

Quiz 1
CHEM 311 Fall 2004

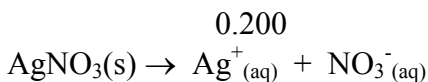
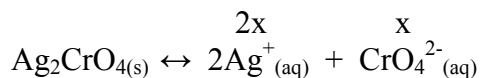
Calculate the solubility (in ng/L) of Ag_2CrO_4 in a 0.200 M solution of AgNO_3 .
(in other words, if you drop a spatula full of Ag_2CrO_4 in 1.0 L of a 0.200 M solution of AgNO_3 , how much of it will dissolve?)

Silver nitrate is a soluble salt.

$$K_{sp}(\text{Ag}_2\text{CrO}_4) = 1.2 \times 10^{-12}$$

$$\text{MW}(\text{Ag}_2\text{CrO}_4) = 331.730 \text{ g}$$

$$\text{ng} = 10^{-9} \text{ g}$$



$$K_{sp} = [\text{Ag}^+_{(aq)}]^2[\text{CrO}_4^{2-}_{(aq)}] = (2x + 0.200)^2 x$$

$\text{Ag}_2\text{CrO}_{4(s)}$ is a relatively insoluble salt. So Assume $0.200 \gg \gg \gg 2x$

$$1.2 \times 10^{-12} = (0.200)^2 x$$

$$x = [\text{CrO}_4^{2-}_{(aq)}] = 3.0 \times 10^{-11} \text{ M}$$

Assumption valid!!!!

$$(3.0 \times 10^{-11} \text{ mol/L}) \times (331.730 \text{ g/mol}) \times (10^9 \text{ ng/g}) = 9.9519 \text{ or } 10 \text{ ng/L (2 sig. figs)}$$

The volume of 10 ng is insignificant compared to 1 L.