Unit 3- Lesson 3

Chemistry 0

March 2022, L. Tracey Gao

Ageless Apples

- What do you observe happens over time?
- Why do you think this might be?
- Do you have any ideas about what might be causing this and how to slow or stop the process?

Sliced Apples

Experiment after 6 hours

Ageless Apples

- When an apple is cut open and turns brown, that is because of a **chemical reaction**. This process is called enzymatic browning.
- This process requires three things: oxygen, a special enzyme called polyphenol oxidase (PPO) and polyphenols.

How do we keep apples from turning brown?

- PPO is a biological catalyst (enzyme), it makes the browning process faster. PPO works best when the pH is around 6.5. When the pH drops below 2.5, PPO stops working at all. If the PPO in an apple becomes inactive, the oxidation reaction that turns apples brown happens much slower (barely at all!). Adding the lemon juice can lower the pH of the apple and therefore deactivate the PPO enzyme.

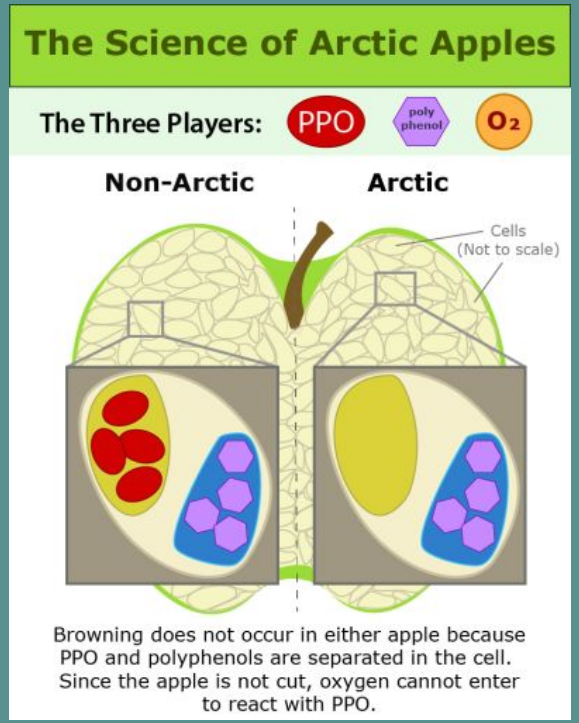
- You can also try soaking apple slices in water. The water will prevent oxygen from reaching the PPO and phenolic compounds.

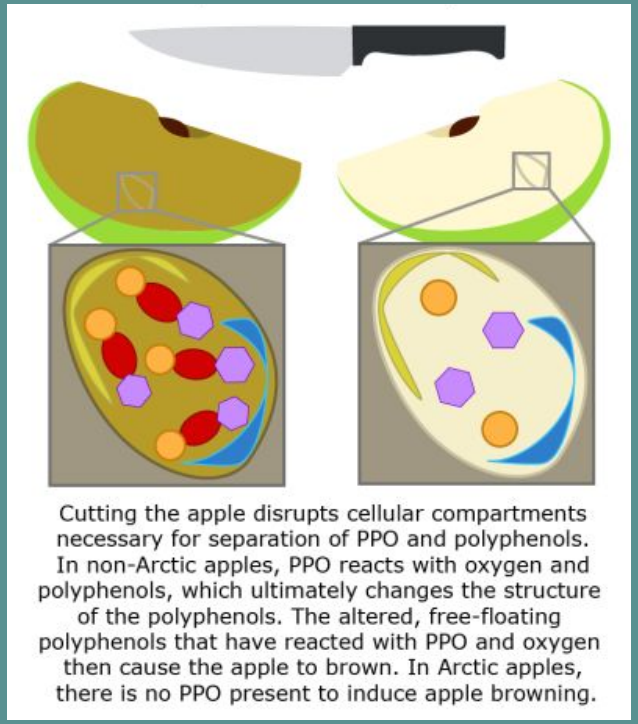
Real life examples

Ascorbic acid added to packaged sliced apples

Traditional Golden Delicious apple (left) versus the Arctic variety (right).

Arctic apples





https://sitn.hms.harvard.edu/flash/2018/arctic-apples-fresh-new-take-genetic-engineering/

Laboratory Equipment- Basic Equipment

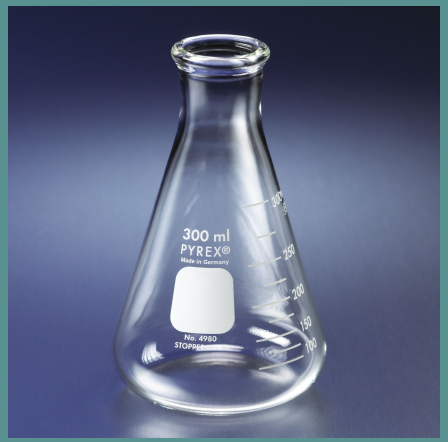
- **Beaker:** A wide, open container with a flat bottom made of glass or plastic. It is a simple container used to mix, heat, or hold substances.

https://www.amazon.com/Glass-Measuring-Beaker-100ml-Graduated/dp/B01J57WFF6

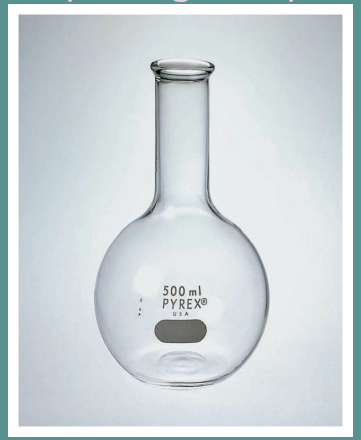
Laboratory Equipment- Basic Equipment

- **Flask:** A glass container with a thin “neck” that widens to a rounded base. Flasks can be used to measure, heat, or store liquids.

Erlenmeyer flask



Florence flask (boiling flask)



Volumetric flask

https://www.fishersci.com

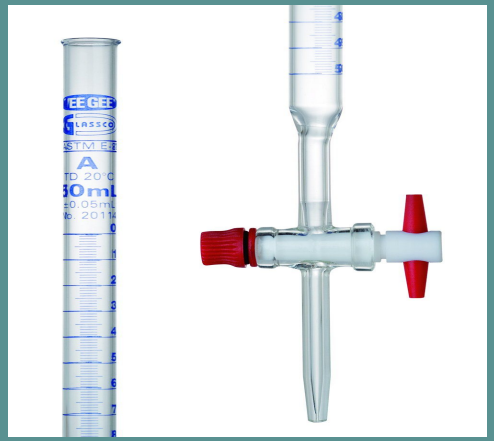
Laboratory Equipment- Basic Equipment

- **Test tube:** A small cylindrical glass tube that has a rounded, u-shaped bottom. It is used to hold or heat small amounts of a substance during laboratory experiments.

https://www.corning.com

Measuring Liquid Volumes

- **Buret:** A long glass cylinder used to accurately measure and dispense a specific volume of liquid. It is often used for titrations, where scientists place an Erlenmeyer flask directly below the tip of the buret and then control the amount of liquid released from the buret.



https://www.amazon.com

Measuring Liquid Volumes

- **Graduated cylinder:** A tall, cylindrical container used to measure the volume of a liquid. They are made in many different sizes, ranging from 10 mL to 2,000 mL.

https://www.thermofisher.com

Measuring Mass

- Mass is measured using devices known as **balances**, which measure mass by comparing an object of unknown mass to an object of known mass.

Triple-beam balance

https://www.drinstruments.com/school-triple-beam-balance.html

Analytical balance

https://v-medtech.com/

Measuring Temperature

- **Thermometer**: A device used to measure temperature.

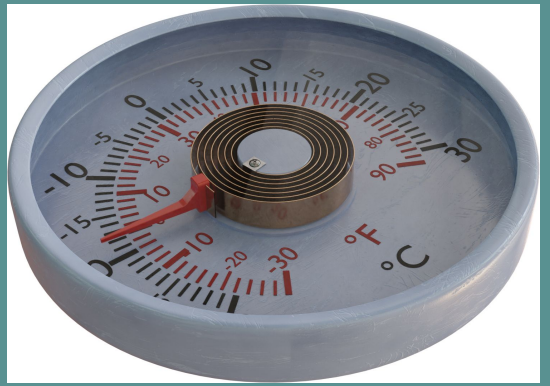
Traditional bulb thermometer

https://highschoolenergy.acs.org/

Digital thermometer

https://www.thomassci.com/

Bimetallic strip thermometer

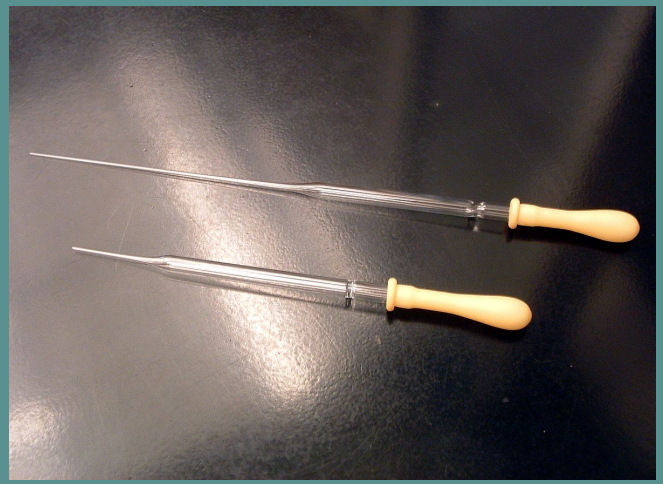


https://www.tec-science.com/

Transferring Liquids

- **Pipette:** A device used to measure and move a liquid from one container to another.

Pasteur pipette



https://en.wiktionary.org/wiki/Pasteur_pipette

Volumetric pipette

https://www.fishersci.com/

Heating Materials

- **Bunsen burner:** A gas burner that produces a single, steady flame for laboratory experiments.The flame burns at the top of a vertical metal tube connected to a natural gas source.

https://www.chemistryworld.com/