Ocean Acidification Simulator Activity: pH Effects on Marine Life

Middle School (NGSS Aligned) Teacher Guide

Overview

This guide supports implementation of the Ocean Acidification Simulator Activity: pH Effects on Marine Life using the 5E instructional model.

Learning Objectives

- Students will observe how CO_2 affects ocean chemistry
- Students will identify patterns in pH changes over time
- Students will explain impacts on marine organisms
- Students will connect human activities to ocean health

Standards Alignment

- **MS-LS2-4:** Construct an argument about ecosystem dynamics
- **MS-ESS3-4:** Construct an argument for how human activities impact Earth's systems
- **MS-PS1-5:** Develop models to describe atomic composition of molecules

Prerequisites

- Basic understanding of pH (acids and bases)
- Knowledge of carbon dioxide
- Familiarity with marine ecosystems

Time Estimate

45 minutes

Materials Needed

- Computer/tablet with internet access
- Student Activity Sheet
- Colored pencils (optional)
- pH scale reference chart

Teaching Tips by Phase

Phase 1: ENGAGE (5-10 minutes)

- Start with the phenomenon or problem presented
- Elicit student predictions and prior knowledge
- Create cognitive dissonance if possible
- Build excitement for investigation

Phase 2: EXPLORE (15-20 minutes)

- Allow students to investigate with minimal guidance
- Circulate and ask probing questions
- Encourage systematic data collection
- Note common discoveries and difficulties

Phase 3: EXPLAIN (10-15 minutes)

- Have students share their findings first
- Build on their observations to introduce concepts
- Address misconceptions directly
- Connect to broader biological principles

Phase 4: ELABORATE (10 minutes)

- Apply knowledge to new scenarios
- Make real-world connections

- Encourage deeper investigation
- Support transfer of learning

Phase 5: EVALUATE (5-10 minutes)

- Use varied assessment strategies
- Focus on conceptual understanding
- Provide immediate feedback
- Plan follow-up based on results

> **Remember:**
>
> The goal is student discovery through guided inquiry. Resist the urge to explain concepts before students have explored them!
