1. What is the solids content in mg/l of a 2.5% sludge?
   Answer: 25,000 mg/l

2. How many lbs of salt needs to be dissolved in water to make 1 liter of 5% salt solution?
   Solution:
   $5\%\ salt\ solution \implies 50,000\ mg/l\ salt$
   To prepare 1 litre of salt solution need to dissolve 50,000 mg or:
   $50,000\ mg * \frac{lb}{453.6\ gms} * \frac{gm}{1,000\ mg} = \boxed{0.11\ lb\ salt}$ in enough water to make 1 liter of solution.

3. What is the concentration in mg/l of 4.5% solution of that substance.

4. How many lbs of salt is needed to make 5 gallons of a 2500mg/l salt solution
   $2500 mg/l = 2500 ppm = \frac{2500\ lbs\ salt}{1,000,000\ lbs\ salt\ solution} * 5 * 8.34\ salt\ solution = \boxed{0.1\ lbs\ salt}$

5. An operator mixes 40 lb of lime in a 100-gal tank containing 80 gal of water. What is the percent of lime in the slurry? Solution:

$$\left(\frac{40\ lbs\ lime}{80\ gal\ water * 8.34\frac{lbs}{gal\ water} + 40\ lbs\ lime} * \frac{1,000,000\ lbs}{million\ lbs}\right) * \frac{\%}{10,000\ ppm} = \boxed{5.7\%}$$

6. A chlorine solution was made to have a 4% concentration. What is the chlorine concentration expressed in mg/l.?
   Using the above concept, 4% is 4 * 10,000 mg/l = 40,000 mg/l

7. How many pounds of salt is in 2 gallons of 2% salt solution?

   The question is to determine the amount of salt -in lbs, in that 2 gallons of salt solution.

   2% implies 20,000mg/l salt solution.

   We need to convert 20,000 mg/l to lbs/2 gallons.

   20,000 mg/l is the same as 20,000 ppm which is $\frac{20,000\ lbs\ salt}{1,000,000\ lbs\ salt\ solution}$

   Thus, lbs salt:

$$\frac{20,000\ lbs\ salt}{1,000,000\ \cancel{lbs\ salt\ solution}} * \frac{8.34\cancel{lbs\ salt\ solution}}{\cancel{gallon}} * 2\cancel{gallons} = 0.3\ lbs\ salt$$

8. How much 65% calcium hypochlorite is required to obtain 7 pounds of pure chlorine?
   65% implies that in every lb of calcium hypochlorite has 65% lbs of available chlorine.
   Therefore, $\frac{\text{0.65 lbs available chlorine}}{\text{lb of calcium hypochlorite}}$ or conversely $\frac{\text{lb of calcium hypochlorite}}{\text{0.65 lbs available chlorine}}$

   $\implies$ lbs calcium hypchlorite required $= \frac{\text{lb of calcium hypochlorite}}{\cancel{\text{0.65 lbs available chlorine}}} * \cancel{\text{7 lb of available chlorine}}$

   $= \boxed{\text{10.8 lbs of calcium hypochlorite with 65\%available chlorine is required}}$