

2. Calculate the lbs of solids in the primary sludge if the sludge flow is 7500 gallons and the solids concentration is 4.5%.

Solution

Applying lbs formula:

$$\text{lbs solids} = \frac{7500 \text{ MG}}{1,000,000} * 4.5 * 10,000 * 8.34 = \boxed{2,815 \text{ lbs solids}}$$

Note:

- 1) 7500 gallons was converted to MG by dividing by 1,000,000

$$7500 \text{ gallons} * \frac{1 \text{ MG}}{1,000,000 \text{ gallons}}$$

- 2) 4.5% was converted to mg/l by multiplying by 10,000 as 1%=10,000mg/l

3. An operator dissolves 1,200 lbs of a chemical in 12,000 gallons of water, what is the resultant concentration in mg/l, of the chemical solution?

Solution:

$$\text{Concentration} \frac{\text{mg}}{\text{l}} = \frac{\text{lbs}}{\text{Volume MG}} * 8.34$$

$$\text{Concentration} \frac{\text{mg}}{\text{l}} = \frac{1,200}{0.012 * 8.34} = \boxed{\frac{11,990 \text{ mg}}{\text{l}} \text{ or } 1.2\% \text{ solution}}$$

Note:

- 1) 12,000 gallons was converted to MG by dividing by 1,000,000

$$12,000 \text{ gallons} * \frac{1 \text{ MG}}{1,000,000 \text{ gallons}}$$

4.5 Process Removal Efficiency Calculations

- Process removal rate or removal efficiency is the percentage of the inlet concentration removed.
- It is used for quantifying the pollutant removal during wastewater treatment and is established based upon the amount of a particular wastewater constituent entering and leaving a treatment process.
- $\text{Process Removal Rate (\%)} = \frac{\text{Pollutant In} - \text{Pollutant Out}}{\text{Pollutant In}} * 100$
- If 10 units of a pollutant are entering a process and 8 units of pollutant are leaving (process removes 2 units), then the process removal rate for that pollutant is $(10-8)/10*100=20\%$. In this example the process is 20% efficient in removing that particular pollutant.
- The amount of pollutant can be measured in terms of concentration (mg/l) or in terms of mass loading (lbs). The pounds formula is used for calculating the mass loadings.

The above example is for calculating the removal efficiency using the inlet and outlet concentrations or mass loading.

The methods below can be used for calculating either the inlet or outlet pollutant concentrations, if the removal efficiency and the corresponding inlet or outlet concentrations are given.

Case 1: Calculating outlet conc. (X) given the inlet conc. and removal efficiency (RE%):

Using the fact that if the inlet concentration was 100 mg/l, the outlet concentration would be 100 minus the removal efficiency.