Problem of the Day

2014.Nov.07

Discussion

The Water Environment Federation is the trade organization for water professionals, including wastewater treatment operations professionals (http://wefcom.wef.org/home). Individual states, or groups of states, sponsor local chapters. On October 29, 2014, I gave a 6-hour Math for Operators Workshop at the annual conference of the Pacific Northwest Clean Water Association (PNCWA). PNCWA represents Idaho, Oregon and Washington (http://www.pncwa.org/). All operators should seriously consider joining their local association. In California it is the California Water Environment Association (http://www.cwea.org/).

Long story short: I randomly covered a series of math problems in the PNCWA workshop, and I have been requested by several attendees to send them the problems. Instead, I am going to post them here (starting with the 2014.Nov.04 Problem of the Day). They are good practice for all visitors to WWTT's Problem of the Day.

For those of you who may be new to WWTT's Problem of the Day, we insert a page break after the problem statement so you can print it without looking at the solution: see what you can do to solve the problem **before** looking at the solution.

Problem

Problem of the Day: Given the following information, calculate the chlorine dose concentration.

- Influent flow = 4.5 Mgal/d
- Chlorine feed = 1,000 lb Cl_2/d
- **Calculate: mg Cl_2/L**.

Solution

This is a “reverse pounds” calculation. Just let the units tell you what to do. But remember whenever you are asked to solve for concentration, mg/L, the railroad track **always** starts with **M•mg/L**.

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$$\frac{\textbf{mg } Cl_2}{\textbf{L}} = \frac{\cancel{\text{M}}\textbf{mg}}{\textbf{L}} \; \frac{1{,}000 \; \cancel{\text{lb}} \; \textbf{Cl}_2}{\cancel{\text{d}}} \; \frac{\cancel{\text{d}}}{4.5 \; \cancel{\text{Mgal}}} \; \frac{\cancel{\text{gal}}}{8.34 \; \cancel{\text{lb}}}$$

All the units have canceled except those needed in the answer, **mg Cl_2/L**. The arithmetic gives the answer:

1,000 ÷ 4.5 ÷ 8.34 = **<u>26.6 mg Cl_2/L</u>**.

Remember this is the chlorine dose and dose is equal to demand plus residual.

Happy calculating!