

Food Explorations Part II: Hidden Antioxidants

STUDENT LAB INVESTIGATIONS

Name: _____

Lab Overview

In this investigation, you will prepare four solutions and test them with an indicator to determine their antioxidant properties.

Lab Objectives

In this lab, you will learn how to...

1. Identify substances with antioxidant properties.
2. Describe health benefits of antioxidants.

Lab Safety: Before beginning ANY investigation you should put on your safety goggles and apron. It is important to avoid getting chemicals on your body. Always wash your hands following completion of an investigation. When handling food, you should also wash your hands prior to beginning an investigation.

Lab Questions

Which of the following substances are antioxidants? (Circle your answer)

Vitamin C

Cream of Tartar

Lemon Juice

Vinegar

Predictions: I predict the following substances are antioxidants.

_____ and _____ because...

Observations of Antioxidants

MATERIALS

| | |
|---|---|
| 1 acidic substance | 1 plastic spoon |
| 1 beaker or measuring cup containing water (350mL or 1 cup) | 1 medicine cup or small cup containing colored iodine |
| 1 – 9 oz plastic cup | ½ teaspoon |
| 1 black permanent marker | Safety goggles |
| 1 medicine dropper | Aprons (optional) |

PROCEDURE

1. Choose one of the acidic substances identified in your prediction above. Use the marker to label the plastic cup with the name of your chosen acid sample (e.g. vitamin C).

2. Prepare your substance using the directions provided below:

Substance Preparation Procedures

- Vitamin C Tablet: Obtain 1 vitamin C tablet. Fill the cup ½ full of water. Crush the tablet and dissolve it in the water.
- Cream of Tartar: Obtain ½ tsp. of cream of tartar in a 9 oz cup. Fill the cup ½ full of water. Stir the mixture until the cream of tartar has completely dissolved.
- Lemon Juice: Fill one 9 oz cup ½ full of lemon juice.
- Vinegar: Fill one 9 oz cup ½ full of vinegar.

3. Describe your *visual* observations of your chosen acid sample before reacting with iodine in Table A.

4. To test for antioxidant properties of each acid substance, use the medicine dropper to add 12-15 drops (do not exceed) of iodine to each sample. Describe your *visual* observations of your chosen acid sample's reaction with iodine in Table A. A solution *with* antioxidant properties will not change color. A solution *without* antioxidant properties will have a brown tint.

5. Share your data with the other groups in your class to complete Table A.

Table A: Substance Observations

| Substance | BEFORE Reacting with Iodine | AFTER Reacting with Iodine | Antioxidant Properties? |
|---------------------------|-----------------------------|----------------------------|-------------------------|
| Vitamin C Tablet Solution | | | YES NO |
| Cream of Tartar Solution | | | YES NO |
| Lemon Juice | | | YES NO |
| Vinegar | | | YES NO |

Conclusion:

1. Compare and contrast the four acid samples and their chemical reactions.

2. Which acid substances had antioxidant properties? Compare your results to your predictions and explain any similarities and differences.

3. Explain why the orange in **Part I: Enzymatic Reactions** investigation did not turn brown?
4. All the substances tested in this investigation were acids. Infer why they are not all antioxidants.
5. Lemon juice (pH 2) is more acidic than vinegar (pH 3). Vitamin C has a slightly lower pH than vinegar. Some fruit salad recipes have yogurt as an ingredient. Yogurt contains lactic acid (pH 2.4). Will the yogurt act as an antioxidant? Explain.
6. As a class, discuss antioxidant properties and the potential benefits to your health.