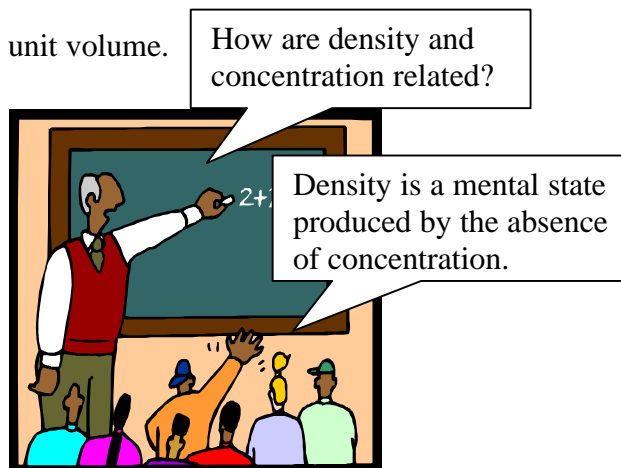


Predicting Concentration of a Saline Solution

The density of a substance is its mass per unit volume. (Note that density can be thought of as a slope or rate of change of mass with respect to volume.) In chemistry class you may be asked to find the density of, say, a sodium chloride solution by measuring its mass and dividing by its volume. As one increases the concentration (proportion) of sodium chloride in a saline solution, the solution gains density. In other words, the variables “density” and “concentration” are related variables. We can use a *linear function* to describe the relationship with reasonable accuracy.



Dr. Krueger’s class has measured the density of four different concentrations of NaCl (sodium chloride) in water. Because measurement always involves error, they have replicated the measurements five times (except for one measurement that had to be thrown out because of a transcription error that was discovered too late). They expect to average the density measurements so that one concentration value corresponds to one average density value. The data from their spreadsheet is below. Density is measured in grams/milliliter (g/mL).

sample #	8% NaCl	12% NaCl	16% NaCl	20% NaCl
1	1.054	1.078	1.094	1.133
2	1.058	1.084	1.119	1.14
3	1.052	1.069	1.109	1.154
4	1.075	1.078	1.108	1.132
5	1.055	1.086		1.127

AvgDensity _____

Compute the average density obtained for each concentration and use your data to find the linear function that predicts concentration (Y) from average density (X). (You may wish to review the “Least Squares Line” activity if you don’t remember how to perform linear regression on your TI-83. Alternatively, you may use Excel’s regression tool.)

- Write the equation of your line here: _____
- If a solution has a density of 1.091 g/mL, what concentration does your linear function predict? Show your work on back:

- If a solution has a concentration of 18% NaCl, what is its density? Again, use your linear function to answer and show your work on back:
