

# How It Works: Du Noüy Tensiometer

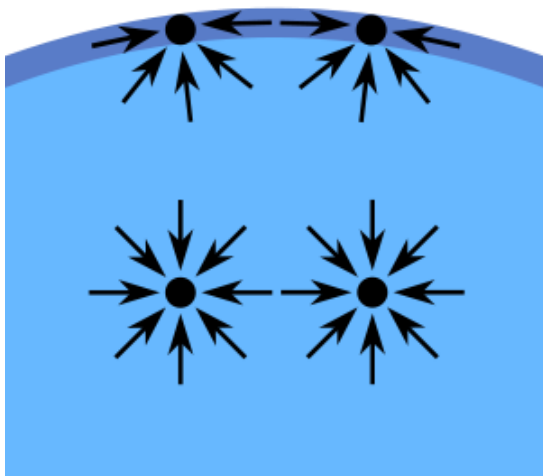
Anthony Lucio

Shaw Research Group

10/31/2013

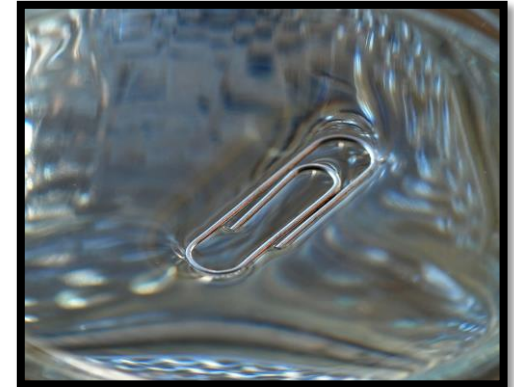
# What is Surface Tension?

- Free energy per unit area or force per unit length
- Surface free energy implies that work is required to bring molecules from the interior of the phase to the surface
- Wants to *minimize* surface area of surface molecules



Net-inward cohesive forces

Symmetric cohesive forces



# Cenco Du Noüy Tensiometer

- The technique was proposed by French Physicist Pierre Lecomte du Noüy in 1925
- **General method:** force required to pull ring through a liquid is related to the surface tension
- Can measure the surface tension at an interface (i.e. oil and water)

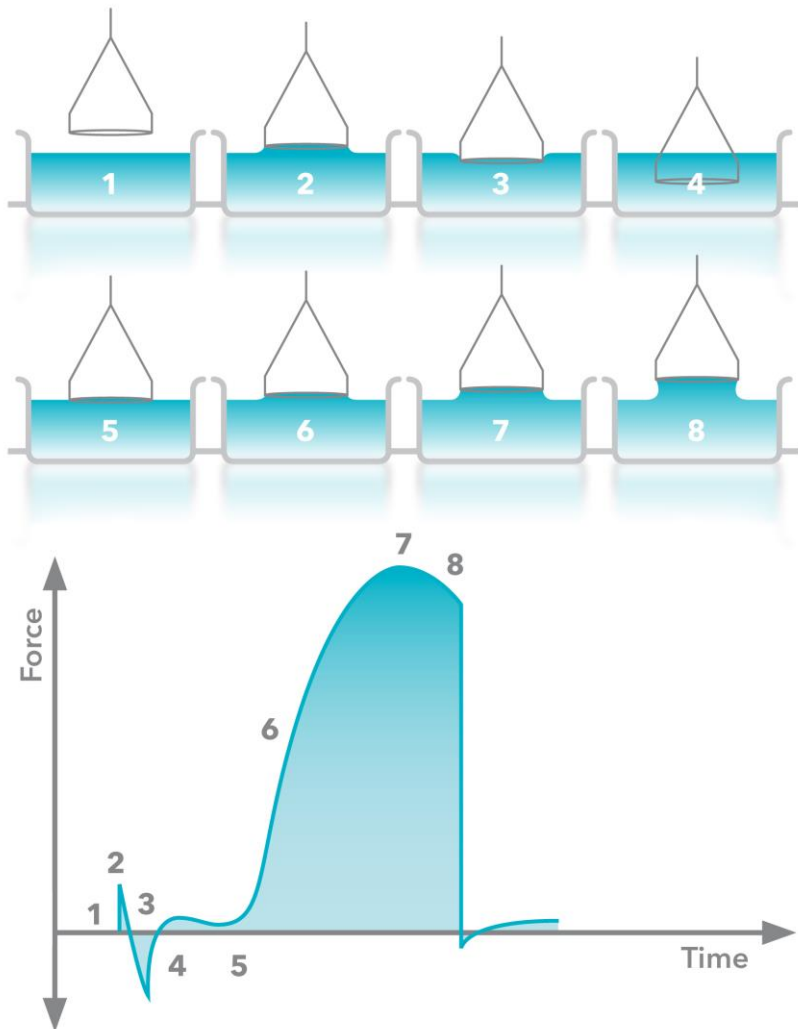


# Du Noüy Ring

- Platinum-Iridium metal ring
  - Teflon or polyethylene as well
- Flame annealed before use
  - Remove surface contaminants
- **The ring needs to be perfect!**
  - round and the bottom flat (i.e. everything flat and symmetric)
  - Even a small blemish or scratch can give inaccurate reading
  - Zero or near-zero contact angle required



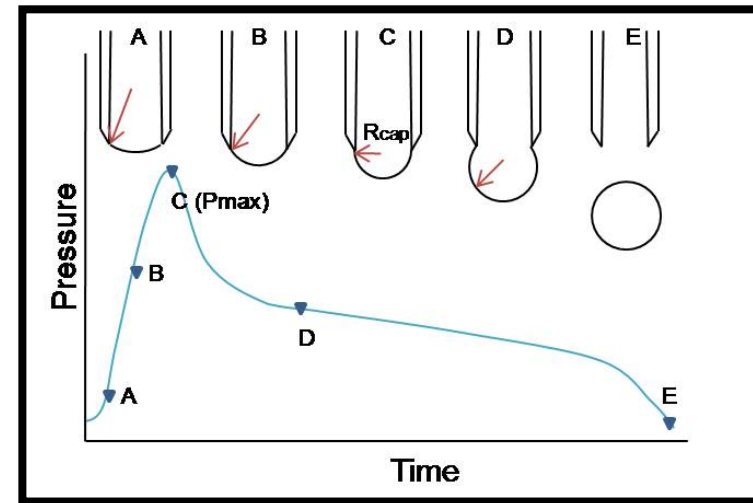
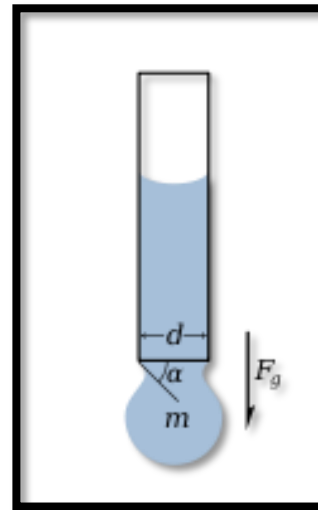
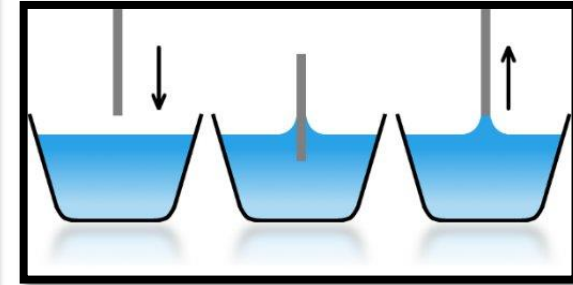
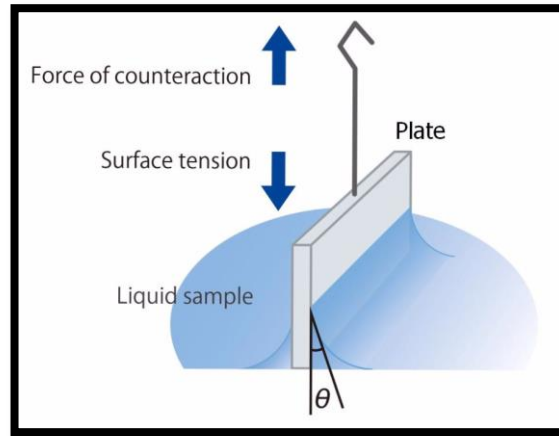
# Pull Through the Liquid!



Units  
N/m  
dyne/cm

# Other Methods of Measurement

- Wilhelmy Plate
- Du Noüy-Padday
- Pendant Drop
- Bubble Pressure



# Neat YouTube Videos

- <http://www.youtube.com/watch?v=Yy6dvChYtJg>
- [http://www.youtube.com/watch?v=A2BZ14g\\_ul4](http://www.youtube.com/watch?v=A2BZ14g_ul4)