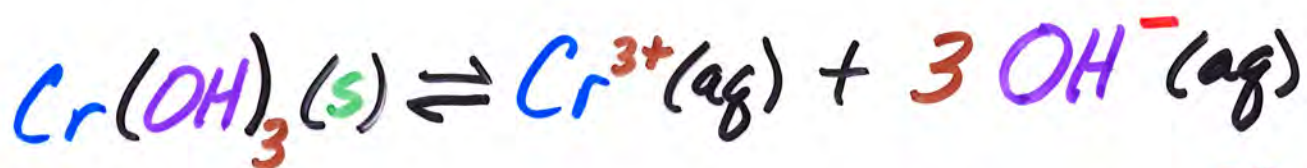


2) Ex : What conc. of OH^- is req. to achieve max. separation of Cr^{3+} & Sn^{2+} from a soln. where both are 0.10M?



$$K_{sp} = 1.6 \times 10^{-30}$$



$$K_{sp} = 5.4 \times 10^{-27}$$

Can **not** tell which will **ppt.** first based on K_{sp} unless form of **eqn.** is **same** & **conc.** are **same**

a) Calc $[OH^-]$ req. to
ppt. each cation

$$K = [Cr^{3+}][OH^-]^3 = 1.6 \times 10^{-30}$$
$$(0.10M)[OH^-]^3 = 1.6 \times 10^{-30}$$
$$[OH^-] = 2.5 \times 10^{-10} M$$

$$[Sn^{2+}][OH^-]^2 = 5.4 \times 10^{-27}$$
$$(0.10)[OH^-]^2 = 5.4 \times 10^{-27}$$
$$[OH^-] = 2.3 \times 10^{-13} M$$

smaller

b) Which cation ppt first?

$Sn(OH)_2$ ppt 1st

c) What is $\text{max } [\text{OH}^-]$ which can be added w/o ppt $\text{Cr}(\text{OH})_3$?

$$[\text{OH}^-] \leq 2.5 \times 10^{-10} \text{ M}$$

only $\text{Sn}(\text{OH})_2$ ppt until

$$[\text{OH}^-] > 2.5 \times 10^{-10} \text{ M}$$

d) What is $[\text{Sn}^{2+}]$ when $\text{Cr}(\text{OH})_3$ starts to ppt?

$$[\text{Sn}^{2+}] [\text{OH}^-]^2 = K_{sp}$$

$$[\text{Sn}^{2+}] (2.5 \times 10^{-10})^2 = 5.4 \times 10^{-27}$$

$$[\text{Sn}^{2+}] = \underline{8.5 \times 10^{-8} \text{ M}}$$

e) How Effective is
the Separation?

What % Sn^{2+} remains?

$$\begin{aligned} \text{\% Sn}^{2+} \text{ remaining} &= \frac{8.5 \times 10^{-8} \text{ M}}{0.10 \text{ M}} \times 100 \\ &= 8.5 \times 10^{-5} \% \end{aligned}$$