Activity: Endothermic & Exothermic Reactions

Summary
In this activity, students observe industrial-strength snap sticks and chemical cold packs and discuss processes of endothermic and exothermic reactions.

Grade Level
High school

AP Chemistry Curriculum Framework
This demonstration supports the following unit, topic, and learning objective:
- **Unit 6: Thermodynamics**
  - **Topic 6.1**: Endothermic and Exothermic Processes
  - **ENE-2.A**: Explain the relationship between experimental observations and energy changes associated with a chemical or physical transformation.

Objectives
By the end of this activity, students should be able to
- Define endothermic and exothermic processes.
- Classify reactions as either endothermic or exothermic.

Chemistry Topics
This activity supports students’ understanding of
- Endothermic/exothermic

Time
**Teacher Preparation**: 5 minutes
**Lesson**: 15–20 minutes

Materials
For each group:
- Industrial-strength snap sticks
- Chemical cold packs

Safety
- Be careful with the cold packs to make sure that the chemicals do not leak from the packaging.
- Students should wash their hands thoroughly before leaving class if they touched the materials.

Teacher Notes
- Number of each cold pack and snap sticks is dependent on budget. I have used one per class successfully.
- Industrial-strength snap sticks are much brighter than the light sticks the students are used to and they make a huge impression.

The demo
1) Review the law of conservation of energy. Students provide examples they are familiar with.
2) Definition of terms **endothermic process** and **exothermic process**.
3) Compare energy of reactants versus energy of products for several examples.
4) Ask students what forms energy can take.
5) Pass snap stick(s) around, asking students to observe the presence of reactant inside the glass ampule and surrounding the ampule. Have student(s) snap the stick, mix, and observe. Turn lights off if possible. Ask students what type of reaction occurred and the form of the energy released.

6) Pass cold pack(s) around, asking students how they would describe the temperature of the pouch. Have the students feel the pouch and describe the contents without getting too physical with the pouch. Have the students activate the cold packs and describe the change in temperature. Ask students which type of reaction is taking place and where is the energy coming from to drive the reaction.

Evaluate
Other examples are given of endothermic and exothermic reactions containing descriptions of energy gained or lost. Students must classify reactions.

CONNECTIONS TO STANDARDS
Common Core: RST.11-12.2,4,5,9; WHST.11-12.4,7
Massachusetts High School Chemistry Standards, Standard 6 - States of Matter, Kinetic Molecular Theory, Thermochemistry. Competency 6.4 - Describe the law of conservation of energy. Explain the difference between an endothermic process and an exothermic process.