Ksp worksheet: **Finish for homework, hand-in when done.** **Name:** _____

1. $PbSO_{4(s)} \rightleftarrows Pb^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)}$ $[Pb^{2+}] = 2.0 \times 10^{-5}$ M Find the value of Ksp.

$Ksp = [Pb^{2+}][SO_4^{2-}]$
$= (2.0 \times 10^{-5})(2.0 \times 10^{-5})$
$Ksp = 4.0 \times 10^{-10}$

$\boxed{4.0 \times 10^{-10}}$

2. Solid aluminum hydroxide dissolves into its respective ions at 25°C. Given that $[OH^-] = 1.5 \times 10^{-5}$ M, find the value of Ksp.

$Al(OH)_{3(s)} \rightarrow Al^{3+} + 3OH^-$
$[Al^{3+}] = x$
$[OH^-] = 3x = 1.5 \times 10^{-5}$
$x = 5.0 \times 10^{-6}$

$Ksp = [Al^{3+}][OH^-]^3$
$= (5.0 \times 10^{-6})(1.5 \times 10^{-5})^3$

$\boxed{Ksp = 1.7 \times 10^{-20}}$

3. Calculate the solubility of $AlPO_4$. (Ksp = 9.8×10^{-21})

$Ksp = [Al^{+3}][PO_4^{3-}]$
$9.8 \times 10^{-21} = x^2$
$9.9 \times 10^{-11} = x$

$\boxed{9.9 \times 10^{-11} M}$

4. Calculate the solubility of MgF_2. (Ksp = 6.4×10^{-9})

$MgF_2 \rightarrow Mg^{2+} + 2F^-$
$Ksp = [Mg^{2+}][F^-]^2$
$6.4 \times 10^{-9} = (x)(2x)^2$
$\frac{6.4 \times 10^{-9}}{4} = \frac{4x^3}{4}$
$\sqrt[3]{1.6 \times 10^{-9}} = \sqrt[3]{x^3}$
$1.2 \times 10^{-3} = x$

$\boxed{1.2 \times 10^{-3} M}$

5. Solid AgI is added to a 0.200M NaI solution. Calculate the solubility of AgI (Ksp of AgI = 1.5×10^{-16})

$AgI \rightarrow Ag^+ + I^-$
$Ksp = [Ag^+][I^-]$
$1.5 \times 10^{-16} = (x)(x + 0.200)$
$= (x)(0.200)$
$\frac{1.5 \times 10^{-16}}{0.200} = \frac{0.200x}{0.200}$

$\boxed{x = 7.5 \times 10^{-16} M}$

6. Solid $PbCO_3$ was placed in solution of 0.100M $Pb(NO_3)_2$. Calculate the solubility of $PbCO_3$ (Ksp = 3.3×10^{-14}).

$PbCO_3 \rightarrow Pb^{2+} + CO_3^{2-}$
$Ksp = [Pb^{2+}][CO_3^{2-}]$
$3.3 \times 10^{-14} = (x + 0.100)(x)$
$= (0.100)(x)$
$\frac{3.3 \times 10^{-14}}{0.100} = \frac{0.100x}{0.100}$
$3.3 \times 10^{-13} = x$

$\boxed{3.3 \times 10^{-13} M}$