

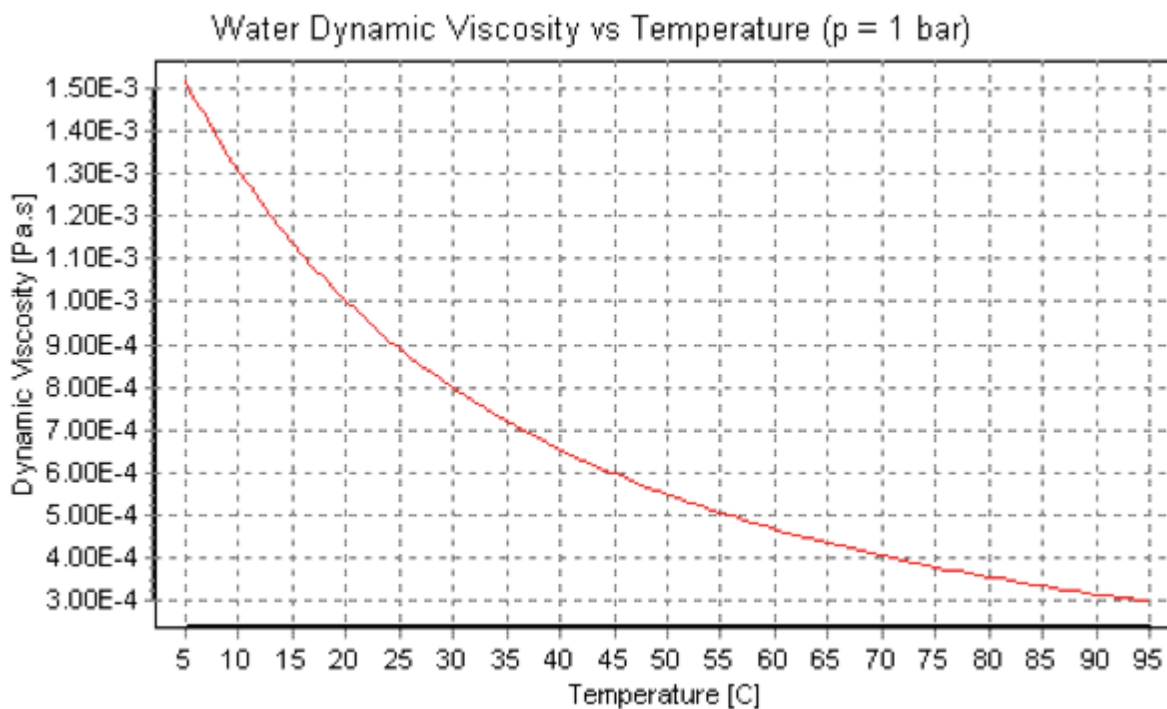
Lab 4 Brownian Motion Tasks

Report (including Intro and Data & Analysis sections) due Wednesday, October 14th at 6pm
Read Ch. 2, sections 2.1-5 in your Lyons text (pp 44-54)

Equipment note: Please treat the microscope with utmost care. For this experiment there is no need to go above the 20X lens and we ask that you don't to protect the higher magnification lenses. Remember to turn the microscope off when you have completed your measurements.

By taking 30 displacement measurements over 60 second intervals, determine the diffusion constant D of $d = 903 \text{ nm} \pm 12 \text{ nm}$ diameter polystyrene spheres in water using the formula $D = \frac{(\Delta x)^2}{2t}$, where Δx is the distance traveled by a sphere in one dimension in time t . Use your diffusion constant, Einstein's formula for Brownian motion diffusion of spherical particles $D = \frac{kT}{3\pi\eta d}$, and the graph below of water's viscosity η vs. temperature to determine Boltzmann's constant.

Separate from your lab report; send me a spreadsheet of your distance measurements so that I can compile the class's results.



Used pipettes and cover slips can be discarded.

After completing your measurements, clean off your depression slide with alcohol over the sink. Remove excess alcohol with a Kim wipe and replace the depression slide in the blue box to dry.