

Figure 12.7 A rock formation such as this is necessary for the accumulation of petroleum and natural gas.

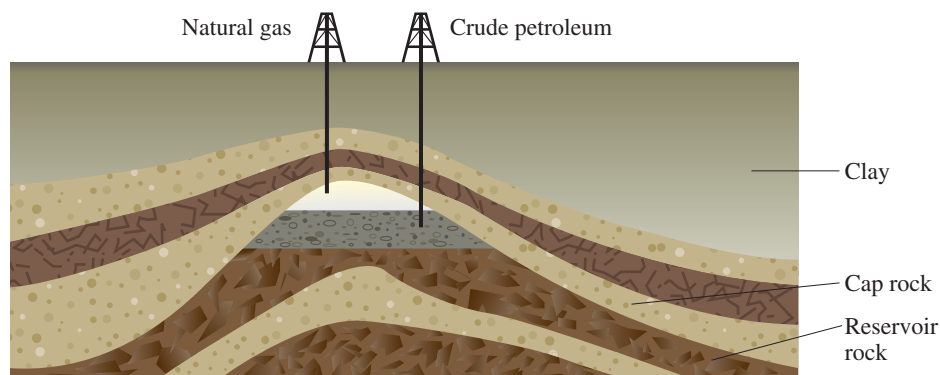


Figure 12.8 An oil rig pumping oil from an underground rock formation.

hydrocarbons—that is, the natural gas and/or petroleum (Figure 12.8). Note that petroleum and natural gas do not occur in the earth in the form of “liquid pools” but rather are dispersed throughout a porous rock formation.

Unprocessed natural gas contains 50%–90% methane, 1%–10% ethane, and up to 8% higher-molecular-mass alkanes (predominantly propane and butanes). The higher alkanes found in crude natural gas are removed prior to release of the gas into the pipeline distribution systems. Because the removed alkanes can be liquefied by the use of moderate pressure, they are stored as liquids under pressure in steel cylinders and are marketed as bottled gas.

Crude petroleum is a complex mixture of hydrocarbons (both cyclic and acyclic) that can be separated into useful fractions through refining. During refining, the physical separation of the crude into component fractions is accomplished by fractional distillation, a process that takes advantage of boiling-point differences between the components of the crude petroleum. Each fraction contains hydrocarbons within a specific boiling-point range. The gasoline fraction consists primarily of alkanes and cycloalkanes with 5 to 12 carbon atoms present. The fractions obtained from a typical fractionation process are shown in Figure 12.9.

Figure 12.9 The complex hydrocarbon mixture present in petroleum is separated into simpler mixtures by means of a fractionating column.

