Na-K Pump Activity: Active Transport in Cells

AP Biology/College Level Teacher Guide

Overview

This guide supports implementation of the Na-K Pump Activity: Active Transport in Cells using the 5E instructional model.

Learning Objectives

- Students will model the Na^+/K^+-ATPase transport cycle
- Students will explain how the pump creates ion gradients
- Students will identify the role of ATP in active transport

Standards Alignment

- **ESSENTIAL KNOWLEDGE 2.4.A.1:** Plasma membranes are selectively permeable and allow the cell to maintain homeostasis.
- **ESSENTIAL KNOWLEDGE 2.4.C.1:** Active transport requires metabolic energy.
- **ESSENTIAL KNOWLEDGE 2.5.B.1:** Electrochemical gradients represent potential energy.

Prerequisites

- Understanding of ATP as energy currency
- Knowledge of membrane structure

Time Estimate

20 minutes

Materials Needed

- Computer with internet access
- Student Activity Sheet

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!
