In Class Problems

# Precipitation–Dissolution Equilibrium for Tara

CENG 340–Introduction to Environmental Engineering

Instructor: Deborah Sills

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Tara asked a great question about the cadmium hydroxide precipitation problem we worked on in class on Monday. She wanted to know if we could use stoichiometry to calculate the equilibrium concentrations of $[OH^-]$ and $[Cd^{2+}]$ in the following equation, and if not, why?

$$[Cd(OH)_2] \overset{K_{sp}}{\rightleftharpoons} [Cd^{2+}] + 2\,[OH^-]$$

where $pK_{sp} = 13.85$

I told her that—within the context of Monday's problem—the answer was no, but that I would try to find a good way to explain why not. I hope that the following problem will help:

If 50 mg of $OH^-$ and 50 mg of $Cd^{2+}$ are present in 1 L of water, what will be the final equilibrium concentration of $Cd^{2+}$? (Note that to solve this problem you need to use the equilibrium equation above.)

1. Take a look at the problem we solved on Monday, and describe how this problem is different from Monday's problem. Write down how you think the differences between the two problems will change your approach to this one.
2. Try to solve the problem.
3. Try to answer Tara's question.