Energy and Matter in Chemical Change

How far and how fast can you run? The answer depends in part on chemical reactions. The scientist in the small photo is testing a runner's fitness. The scientist monitors the breath that the runner exhales to determine the quantity of oxygen he consumes. This test works because the reactions that provide the energy the runner needs to keep moving consume oxygen from the air and stored glucose from his cells. The harder the athlete works, the more oxygen he consumes.

Whether they are developing a fitness test or a large-scale process for a chemical plant, scientists and engineers apply theories about the nature of matter. Modern chemical theories have developed over the past four hundred years. The roots of these chemical theories, however, go much farther back in time. The observations, ideas, and discoveries of philosophers, alchemists, craftspeople, and countless others were crucial to the early development of chemical theories.

In this unit, you will learn how theories of matter developed. You will apply these theories to your own observations of matter and chemical reactions. By studying matter and its interactions, you will equip yourself to make decisions and think critically about the benefits and risks of the chemistry that surrounds you.