

**Activity Sheet Answers**  
**Chapter 6, Lesson 7**  
**Energy Changes in Chemical Reactions**

**ACTIVITY**

1. Did the temperature increase, decrease, or stay the same when you combined baking soda and vinegar?

The temperature decreased.

2. What is the lowest temperature reached during your group's reaction?

Answers will vary but should probably be about 15 °C.

3. Did the temperature increase, decrease, or stay the same when you combined baking soda solution and calcium chloride?

When a baking soda solution and calcium chloride are combined, the temperature increases.

4. What is the highest temperature reached during your group's reaction?

Answers will vary but may be above 90 °C.

**EXPLAIN IT WITH ATOMS & MOLECULES**

5. Is the baking soda and vinegar reaction endothermic or exothermic?

The baking soda and vinegar reaction is endothermic.

6. Draw an energy arrow on the reactant side and another on the product side to compare the amount of energy used and released during the reaction.



7. What do the arrows show about the amount of energy required to break the bonds of the reactants compared to the amount of energy released when the products are formed?

In the baking soda and vinegar reaction, there is a larger arrow going in on the reactant side and a smaller arrow going out on the product side. This shows that it took more energy to break the bonds of the reactants than was released when the products were formed.

8. Is the reaction between baking soda solution and calcium chloride solution endothermic or exothermic?

The baking soda solution and calcium chloride reaction is exothermic.

9. Draw an energy arrow on the reactant side and another on the product side to compare the amount of energy used and released during the reaction.



10. What do the arrows show about the amount of energy required to break the bonds of the reactants compared to the amount of energy released when the products were formed?

In the baking soda solution and calcium chloride reaction, there is a smaller arrow going in on the reactant side and a larger arrow going out on the product side. This shows that more energy was released when the products were formed than it took to break the bonds of the reactants.

### TAKE IT FURTHER

11. Which is an example of an endothermic reaction?

The self-inflating balloon is an example of an endothermic reaction.

Which is an example of an exothermic reaction?

The hand warmer is an example of an exothermic reaction.

12. For the hand warmer, what can you say about the amount of energy required to break bonds in the reactants compared to the amount of energy that is released when bonds are formed in the products?

For the hand warmer, more energy is released when the products are formed than it takes to break the bonds in the reactants.

13. For the self-inflating balloon, what can you say about the amount of energy required to break bonds in the reactants compared to the amount of energy that is released when bonds are formed in the products?

For the self-inflating balloon, it takes more energy to break the bonds in the reactants than is released when the products are formed.

## **EXTRA EXTEND**

14. What clues do you observe that let you know that a chemical reaction is taking place?

In the reaction between a magnesium sulfate solution, universal indicator, sodium carbonate solution, and citric acid, there is a color change, formation of a precipitate, and production of a gas. These are all clues that a chemical reaction is taking place.

15. In this chemical reaction, you may not have noticed a temperature change. Use what you know about energy in the breaking and making of bonds to explain how this can be.

There was no obvious temperature change even though bonds must have been broken and formed in the chemical reactions. Maybe the energy required to break the bonds in the reactants is very similar to the amount of energy released when the bonds in the products are formed. Maybe there is a small temperature difference but the thermometer is not sensitive enough for it to be observed.