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.
$Ksp(Ag_2CrO_4) = 1.2*10^{-12}$
$MW(Ag_2CrO_4) = 331.730$ g
ng = 10^{-9} g

$$\overset{\quad 2x \qquad\qquad x}{Ag_2CrO_{4(s)} \leftrightarrow 2Ag^+_{(aq)} + CrO_4^{2-}{}_{(aq)}}$$

$$\overset{\quad 0.200}{AgNO_3(s) \rightarrow Ag^+_{(aq)} + NO_3^-{}_{(aq)}}$$

$Ksp = [Ag^+_{(aq)}]^2[CrO_4^{2-}{}_{(aq)}] = (2x + 0.200)^2\ x$

$Ag_2CrO_{4(s)}$ is a relatively insoluble salt. So …. Assume 0.200 >>>> 2x

$1.2*10^{-12} = (.200)^2x$

$x = [CrO_4^{2-}{}_{(aq)}] = 3.0*10^{-11}$ M

Assumption valid!!!!

$(3.0*10^{-11}$ mol/L)*(331.730 g/mol)*(10^9 ng/1 g) = 9.9519 or 10 ng/L (2 sig. figs)

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