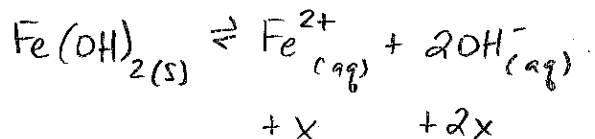# How Much Will Dissolve?

You can use molar solubility to determine how many __grams__ of a solid will dissolve in a quantity of water!

5. How many grams of iron (II) hydroxide can dissolve in 500. mL of water? Its $K_{sp} = 4.87 \times 10^{-17}$ at 25°C.

$$Fe(OH)_{2(s)} \rightleftharpoons Fe^{2+}_{(aq)} + 2OH^-_{(aq)}$$
$$+x \qquad\qquad +2x$$

$$K_{sp} = [Fe^{2+}][OH^-]^2 = x(2x)^2 = 4x^3 = 4.87E-17$$

$$\Rightarrow x = \sqrt[3]{\frac{4.87E-17}{4}} = 2.30E-6\,M \times 0.500\,L = 1.15E-6\,mol\,Fe(OH)_2$$

$$\uparrow \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad x\,\frac{89.866\,g}{1\,mol}$$
$$mol/L$$

$$= 1.03 \times 10^{-4}$$
$$g\,Fe(OH)_2$$

6. The molar solubility of $PbCl_2$ in pure water is 1.43×10^{-2} M at 25°C.

   a. Write the equilibrium constant expression for the dissolving of $PbCl_2(s)$.
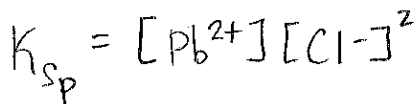
   $$K_{sp} = [Pb^{2+}][Cl^-]^2$$

   b. How many grams of $PbCl_2$ can dissolve into 200. mL of pure water?

   $$1.43 \times 10^{-2}\,M \times 0.200\,L = 0.00286\,mol\,PbCl_2$$
   $$\times \frac{278.19}{1\,mol} = 0.795\,g\,PbCl_2$$

   c. What change could be made to increase amount of $PbCl_2$ that will dissolve?

   ↑ amount of H_2O it's being dissolved in