Explore: The Onion Cry Lab (45-60mins)

Objective: Investigate the chemical reaction that releases syn-Propanethial-S-oxide when an onion is cut and determine if more chemical reactions occur as onion is manipulated in different ways (steeped, cooked, and fried).

Materials:

- Raw onions
- Goggles
- Sharp knives
- Cutting boards
- pH strips
- Glass slides or mirror
- Stopwatch
- Small sealed containers

Instructions (Read instructions carefully BEFORE beginning ANY work):

1. Open the container of pre-sliced onions at your table and over a glass slide/mirror nearby to see if fogging occurs. Record your observations in the student worksheet.

2. Waft air toward nose to smell. In your student worksheet, take note of immediate reactions (make sure to include any eye reactions like eye irritation or tears).

3. Collect airborne compounds by exposing a pH strip near the cut site for 1 minute. Record any observable pH change in your student worksheet.

4. Soak the onions in a small dish of cold water (from the refrigerator), Record your observations in your student worksheet.

🧪 Observational Data to Be Collected:

Lab Instructions

Read each step carefully and record your observations in the spaces provided. Be sure to use all safety precautions and do not directly inhale or touch the onion with your bare hands.

1: Fogging Observation

1. Did fogging occur on the glass slide or mirror?

☐ Yes ☐ No

Time tracking:

Initial fog appearance:_____ when fog started disappearing: _____

Describe the appearance of the fog (talk about the amount of fog, its location, track the amount of time it took to see fog):

2: Smell & Eye Reaction

2. Describe the smell of the pre-sliced onion:

3. Did you experience any eye or throat irritation?

☐ No irritation ☐ Mild irritation ☐ Moderate irritation ☐ Strong irritation

Additional notes:

3: pH Strip Testing

4. Initial pH strip color: _____

5. Color after 1-minute exposure to onion fumes: _____

6. Estimated pH value (use chart): _____ Describe any visible change or residue:

4: Cold Water Soak

7. Describe any change in smell after soaking the onion in cold water:

8. Did the eye irritation increase, decrease, or stay the same after soaking?
☐ Increased ☐ Decreased ☐ Stayed the same

9. Describe any visible change in the onion or water (color, cloudiness, texture):

10. Can you label this change as physical or chemical?

🔬 Stations Lab: Observing Onion Transformations

🧪 Station A: Boiled Onion

Observation Category	**Your Observations**
Initial Appearance (Raw)	
Smell During Boiling	
Texture After Boiling	
Water Color After Boiling	
pH Test (Indicator Color)	
Estimated pH Value	

🍳 Station B: Caramelized Onion

Observation Category	**Your Observations**
Initial Appearance (Raw)	
Smell During Boiling	
Color Change	
Texture After Boiling	
Notable Reactions Observed	
Estimated pH Value	

🧠 Reflection Questions

1. **What evidence suggests a chemical change took place?**
   (Refer to color change, new smells, texture shifts, etc.)

2. **How do the outcomes compare between boiling and caramelizing?**
   (Think about appearance, smell, texture, and chemistry.)

3. Onions contain natural sugars and amino acids. When cooked slowly, these interact in the Maillard reaction. **Do you see any signs of this reaction? How do you know?**

Final Reflection

Which manipulation (cutting, boiling, caramelizing) caused a chemical change? How do you know?