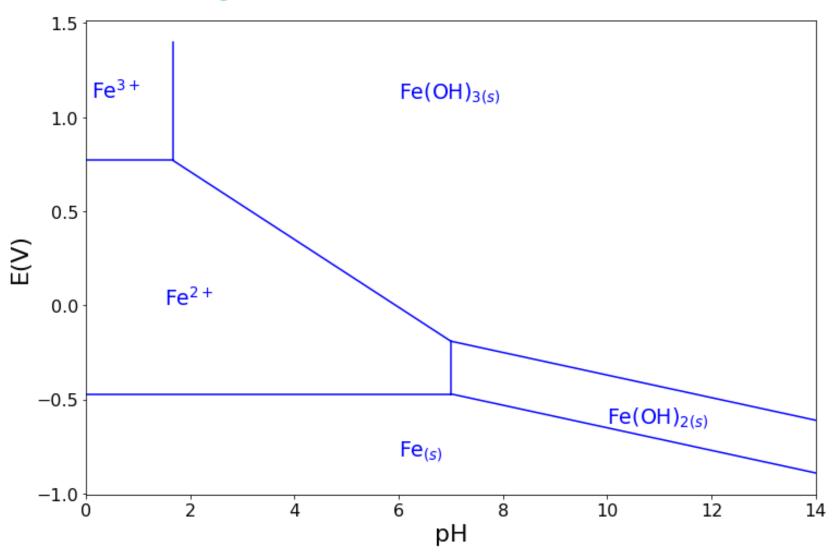


Diagramme Pourbaix Fer-Eau

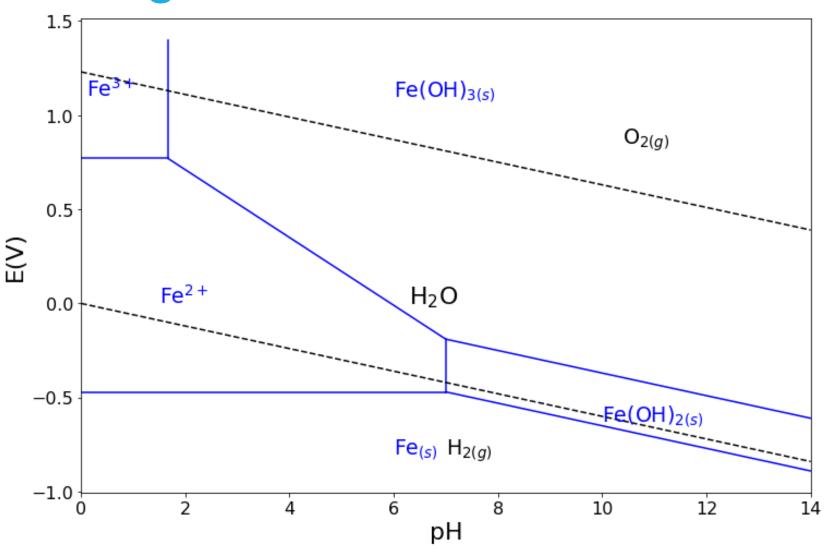
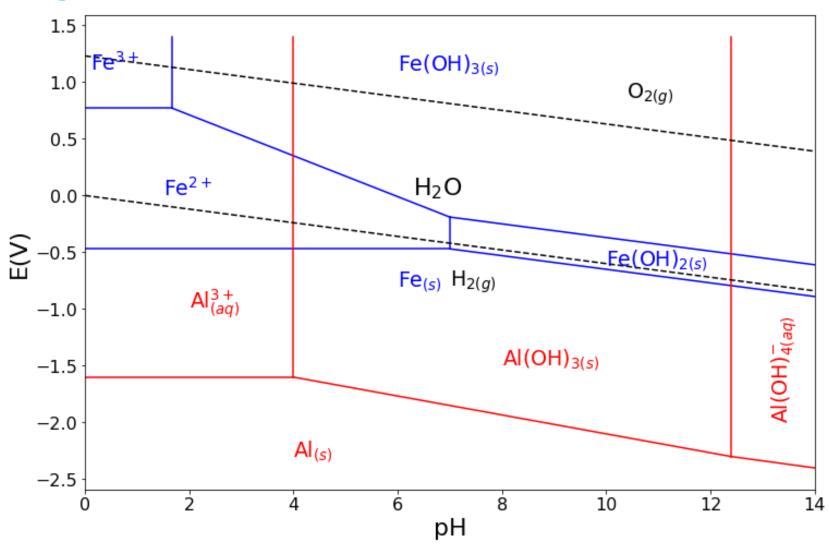
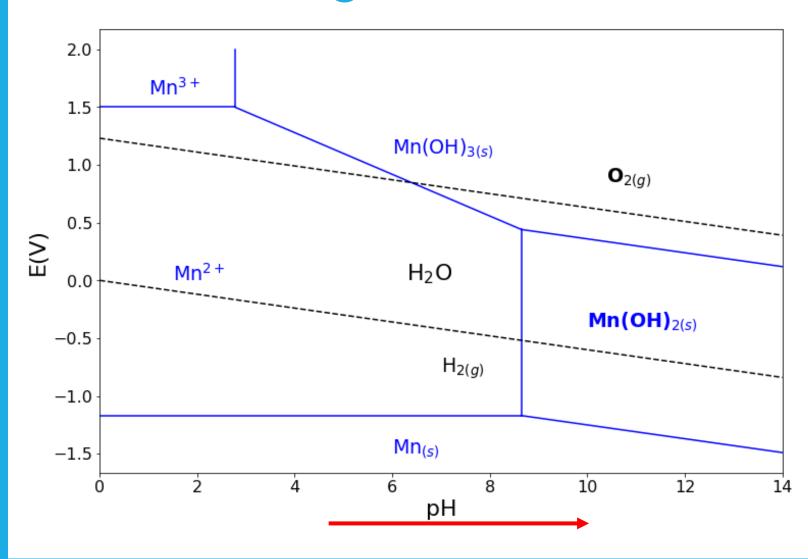
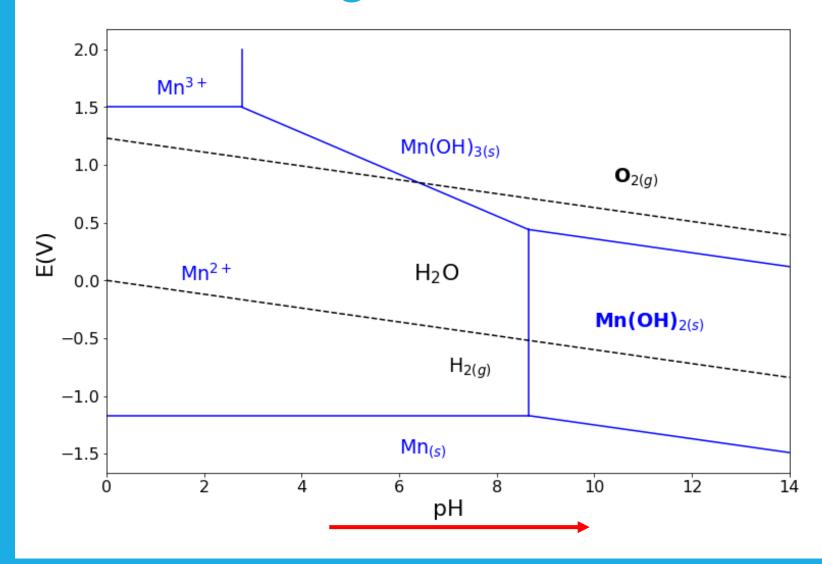


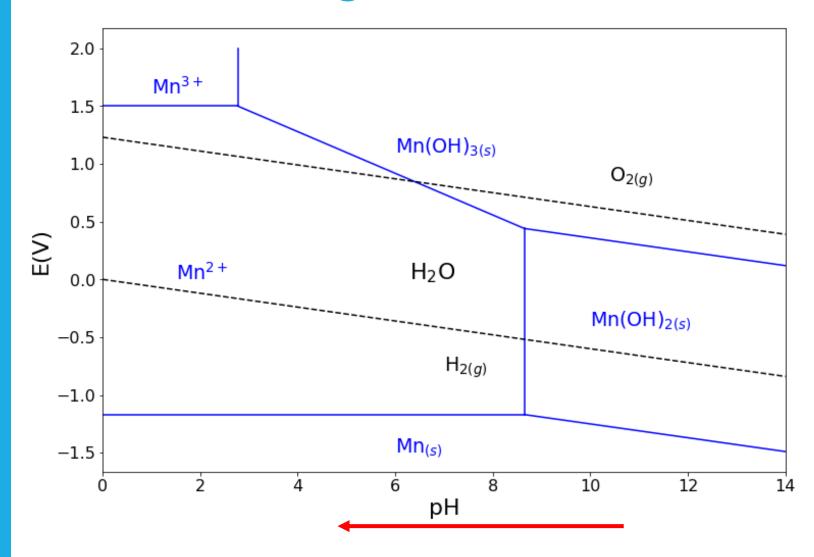
Diagramme Pourbaix Fer-eau-Aluminium





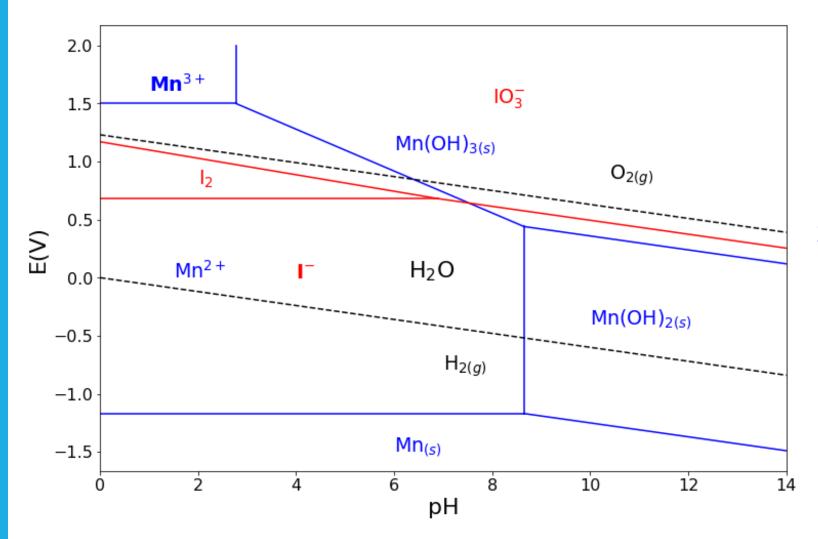


$$4Mn(OH)_{2(s)} + O_{2(aq)} + 2H_2O$$
=
$$4Mn(OH)_{3(s)}$$



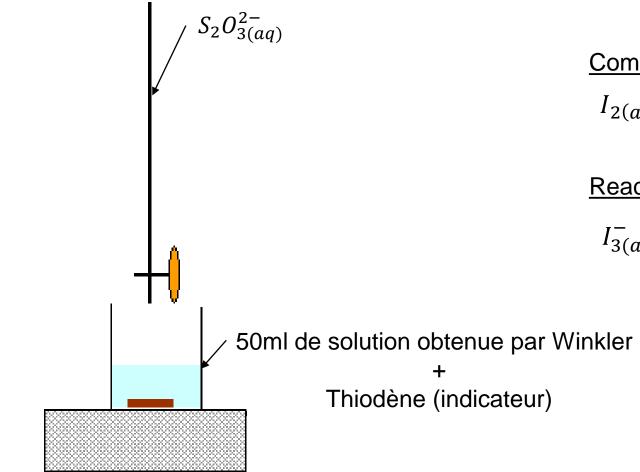
$$Mn(OH)_{3(s)} = Mn_{(aq)}^{3+} + 3OH_{(aq)}^{-}$$

 $Mn(OH)_{2(s)} = Mn_{(aq)}^{2+} + 2OH_{(aq)}^{-}$



$$2Mn_{(aq)}^{3+} + 2I_{(aq)}^{-} = 2Mn_{(aq)}^{2+} + I_{2(aq)}$$

Titrage



Complexation du diode:

$$I_{2(aq)} + I_{(aq)}^{-} = I_{(aq)}^{3-}$$

Reaction de titrage:

$$I_{3(aq)}^{-} + 2S_2O_{3(aq)}^{2-} = 3I_{(aq)}^{-} + S_4O_{6(aq)}^{2-}$$

Détermination de [O₂]

•
$$[I_2]_{form\acute{e}} = [I_3^-]_{dos\acute{e}} = V_{eq} * \frac{[s_2 o_3^{2-}]}{2V_0}$$

•
$$[Mn(III)]_{form\acute{e}} = 2[I_2]_{form\acute{e}} = V_{eq} * \frac{[S_2 O_3^{2-}]}{V_0}$$

•
$$[O_2]_{dissout} = \frac{[Mn(III)]_{form\acute{e}}}{4} = V_{eq} * \frac{[S_2O_3^{2-}]}{4V_0}$$

Détermination de [O₂]

•
$$[I_2]_{form\acute{e}} = [I_3^-]_{dos\acute{e}} = V_{eq} * \frac{[S_2 O_3^{2-}]}{2V_0}$$

•
$$[Mn(III)]_{form\acute{e}} = 2[I_2]_{form\acute{e}} = V_{eq} * \frac{[S_2 O_3^{2-}]}{V_0}$$

•
$$[O_2]_{dissout} = \frac{[Mn(III)]_{form\acute{e}}}{4} = V_{eq} * \frac{[S_2O_3^{2-}]}{4V_0}$$

Numérotati on	1A	1B	2	3
Classement	Excellente qualité	Potable	Industrielle	médiocre
Usages	Tout usage	Potable / Industrie alimentaire	Irrigation	refroidisse ment
[O2] dissout mg.L ⁻¹	>7	5 à 7	3 à 5	< 3