CALCULATING THE CHLORINE DOSAGE USING: 5% TO 15% AVAILABLE CHLORINE SODIUM HYPOCHLORITE (NaOCl)

We will modify some of those previous examples and problems that we used with "pure" chlorine by adapting them for disinfection using liquid sodium hypochlorite.

CALCULATING THE CHLORINE DOSAGE USING METHOD 2 (200 mg/L solution)

EXAMPLE: Among other requirements, Method 2 for disinfection of a water storage tank requires that a 200 mg per liter (200 mg/L) solution be brushed or sprayed on all surfaces that will come in contact with the potable water to be stored. This solution must remain on those wetted surfaces for at period of least 30 minutes. You calculate that you will need 550 gallons of the 200 mg per liter solution. You will use a sodium hypochlorite solution that is 12.5% available chlorine. How many gallons of the 12.5% sodium hypochlorite solution will you need?
(Ans: 0.88 gallons of sodium hypochlorite to get 0.92 lbs of available chlorine)

As before, the first two steps to find the pounds of pure chlorine remain unchanged:
We first convert the 550 gallons into MG units so that we can use the pounds formula:

$$\frac{(550\ \text{gal})}{1}\left(\frac{1\ \text{MG}}{1{,}000{,}000\ \text{gal}}\right) = \frac{550\ \text{gal}}{1{,}000{,}000} = 0.00055\ \text{MG}$$

We now insert our MG volume into the pounds formula and calculate the number of pounds of pure chlorine we need.

(0.00055 MG)(8.34)(200) = 0.92 lbs PURE chlorine

Now we do something different as we need to find the number of pounds of liquid sodium hypochlorite to put into the disinfecting water.

(X lbs of sodium hypochlorite)(0.125 avail Cl2) = 0.92 lbs PURE chlorine

We now solve for the number of pounds of sodium hypochlorite that will have the 0.92 lbs of available chlorine in it. We divide each side of the equal sign by the 0.125 avail Cl2 to get the X lbs of sodium hypochlorite by itself:

$$\frac{(\text{X lbs of sodium hypo})(0.125 \text{ avail } Cl_2)}{0.125 \text{ avail } Cl_2} = \frac{0.92 \text{ lbs PURE chlorine}}{0.125 \text{ avail } Cl_2}$$

$$(\text{X lbs hypo}) = \frac{0.92 \text{ lbs pure } Cl_2}{0.125 \text{ avail } Cl_2} = 7.36 \text{ lbs sodium hypochlorite}$$

I guess if we had a scale out in the field we could weigh 7.36 lbs of the liquid sodium hypochlorite out, but we should use gallons as our measurement! So we just convert the 7.36 lbs of sodium hypochlorite into gallons. Sodium hypochlorite weighs about the same as water, so we do not have to make a change in weight due to its density.

$$\frac{(7.36 \text{ lbs sod. hypo})(1 \text{ gal})}{1 \quad 8.34 \text{ lbs}} = 0.88 \text{ gal of 12.}$$

Your turn! This one is for you to do!
PROBLEM 1: You calculate that you will need 850 gallons of a 200 mg/L solution to disinfect a water storage tank. How many gallons of a 7.5% available chlorine sodium hypochlorite (NaOCl) solution will you need?
(Ans: 2.27 gallons to get 1.42 lbs of chlorine)

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