In 
$$\xrightarrow{A \ mg/l \ (Given)}$$
 Process  $X \ mg/l \ (Unknown)$  Out
$$(100 - RE\%) \ mg/l$$
Removal  $Efficiency = RE\% \ (Given)$ 

Setup the equation as: 
$$\frac{Out}{In}$$
:  $\frac{X mg/l}{A mg/l} = \frac{100 - RE\%}{100}$   
Calculate X using cross multiplication - if  $\frac{A}{B} = \frac{C}{D} \implies A = B * \frac{C}{D}$ :
$$X mg/l = A mg/l * \frac{100 - RE\%}{100}$$
Case 2: Calculating inlet conc. (X) given the outlet conc. and remove

Case 2: Calculating inlet conc. (X) given the outlet conc. and removal efficiency (RE%):

In 
$$\frac{X \ mg/l \ (Unknown)}{100 \ mg/l}$$
 Process  $\frac{A \ mg/l \ (Given)}{(100 - RE\%) \ mg/l}$  Out  $\frac{Removal \ Efficiency = RE\% \ (Given)}{}$ 

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

Setup the equation as: 
$$\frac{In}{Out}$$
:  $\frac{X \ mg/l}{A \ mg/l} = \frac{100}{100 - RE\%}$ 

Calculate X using cross multiplication - if 
$$\frac{A}{B} = \frac{C}{D} \implies A = B * \frac{C}{D}$$
:  
 $X \ mg/l = A \ mg/l * \frac{100}{100 - RE\%}$ 

## **Example Problems:**

Solution:

1. What is the % removal efficiency if the influent concentration is 10 mg/L and the effluent concentration is 2.5 mg/L<sup>3</sup>

Removal Rate(%) = 
$$\frac{In - Out}{In} * 100 \implies \frac{10 - 2.5}{10} * 100 = \boxed{75\%}$$

2. Calculate the outlet concentration if the inlet concentration is 80 mg/l and the process removal efficiency is 60%

In 
$$\frac{80mg/l}{100mg/l}$$
 Process  $\frac{Xmg/l}{40mg/l}$  Out Removal Efficiency = 60%

$$\frac{Out}{In} : \frac{Actual \ Outlet(X)}{80} = \frac{100 - 60}{100}$$

$$\Rightarrow \frac{Actual \ Outlet(X)}{80} = 0.4$$

$$\Rightarrow Actual \ Outlet(X) = 0.4 * 80 = \boxed{32mg/l}$$