

## Facet Cluster 2.4: Energy in chemical reactions

### Teacher Page

## Elicitation Questions

- b. Which part of the reaction contains more energy, the reactants or products?  
OR Why are the ammonium nitrate and water kept apart in the ice bag until you need them?

- b. In terms of energy, what happened when the fireworks exploded?

## Elicitation Questions

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**Elicitation Question Activity:** Endothermic and exothermic

**Directions:**

*Exothermic Reaction*

In ziplocks (1 per partner or student):

- Before class, mix 2 parts calcium chloride ( $\text{CaCl}_2$ ) and 1 part sodium bicarbonate ( $\text{NaHCO}_3$ )
- Students add enough phenol red solution to mix powders
- Zip bag closed quickly, trying to get as much air out as possible
- Mix and observe changes

*Endothermic Reaction*

In ziplocks (1 per partner or student):

- Mix 3 parts ammonium nitrate ( $\text{NH}_4\text{NO}_3$ ) and 1 part water
- Zip bag closed and observe changes

**Class questions:**

- What do you notice?
- How are things changing inside the bag? What is staying the same?
- Can we explain these changes? What could be causing them?
- Can you think of any other reactions that do something similar?

### Sample student responses from ChemFacets research

- 1) While playing hockey, Sebastian injured his ankle. His coach handed him an instant ice pack for the injury. The directions said to smash the bag, which breaks the tubes of water and ammonium nitrate inside, allowing them to mix. Upon doing this, the bag became freezing cold and Sebastian was able to ice his ankle.

- a) In terms of the bag and its environment, where did the heat go?

<b>Heat was used up in the reaction</b>
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Heat went into the surrounding environment
Heat was lost.

- b) Which part of the reaction contains more energy, the reactants or products? OR Why are the ammonium nitrate and water kept apart in the ice bag until you need them?


- 2) Gunpowder is used to erupt fireworks in the sky. Ashes float down after.

- a) Which has more energy, the reactant gunpowder, or the product ashes? Why do you think so? Explain where the energy is stored.


- b) In terms of energy, what happened when the fireworks exploded?

<b>Energy was released</b>
Energy was used up in the reaction
Energy was unstable and caused the reaction to occur