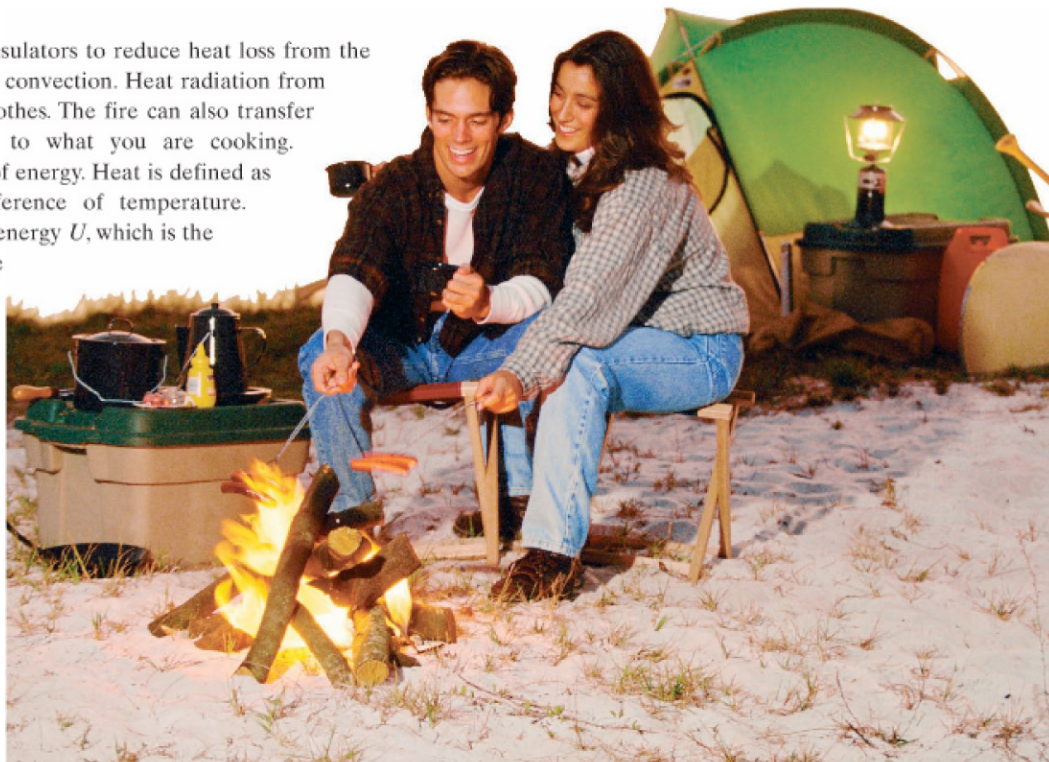


When it is cold, warm clothes act as insulators to reduce heat loss from the body to the outside by conduction and convection. Heat radiation from a campfire can warm you and your clothes. The fire can also transfer energy directly by heat conduction to what you are cooking. Heat, like work, represents a transfer of energy. Heat is defined as a transfer of energy due to a difference of temperature. Another useful concept is the internal energy U , which is the sum total of all the energies of the molecules of the system.



CHAPTER 14

Heat

When a pot of cold water is placed on a hot burner of a stove, the temperature of the water increases. We say that heat “flows” from the hot burner to the cold water. When two objects at different temperatures are put in contact, heat spontaneously flows from the hotter one to the colder one. The spontaneous flow of heat is in the direction tending to equalize the temperature. If the two objects are kept in contact long enough for their temperatures to become equal, the objects are said to be in thermal equilibrium, and there is no further heat flow between them. For example, when a fever thermometer is first placed in your mouth, heat flows from your mouth to the thermometer. When the thermometer reaches the same temperature as the inside of your mouth, the thermometer and your mouth are then in equilibrium, and no more heat flows.

Heat and temperature are often confused. They are very different concepts, and in this Chapter we will make a clear distinction between them. We begin by defining and using the concept of heat. We also discuss how heat is used in calorimetry, how it is involved in changes of state of matter, and the processes of heat transfer—conduction, convection, and radiation.