Decomposing Hydrogen Peroxide with Yeast

Florida State Standard:
SC.8.P.9.2 - Investigate and describe how energy is transferred and transformed in chemical reactions.

Florida State Benchmark:
SC.8.P.9.2.1 - Identify and describe examples of exothermic and endothermic reactions in everyday life.

A. Teacher: [Your Name]
B. Grade Level: 8th Grade
C. Subject: STEM/Science
D. Date: [Insert Date]
E. Duration: 45 minutes
F. Lesson Focus: Understanding chemical reactions and energy transformation through an exothermic reaction.
G. Materials:

- 3% hydrogen peroxide
- Active dry yeast
- Warm water (~100°F)
- Liquid dish soap
- Measuring spoons
- Small bowl
- Graduated cylinder or measuring cup
- Clear plastic or glass bottle
- Food coloring (optional)
- Tray or shallow container
- Safety goggles

H. Lesson Objectives:

1. Identify and describe the components of a chemical reaction.
2. Demonstrate how yeast acts as a catalyst in the decomposition of hydrogen peroxide.
3. Analyze energy changes during the reaction and classify it as exothermic.

I. Procedures:

1. Introduction: (5 minutes)

- Begin with a discussion on chemical reactions in daily life, focusing on energy transformations.
- Ask students if they've ever observed reactions like baking or rusting and introduce the concept of catalysts.

2. Experiment: (15 minutes)

- Guide students in setting up the experiment.
- Have them dissolve yeast in warm water and add dish soap to hydrogen peroxide in a bottle.
- Students will pour the yeast mixture into the bottle and observe the reaction.

3. Observation: (10 minutes)

- Students record observations about foam production, heat, and any other notable reaction characteristics.
- Discuss why foam forms and the role of oxygen gas.

4. Generalization: (10 minutes)

- Review the chemical equation: 2H2O2→catalase2H2O+O22 H_2O_2 \xrightarrow{\text{catalase}} 2 H_2O + O_22H2O2catalase2H2O+O2
- Emphasize the concept of exothermic reactions and energy release.

5. Assessment: (5 minutes)

- Quick formative assessment: Ask students to describe the role of yeast and identify the type of reaction.
- Collect observation sheets for review.

Note 1: Safety Precautions
Safety is crucial when working with chemicals like hydrogen peroxide. Ensure all students wear safety goggles throughout the experiment to protect their eyes. Instruct students to handle hydrogen peroxide carefully, avoiding contact with skin and eyes, and to notify the teacher immediately in case of spills. Emphasize the importance of washing hands thoroughly after completing the experiment.

Note 2: Accommodations for ELL, ESE, etc.
To support English Language Learners (ELL) and Exceptional Student Education (ESE) students, provide visual aids such as diagrams of the reaction setup and step-by-step instructions. Use simplified language for key concepts and allow these students to work in pairs or small groups with peers who can offer additional support. Offer verbal instructions alongside written ones and provide sentence frames for observations and conclusions. If necessary, allow extended time for completing tasks and assessments.