Measuring Salinity

Methods to Measure Salinity

- Taste
- Density
- Resistivity/Conductivity

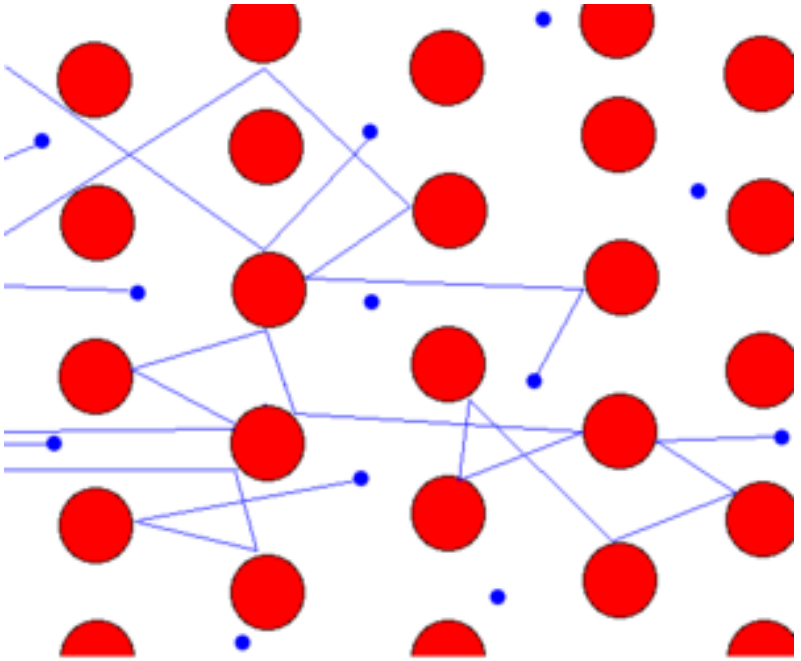
Conductivity

- Drude Model (1900)

$$\mathbf{J} = \left(\frac{nq^2\tau}{m}\right)\mathbf{E}.$$

$$J = \sigma E$$

$$\sigma = \frac{nq^2\tau}{m}$$



http://en.wikipedia.org/wiki/Drude_model

J=current Density
E=electric Field
n=electron density
q=electron charge
m=electron mass
σ=conductivity
τ=average time between collisions

Resistivity and Conductivity

- Resistivity is just the inverse of Conductivity

$$\rho = \frac{1}{\sigma}$$ Ohms/meter

- Resistance (from Ohm's Law V=IR), is proportional to resistivity and distance

The Experiment Procedure

- Use the multimeter to measure the resistance of deionized water.
- Use the conductivity meter to measure the conductivity of deionized water.
- Add known amounts salt and measure the conductivity after each time you add salt.

Post Experiment

- Make a graph of conductivity vs concentration of salt and explain the features of the graph considering the Drude model.
- Make an educated guess as to why the multimeter did not give a constant value for resistance.
- If you are given the conductivity of a water sample, can you accurately calculate the salinity? Why or why not?