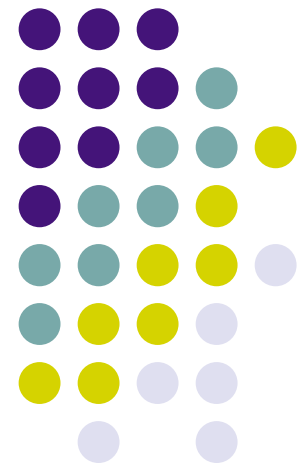
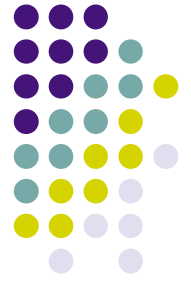


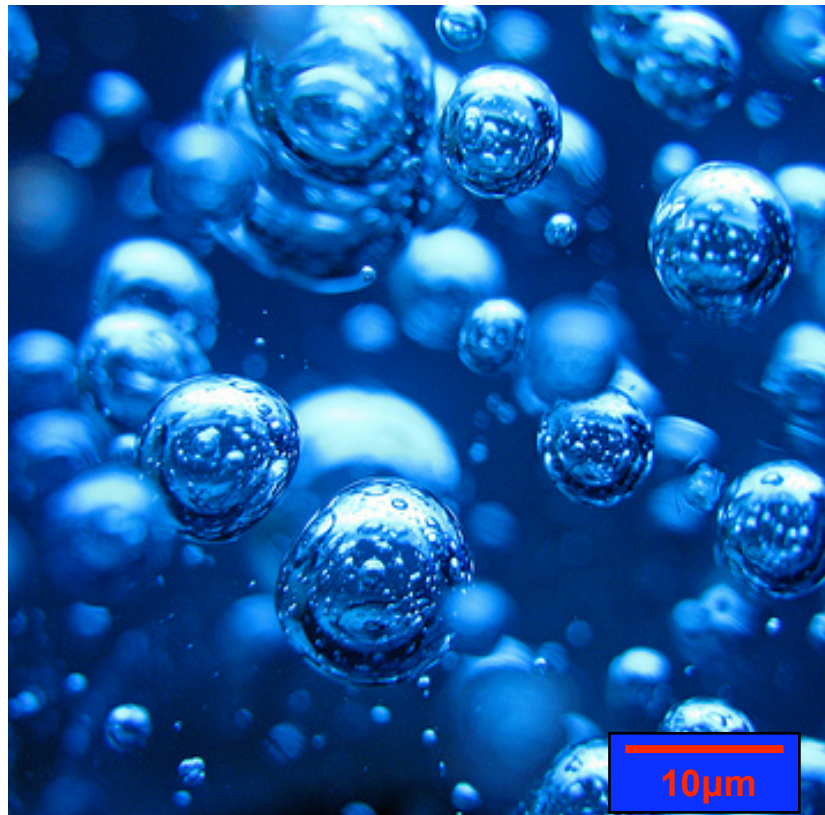
Micro-Bubbles

By: Givi Basishvili
Xavier Marrero





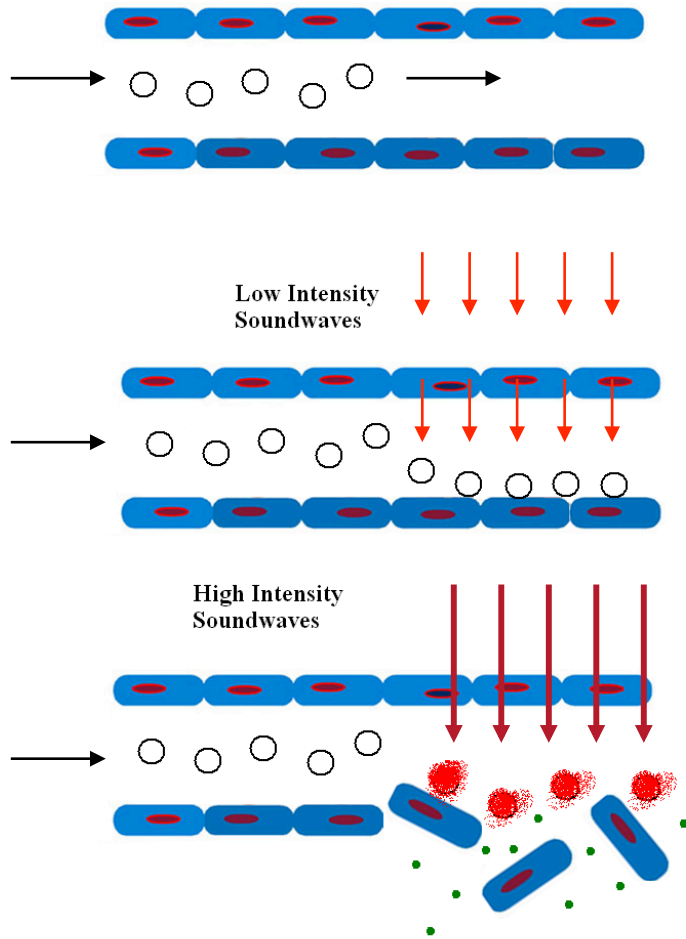
What are Micro-Bubbles?



- Small bubbles ($>10\mu\text{m}$; 0.000001meters)
- Can hold:
 - Oxygen
 - Genetic Info (DNA)
 - Drugs
- Used for Medical Purposes



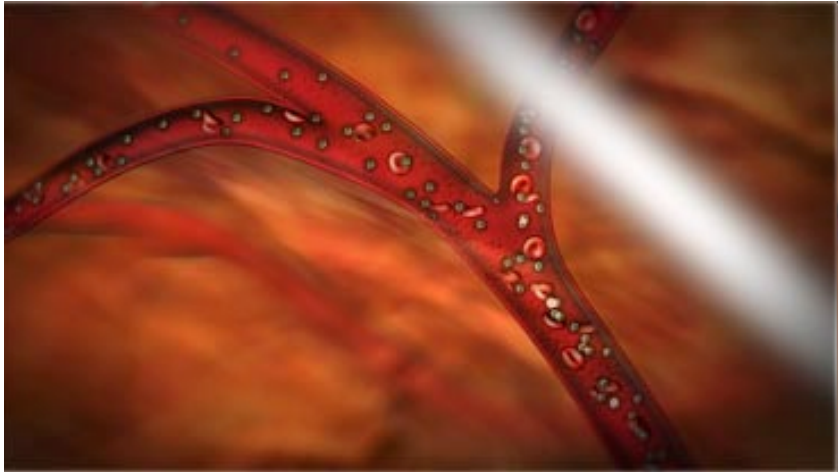
Purpose



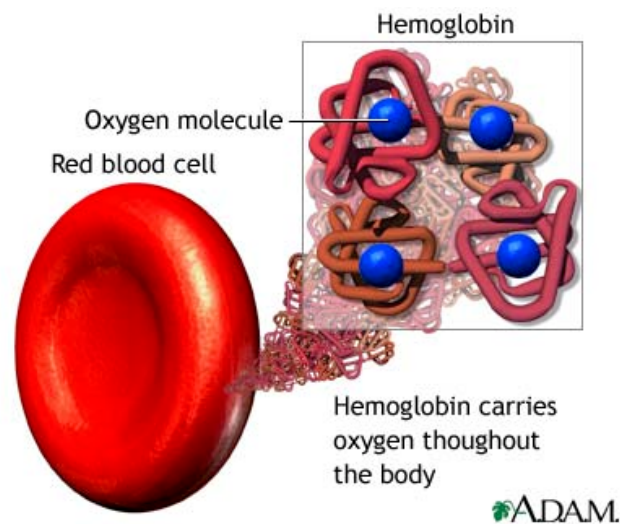
- Deliver Chemicals to specific areas.
- Targeted and popped by Ultrasound.
- Can be used to treat cancer, lung failure and other disorders.



Oxygen Bubbles

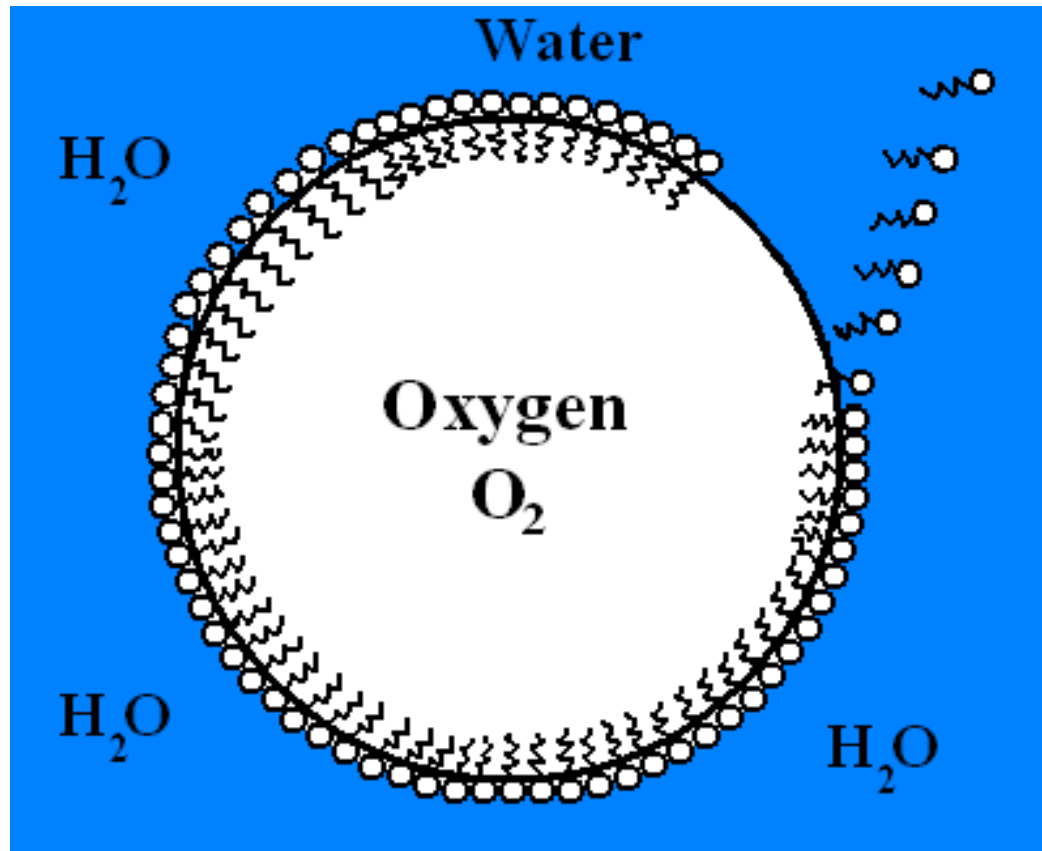


- Will keep patients with lung failure alive!
- Injected directly into blood.
- Oxygen acquired by Red blood cells and Hemoglobin.





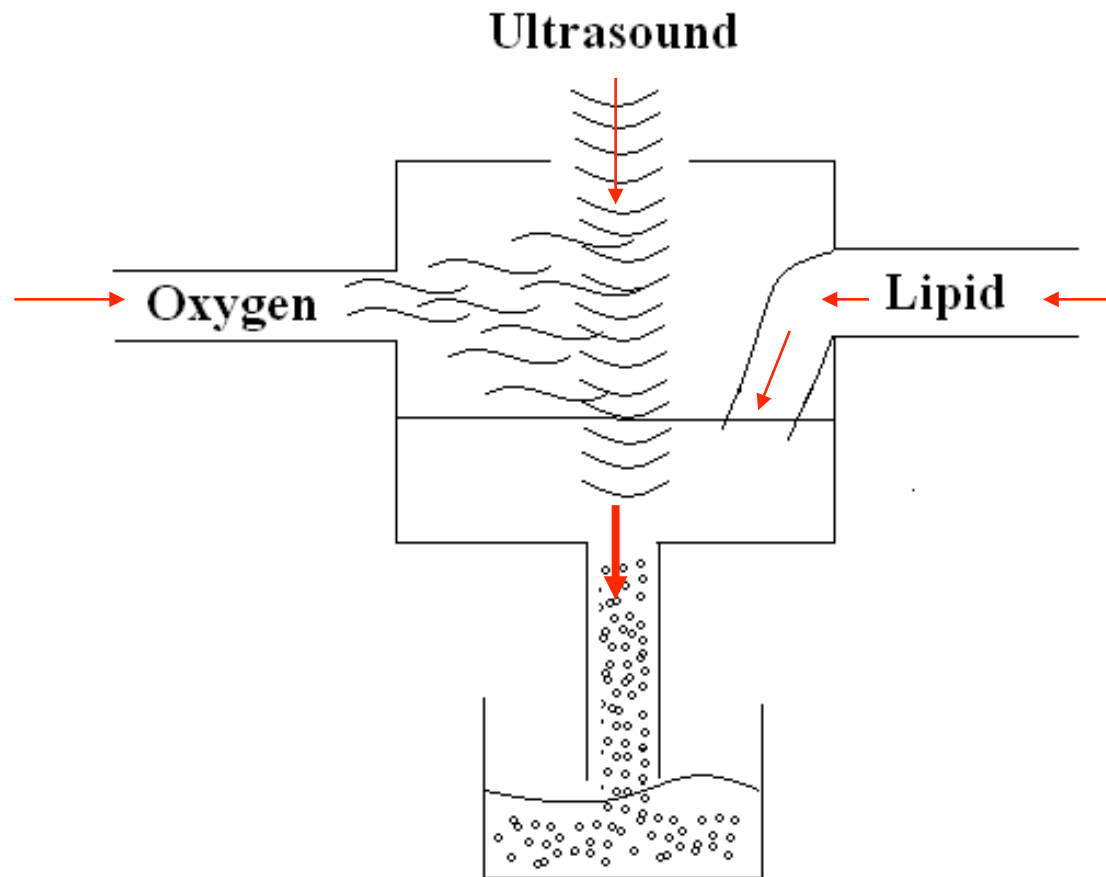
Bubble Chemistry



- Components:
 - Lipid
 - Oxygen
 - Water
- Intermolecular Forces



Engineering Bubbles

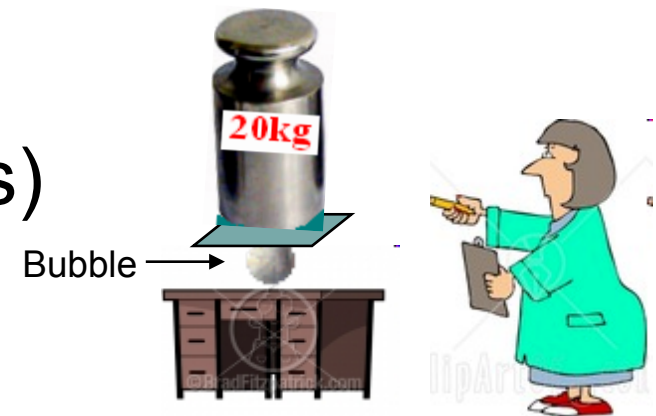


Lipid + Oxygen + Sound Waves = Oxygen Bubbles



Research

- Create stable Bubbles
- Determine best storing conditions.
- Determine bubble properties.
- Test in vivo (living organisms)



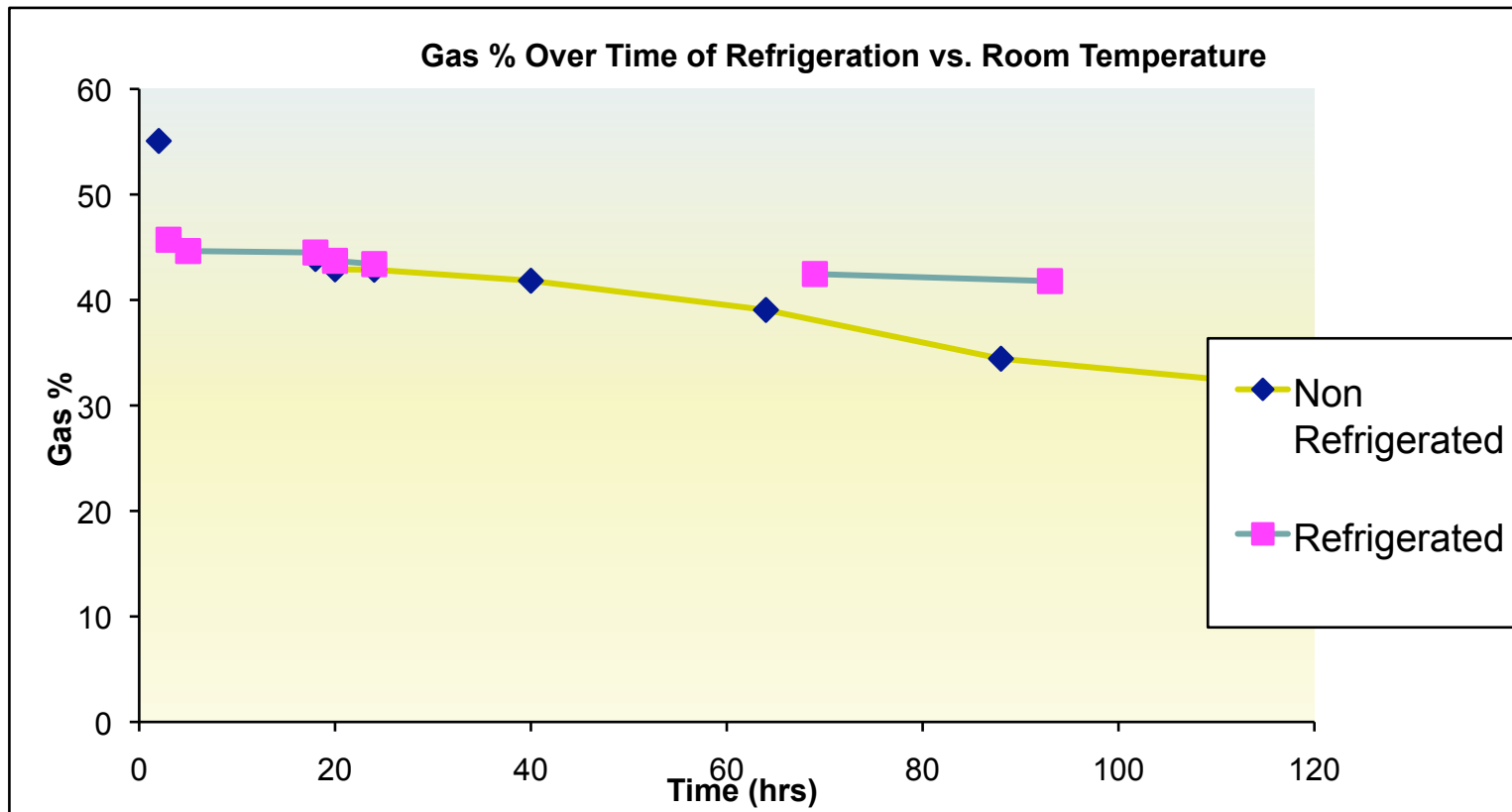
STABILITY TESTS



- Problem: Our micro-bubbles only last for 3-5 days so we want to make it as stable as possible.
- Perform different experiments to test whether leaving the micro-bubbles in refrigeration is more stable than leaving it outside in room temperature.
- First test: Leave the micro-bubbles outside in room temperature.
- Second test: Leave the micro-bubbles in a refrigerator.



STABILITY TEST'S RESULTS



- The gas density decreased in both experiments but greatly in the room temperature micro-bubbles.

CONCLUSION FOR STABILTY TESTS



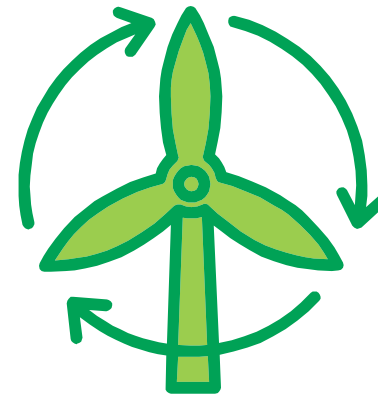
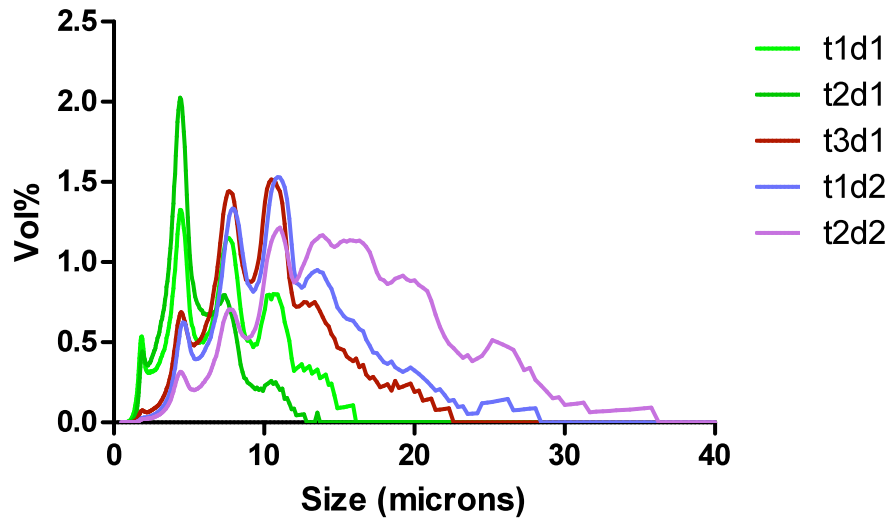
- The micro-bubbles left in the refrigerator were far more stable than the ones left outside in room temperature.



Storage: Rotation

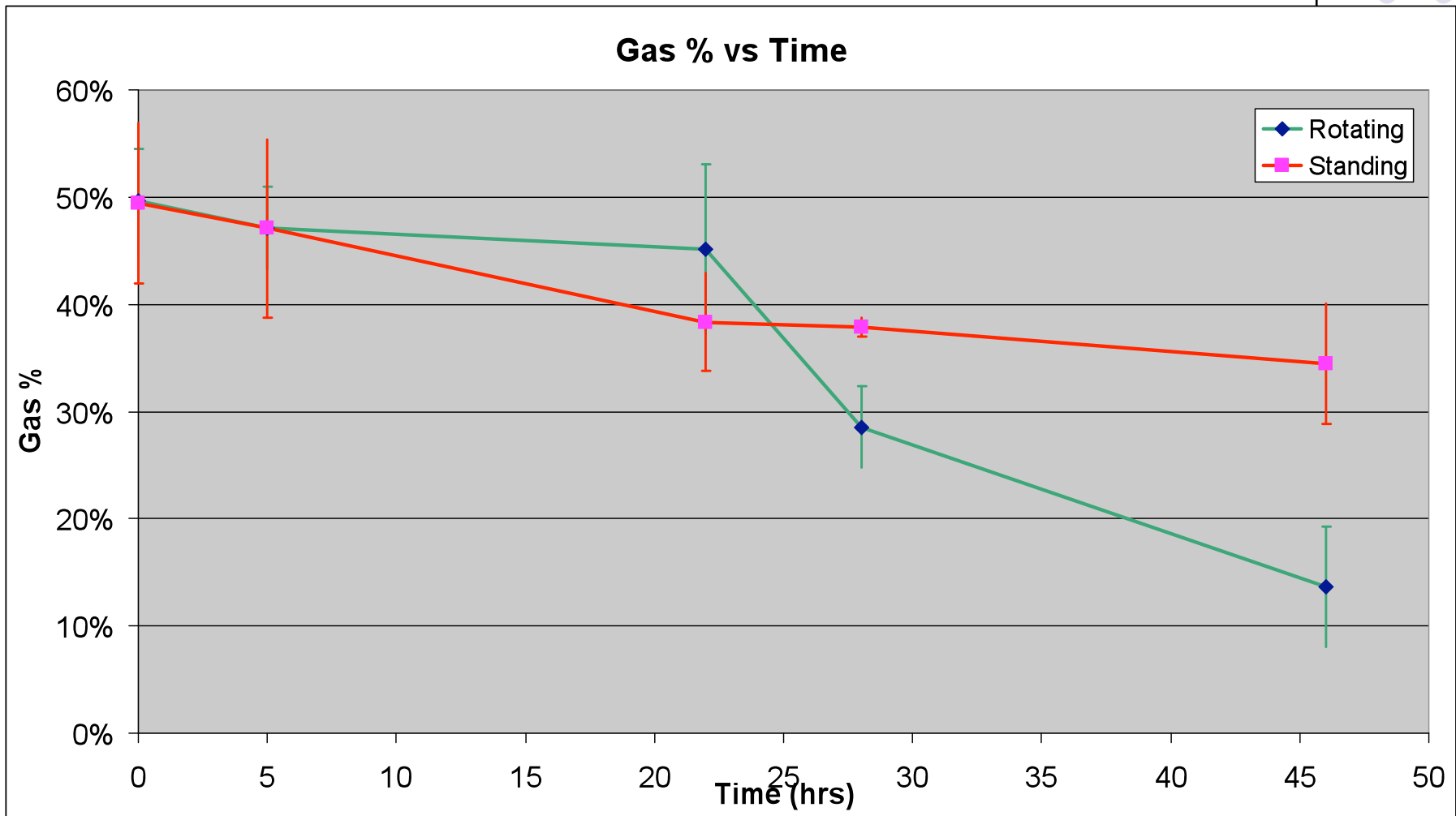
- Hypothesis: Rotation will prevent bubble coalescence.

Bubble Size over Time

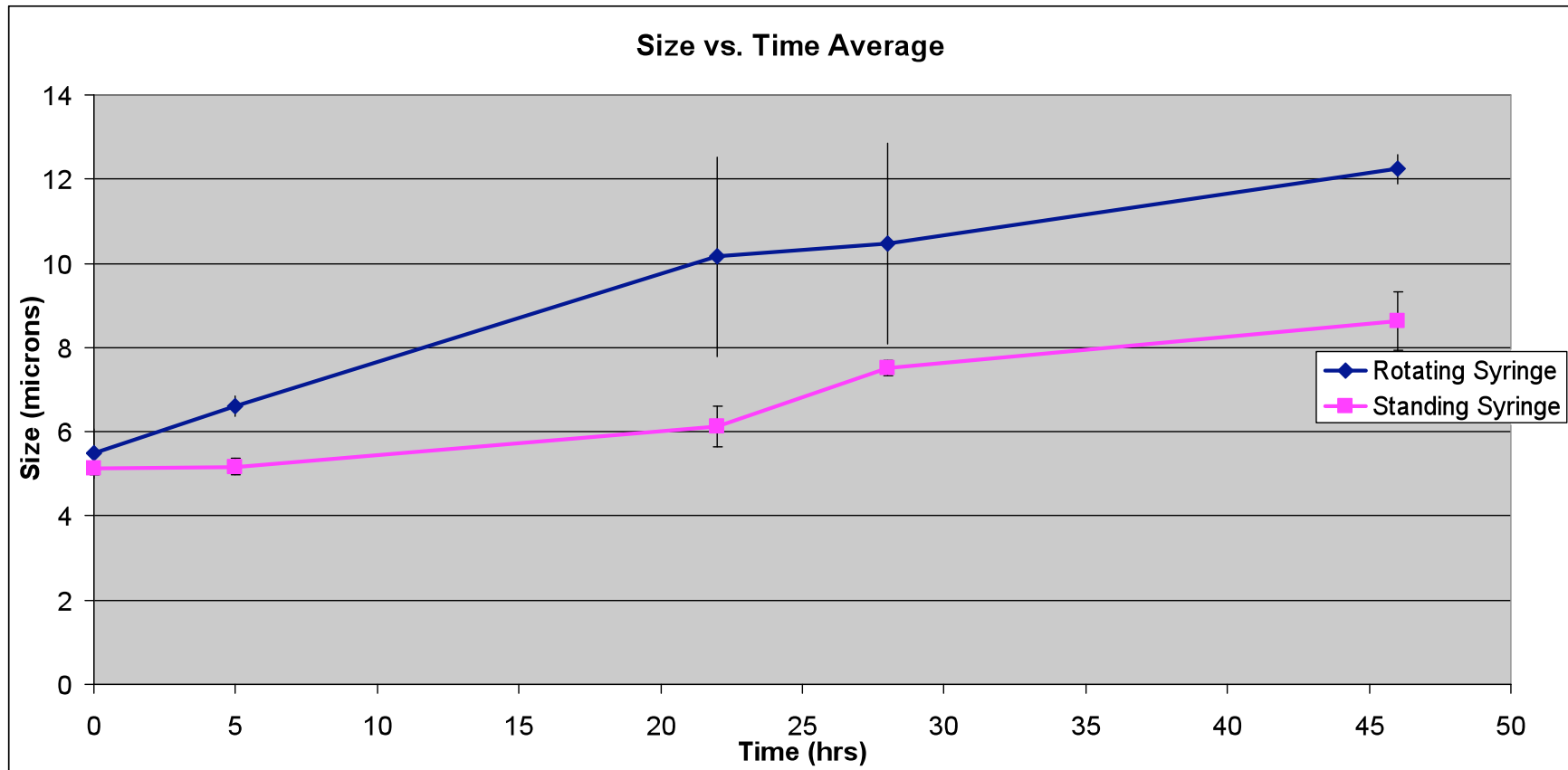


Bubbles growing over time.

Data



Size Growth





Conclusion #2

- Rotation = Higher Kinetic Energy = More Instability
- Collision with the wall also causes damage.

Future Tests

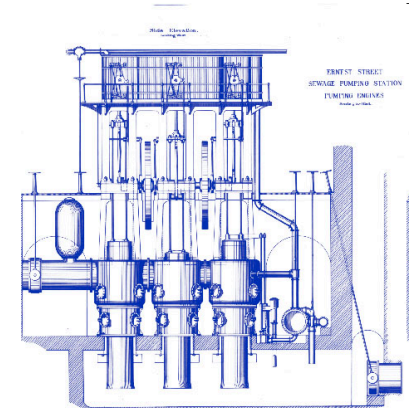


- Testing different lipid formulas.



- Vary engineering used to create bubbles.

- Determine the elasticity of bubbles.





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- <http://www.bradfitzpatrick.com/store/images/products/thumbs/bo002-cartoon-desk-clipart.jpg>
- <http://images.clipartof.com/thumbnails/5081-Female-Scientist-Holding-Pencil--Clipboard-Clipart.jpg>
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Thank You for Listening.

Any questions?