7. Calculate the $[Mg^{2+}]$ in a saturated solution of $Mg(OH)_2$ at 25°C. Show all your steps in a logical manner. Correct use of units and significant digits counts (3 marks)

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

$Ksp = [Mg^{2+}][OH^-]^2$
$= s(2s)^2$
$= 4s^3$

$s = \sqrt[3]{\frac{Ksp}{4}} = \sqrt[3]{\frac{5.6\times10^{-12}}{4}}$

$[Mg^{2+}] = s = 1.1187\times10^{-4}$ M

3

Answer $[Mg^{2+}] = 1.1\times10^{-4}$ M

8. Calculate the mass of $AgIO_3$ which will dissolve in 2.50 L of water at 25°C. Show all your steps in a logical manner. Correct use of units and significant digits counts (3 marks)

$AgIO_{3(s)} \rightleftharpoons Ag^+_{(aq)} + IO_3^-{}_{(aq)}$

$Ksp = [Ag^+][IO_3^-]$
$Ksp = s^2$
$s = \sqrt{Ksp} = \sqrt{3.2\times10^{-8}}$
$s = 1.7889\times10^{-4}$ M

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$\frac{mol}{M/L}$

$mol = M \times L$
$= 1.7889\times10^{-4}$ M $\times$ 2.50 L
$= 4.472\times10^{-4}$ mol

$mass = 4.472\times10^{-4}$ mol $\times \frac{282.8\text{ g}}{1\text{ mol}} = 0.13$ g

Answer 0.13 g

9. At a certain temperature 2.2×10^{-4} grams of CuI will dissolve in 1.0 L of water. Calculate the Ksp for CuI at this temperature. Show all your steps in a logical manner. Correct use of units and significant digits counts (3 marks)

moles 2.2×10^{-4} g CuI $\times \frac{1\text{ mol}}{190.4\text{ g}} = 1.155\times10^{-6}$ mol

$M = \frac{1.155\times10^{-6}\text{ mol}}{1.0\text{ L}} = 1.155\times10^{-6}$ M ← molar solubility

3

$CuI_{(s)} \rightleftharpoons Cu^+ + I^-$
-1.155×10^{-6} M $+1.155\times10^{-6}$ M $+1.155\times10^{-6}$ M

$Ksp = [Cu^+][I^-]$
$= (1.155\times10^{-6})^2$
$= 1.3\times10^{-12}$

Answer $Ksp = 1.3\times10^{-12}$

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