

Non Contact Determination of Surface Tension by Means of Focused Acoustics

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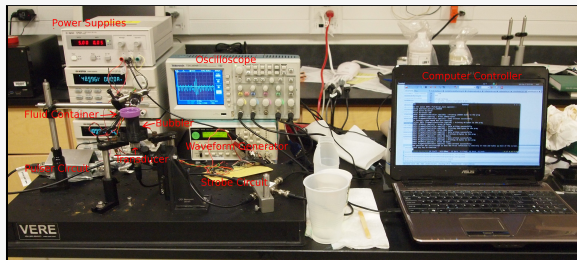
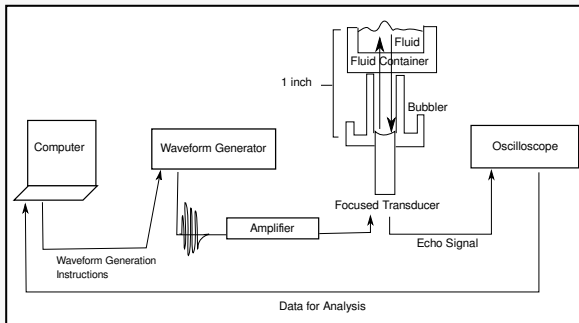
A focused acoustic transducer is used to form a small mound on the surface of a water glycol solution held in an HDPE milk bottle cap. The transducer is then used to ultrasonically measure the height of the mound at successive intervals as the mound relaxes. The relaxation curve can be used to determine the surface tension of the solution. Various concentrations of water and glycol are analyzed, and the results compared with surface tensions for known concentrations.

Surface Tension

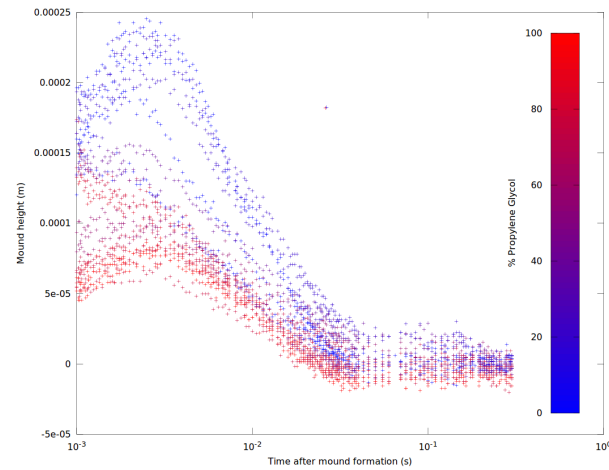
$$\sigma = 0.0538 \frac{\lambda^3 F^3 \rho}{t_p^2}$$

t_p^2 - Time to reach maximum height
 λ - Wavelength of sound in medium
 F - F number of acoustic lens
 ρ - Density of fluid

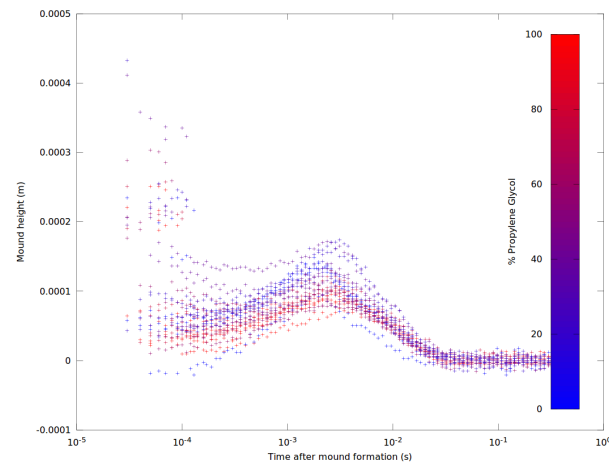
Apparatus



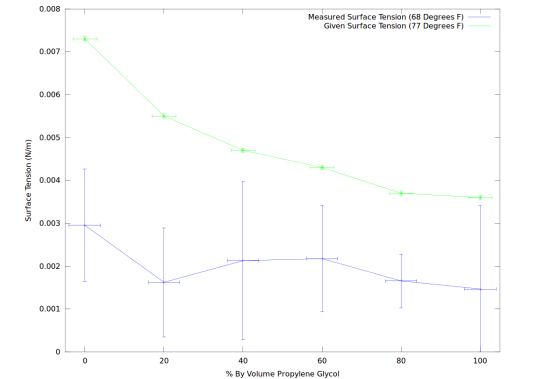
Mound Decay Curve



Mound Decay Curve



Results



*Rigorous uncertainty analysis incomplete

Future Work

- Determine viscosity from maximum mound height
- Tighten Engineering on apparatus to get more consistent results
- Evaluate substances with other surface tensions and viscosities

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References

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