

# Removal of Surface-Active Contaminants from a Liquid-Liquid Interface

Dylan McCapes

Engineering Major

Santa Barbara City College

Mentor: John Frostad

Faculty Advisor: Professor Gary Leal

Department: Chemical Engineering

Funding Agency: IMMS

(Institute for Multi-scale Materials Studies)



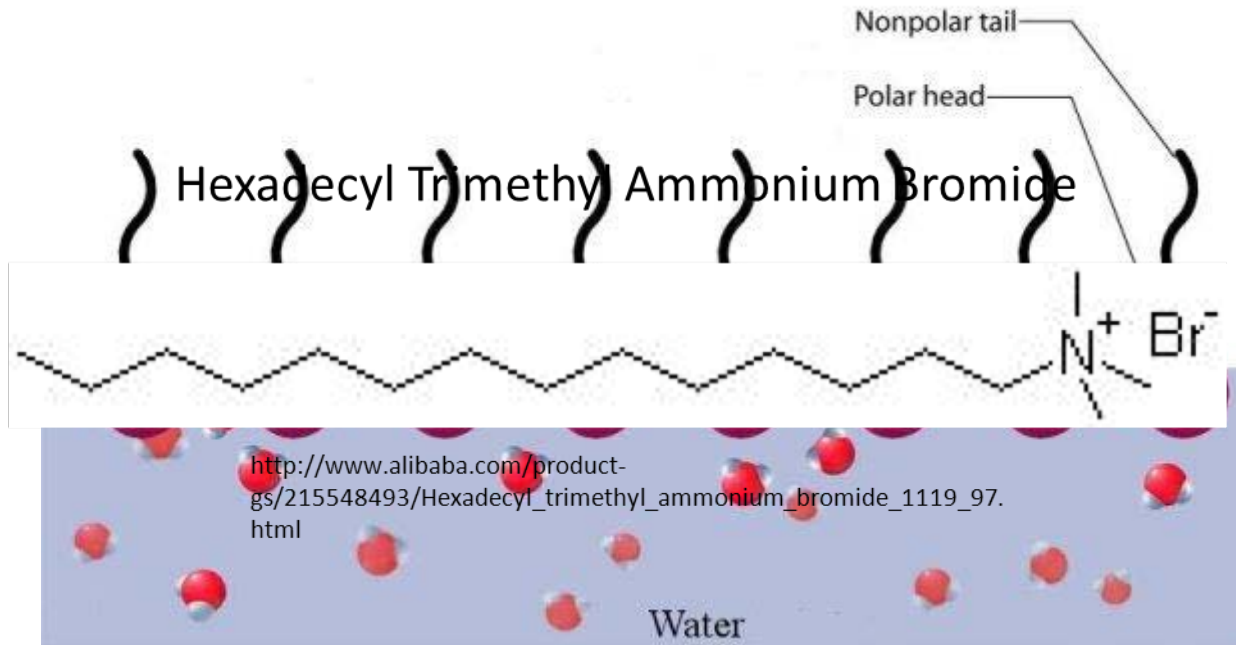
# Outline

- Purpose of study
- Experiments
- Design for apparatus

# What are Surfactants?



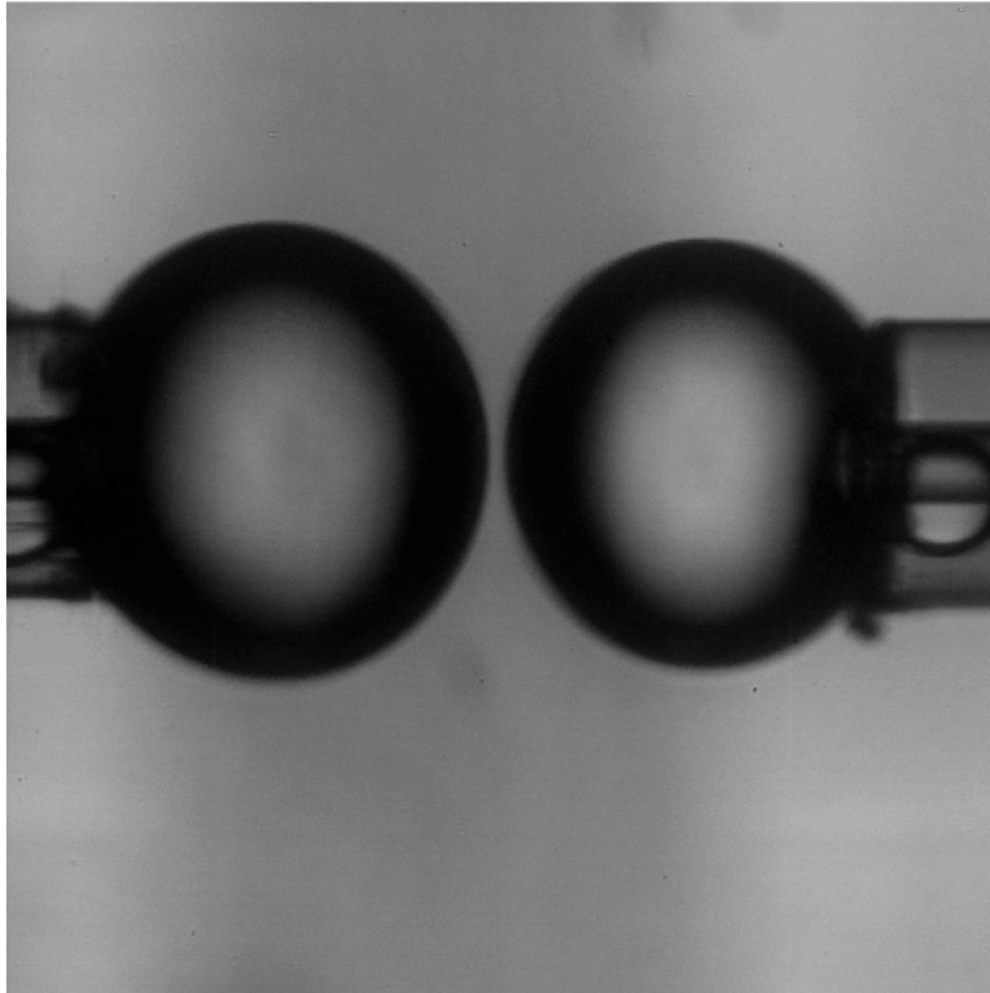
<http://www.perfumezilla.com/maja/maja-soap/>



[http://www.alibaba.com/product-gs/215548493/Hexadecyl\\_trimethyl\\_ammonium\\_bromide\\_1119\\_97.html](http://www.alibaba.com/product-gs/215548493/Hexadecyl_trimethyl_ammonium_bromide_1119_97.html)

[http://en.wikipedia.org/wiki/Langmuir%E2%80%93Blodgett\\_film](http://en.wikipedia.org/wiki/Langmuir%E2%80%93Blodgett_film)

# What is Coalescence?



Significantly slower than real time

# Stability of Foams and Emulsions



<http://irwan.net/tempurpedic-mattress/>



[http://www.nasa.gov/externalflash/135\\_splash/index.html](http://www.nasa.gov/externalflash/135_splash/index.html)

# Gathering data using a tensiometer

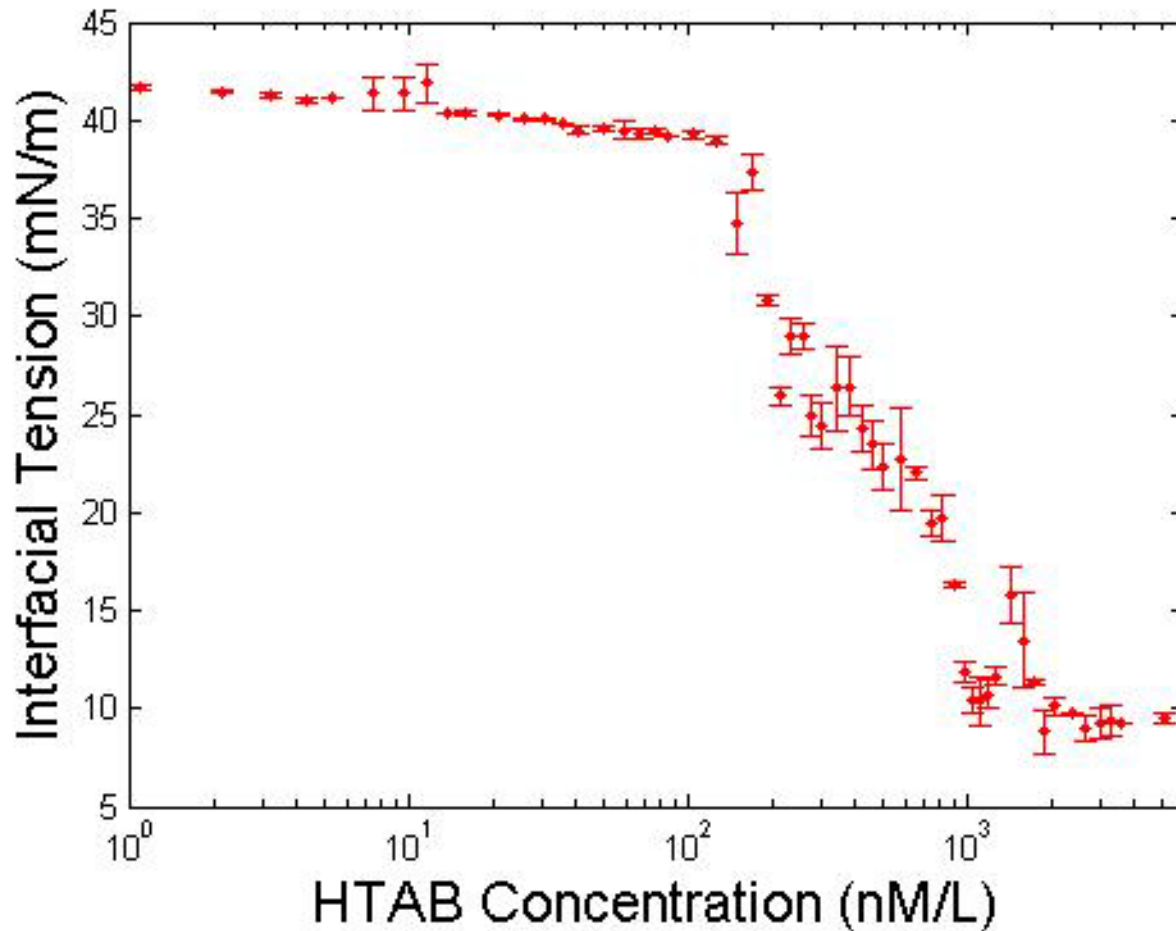


Fisher Tensiometer



film during measurement  
Du-nouy Ring

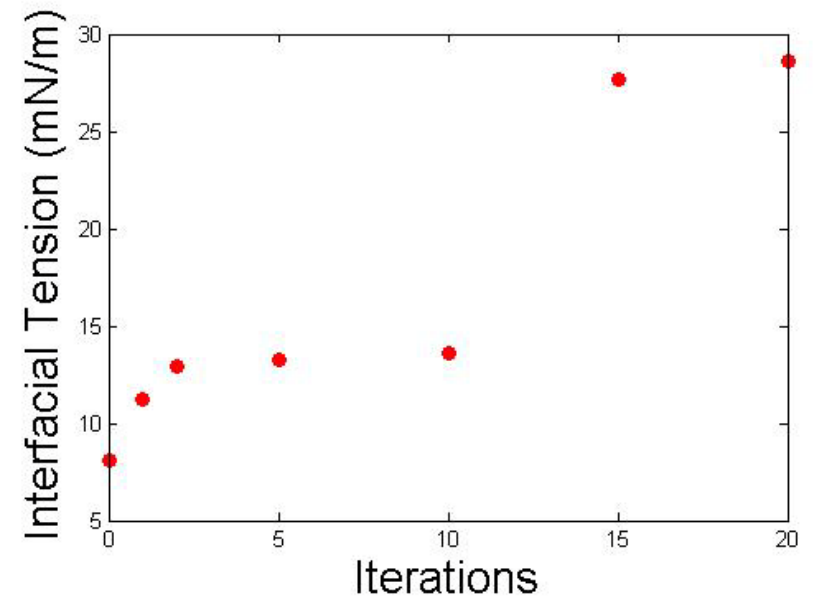
# Isotherm for HTAB in Polydimethylsiloxane/Water System



# Flat Interface Removal Experiment



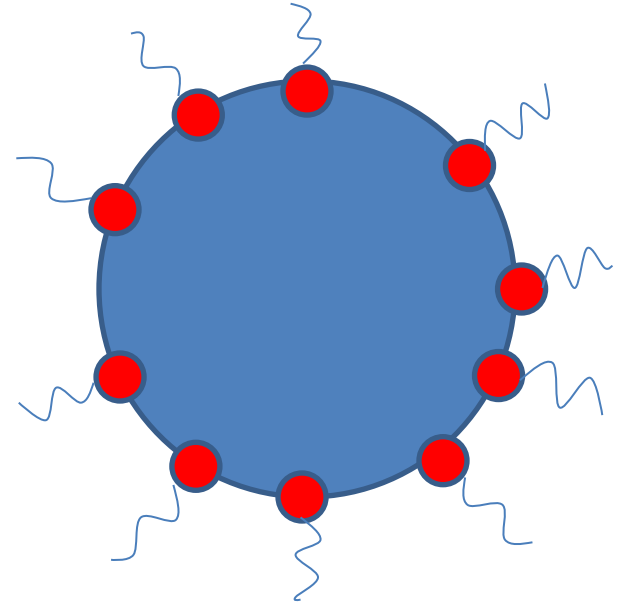
Removing interface using a syringe





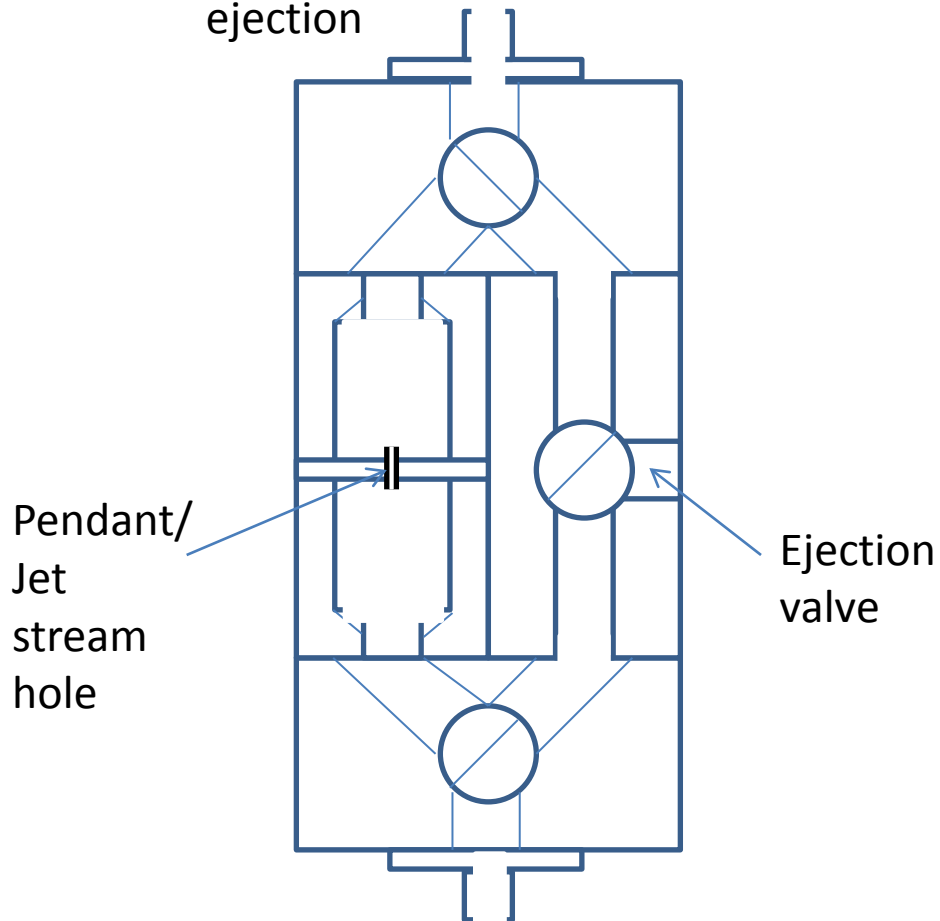
# Surfactant Removal System

- Create a device to remove interface
  1. Maximize surface area to volume ratio
  2. Control drop size
  3. Measure interfacial tension within device



# Apparatus Design

Valve system for pendant drop/jet stream and ejection



Harvard Apparatus



# Future Goals

- Test prototype apparatus
- Build a patentable apparatus

# Summary

- Surfactant removal is important for coalescence study
- HTAB isotherm is used to determine HTAB concentration from interfacial tension
- Flat interface removal experiment verifies idea behind apparatus
- Valve system with pendant drop/jet stream hole and eject valve

Thank You