



FIGURE 7.13.

The carbon and carbon dioxide (CO₂) cycle as it exists today. The numbers show the present distribution of carbon in billions of metric tons. The bulk of the CO₂ released through volcanic action (outgassing) over geologic time has been dissolved in the oceans and then precipitated as calcium carbonate to form sedimentary rocks such as limestones and dolomites. Additional CO₂ has been removed by the biologic processes of plants and animals with their carbon-rich remains accumulating in sediments and fossil fuels (coal, oil, and gas).

bacteria to elephants. In coastal or inland waters where the productivity of organic matter is high, large numbers of minute organisms thrive, die, and are buried in muds and oozes. Those that escape scavenging and oxidation preserve their carbon content. Over the course of millions of years bacterial and chemical reactions convert the organic remains into liquid and gaseous hydrocarbons.

For commercial deposits of oil and gas to exist, several other conditions must occur. The converted hydrocarbons must be squeezed out of their muddy formations. The pressure to accomplish this comes from overlying sediments that have been deposited on top of the organic bearing layer. Secondly, the liquid and gaseous hydrocarbons must have a porous or permeable formation into which to migrate. Thirdly, there must be an impermeable overlying formation to trap the petroleum or it would escape to the surface. A common type of trap is illustrated in Figure 7.12. This trap must remain relatively undisturbed by metamorphic or volcanic processes that would crack or otherwise severely deform the structure, allowing the petroleum to escape.

Commercial sources of fossil fuels are the legacy of hundreds of millions of years of dead organic matter. In effect, these fossil fuels represent solar energy captured by plants and animals. They are