

Additional Teacher Background

Chapter 6, Lesson 7, p. 549

Chemical Reactions can be Exothermic or Endothermic

Previous Extra Teacher Background sections in Chapters 2 and 5 discuss the energy changes in the process of evaporation/condensation and dissolving. The processes in both contexts involve the breaking and making of bonds. In both cases the point was made that:

It takes energy to break bonds, and energy is released when bonds are formed

These same principles apply in the context of chemical reactions which can be either exothermic or endothermic. If it takes more energy to break the bonds of the reactants than is released when the bonds of the products are formed, then the reaction is endothermic and the temperature decreases.

If more energy is released when the bonds in the products form than it took to break the bonds of the reactants, then the reaction is exothermic and the temperature increases.

“Using” energy in bond-breaking and “releasing” energy in bond-making are really energy conversions between kinetic and potential energy. It takes a certain amount of kinetic energy to break the bonds holding atoms together in the molecules of the reactants. When the bonds are broken, this kinetic energy is converted to the potential energy of attraction between the atoms. When the atoms rebond to form the products, this potential energy is converted to kinetic energy. Depending on the combinations of bonds broken and made, a reaction is either endothermic or exothermic.