Pearson

# 8.1: Molecular Gastronomy

On July 30, 2011, one of the most famous restaurants in the world—which boasted over one million reservation requests per year for a mere 8000 available spots—shut down. The restaurant, located on the coast north of Barcelona, Spain, was called elBulli, and it made the combination of chemistry and cooking famous. The style of cuisine practiced by the chefs at elBulli, which relies heavily on chemical processes, is often called *molecular gastronomy*.

A common chemical reaction in molecular gastronomy is precipitation. In a *precipitation reaction*, two *solutions*—homogeneous mixtures often containing a solid dissolved in a liquid—are mixed. Upon mixing, a solid forms. For example, when we mix a solution of lead(II) nitrate with postassium iodide, a brilliant yellow solid forms (see Section 8.4). The solid is lead(II) iodide.

In molecular gastronomy, chefs use a similar precipitation reaction—called spherification—to encapsulate liquids. One of the most famous creations at elBulli is the spherical olive (Figure 8.1). To make a spherical olive, chefs take juice from real olives and mix it with a calcium salt (such as calcium chloride), which dissolves in the olive juice. They then carefully pour the olive juice into a bath of sodium alginate. Sodium alginate is a sodium salt that dissolves into water, resulting in the presence of alginate ions. When the calcium ions in the olive juice encounter the alginate ions in the bath, a precipitation reaction occurs. In this case, the precipitation reaction forms an encapsulating sphere around the juice. The result is a spherical, edible "olive" that pops in the mouth and releases its juice.

**Figure 8.1 The Spherical Olive**

The spherical olive is made by precipitating an encapsulating layer around olive juice.

In this chapter, we explore solutions, focusing especially on *aqueous* solutions (solutions in which one component is water). The olive juice and calcium chloride mixture just discussed is an example of an aqueous solution. Other common aqueous solutions include seawater, vinegar, and the watery environment within biological cells. We will also explore the chemical reactions that occur within solutions, such as precipitation reactions, which have many common applications.