Abstract Submitted
for the NES16 Meeting of
The American Physical Society

Studies of pH in Attoliter-Volume Droplets of Water[1] TREVOR DEMILLE[2], KIERAN RAMOS[3], LORI GOLDNER[4], RYAN PAJELA[5], SAMSON VELPULA[6], University of Massachusetts Amherst — The applications of attoliter-volume droplets suspended in perfluorinated liquids are numerous, for instance, in microfluidics, single molecule biophysics, and the pharmaceutical industry. As we examine droplets of smaller volumes, the effect of the water/perfluorinate interface on droplet pH becomes more pronounced. We studied the attoliter environment using the pH-sensing fluorescent dye fluorescein. Droplet preparation was done by ultrasonication or extrusion with buffer and perfluorinated oil (FC40 or FC77). The emulsions were stabilized with a non-ionic surfactant. By varying the buffer strength, ionic strength and pH of the aqueous phase, the pH of the resulting confined phase, measured in a fluorimeter, was compared to the pH of the original stock buffer. Preliminary data would suggest that the concentration of non-ionic surfactant in the emulsion affects the measured pH of the droplets. For droplets made by ultrasonication with low surfactant concentration, droplet pH is significantly lower than that of the stock buffer.

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Date submitted: 11 Mar 2016 Electronic form version 1.4