Ch 19 – Solubility Equilibria

Selected NChO Problems

1999-4.	**(A) AlCl$_3$** Three clues lead to choice (A): (1) "colorless aqueous solution" eliminates blue CuSO$_4$. (2) ppt with NaOH eliminates Ba(NO$_3$)$_2$ because Ba(OH)$_2$ is soluble. (3) white ppt with AgC$_2$H$_3$O$_2$ AgI is a yellow precipitate; AgCl is a white precipitate.
1999-40.	**(C) 7.3 x 10^{-14}** PbCO$_3$ is a 1:1 compound so K$_{sp}$ = s^2 s = 2.7 x 10^{-7} K$_{sp}$ = (2.7 x 10^{-7})^2 = 7.3 x 10^{-14}
1998-4.	**(D) PbCl$_2$** Solubility rules help eliminate (A), (B), and (C). (NO$_3^-$, Na$^+$, and K$^+$ are always soluble.)
1998-39.	**(D) 8.8 x 10^{-9}** PbI$_2$ is a 1:2 compound so K$_{sp}$ = 4s^3 s = 0.0013 <u>M</u> K$_{sp}$ = 4(0.0013)^3 = 8.8 x 10^{-9}
1997-5	**(C) MgSO$_4$ and Pb(NO$_3$)$_2$** PbSO$_4$ precipitate is formed. (solubility rules)
1997-40.	**(A) 1 only** Ca(OH)$_2$ + 2 NH$_4$Cl → 2 NH$_3$(g) + 2 H$_2$O + CaCl$_2$ "1" is true "2" CaCl$_2$ is formed, but it is not a precipitate "3" is a complex ion. 　　　NH$_3$ is a good ligand, but you would need concentrated NH$_3$ to form the complex ion.
1996-40.	**(B) BaCO$_3$ only** Look for salt with anion from a weak acid. BaCO$_3$; CO$_3^{2-}$ from H$_2$CO$_3$ (weak) BaSO$_4$; SO$_4^{2-}$ from H$_2$SO$_4$ (strong)
1995-12.	**(B) CaCl$_2$ + K$_2$CO$_3$ ®** CaCO$_3$ is a precipitate (solubility rules)
1995-35.	**(C) 4.4 x 10^{-4}** CuCl is a 1:1 compound, so K$_{sp}$ = s^2 K$_{sp}$ = 1.9 x 10^{-7} = s^2 s = $\sqrt{1.9x10^{-7}}$ = 4.4 x 10^{-4}
1994-36.	**(B) 1.5 x 10^{-3}** PbI$_2$ is a 1:2 compound so K$_{sp}$ = 4s^3 K$_{sp}$ = 1.4 x 10^{-8} s = $\sqrt[3]{K_{sp}/4}$ = 1.5 x 10^{-3}
1993-30.	**(A) BaCO$_3$** see explanation for 1996-40. above. **HCl, HNO$_3$, H$_2$SO$_4$** are all strong acids.
1992-32.	**(D) CaCl$_2$** Look for salt with anion NOT from a weak acid. **HF, H$_2$CO$_3$,** and **H$_2$C$_2$O$_4$** are all weak acids.