Solubility Equilibria Worksheet.

1 a. $(NH_4)S$ soluble
b. $ZnCO_3$ slightly soluble (I)
c. $Mg(OH)_2$ slightly soluble (I)
d. Na_2CO_3 soluble
e. FeS slightly soluble (I)
f. $BaSO_4$ insoluble
g. Hg_2Cl_2 insoluble
h. $CaBr_2$ soluble
i. CoS slightly soluble (I)

(p 144)

2a. $CaCl_{2(aq)} + 2AgNO_{3(aq)} \longrightarrow Ca(NO_3)_{2(aq)} + 2AgCl_{(s)}$

$Ag^+_{(aq)} + Cl^-_{(aq)} \longrightarrow AgCl_{(s)}$

b. $2KOH_{(aq)} + MgCl_{2(aq)} \longrightarrow 2KCl_{(aq)} + Mg(OH)_{2(s)}$

$Mg^{2+}_{(aq)} + 2OH^-_{(aq)} \longrightarrow Mg(OH)_{2(s)}$

c. $KOH_{(aq)} + NaCl_{(aq)} \longrightarrow KCl_{(aq)} + NaOH_{(aq)}$

d. $2KCl_{(aq)} + Pb(NO_3)_{2(aq)} \longrightarrow PbCl_{2(s)} + 2KNO_{3(aq)}$

$Pb^{2+}_{(aq)} + 2Cl^-_{(aq)} \longrightarrow PbCl_{2(s)}$

e. $(NH_4)_2S_{(aq)} + Ni(NO_3)_{2(aq)} \longrightarrow 2NH_4NO_{3(aq)} + NiS_{(s)}$

$Ni^{2+}_{(aq)} + S^{2-}_{(aq)} \longrightarrow NiS_{(s)}$

(p A24)

3a. $AgBr$ 5.0×10^{-13} $\underline{AgSCN}$ 1×10^{-12}

b. $SrCO_3$ 7.0×10^{-10} $\underline{SrSO_4}$ 1.2×10^{-5}

c. $\underline{MgF_2}$ 6.4×10^{-9} CaF_2 4.0×10^{-11}

d. $\underline{ZnS}$ 2.5×10^{-22}
$= x^2$
$x = 1.5\times10^{-11}$

Bi_2S_3 1.1×10^{-73}
$= (2x)^2 \cdot (3x)^3 = 4x^2 \cdot 27x^3 = 108x^5$
$x = 1.0\times10^{-15}$

e. Ag_2S 1.6×10^{-49} $\underline{SnS_2}$ 1×10^{-26}

f. $Ca_3(PO_4)_2$ 1.3×10^{-32}
$= (3x)^3(2x)^2$
$= 27x^3 \cdot 4x^2$
$= 108x^5$
$x = 4.1\times10^{-8}$

$\underline{Ag_3(PO_4)}$ 1.8×10^{-18}
$= (3x)^3\ x$
$= 27x^3 \cdot x$
$= 27x^4$
$x = 1.6\times10^{-5}$