# **Mixtures and Solutions Discussion Guide (for use during or after reading)**

1. What must be true in order for a heterogeneous mixture to be considered a suspension? (Heterogeneous Mixtures, Suspensions, p. 6-11)
   1. A heterogeneous mixture is one in which particles of each substance are not evenly spread throughout. For example, ice in a glass of soda is considered a heterogeneous mixture because the ice is not evenly spread throughout the soda. In order for a heterogeneous mixture to be considered a suspension, the large, visible particles must eventually settle out due to the influence of gravity. For example, the smoke from a campfire is considered a suspension of solid soot and ash particles in the air, a gas.
2. What is a colloid and why is it considered a heterogeneous mixture? (Colloids, p. 12-13)
   1. A colloid is a mixture in which particles of one substance are mixed throughout another substance but are not quite dissolved completely. Colloids are considered heterogeneous mixtures because although two substances are mixed together, they do not completely combine to create a homogeneous mixture.
3. What must be true in order for a homogeneous mixture to be considered a solution? (Homogeneous Mixtures, Solutions, p.14-19)
   1. A homogeneous mixture is one in which particles of one substance are spread evenly throughout the other substance. For example, air is considered a homogeneous mixture because molecules of nitrogen, oxygen, and other gases are evenly distributed throughout. In order for a homogeneous mixture to be considered a solution, particles do not settle out, cannot be filtered out, and cannot be seen with the naked eye.
4. Define and describe the vocabulary terms solute, solvent, and solubility. (Solubility, p. 20-23)
   1. Solutions can be described by their solutes and solvents. The substance being dissolved is considered the solute, and the substance doing the dissolving is called the solvent. Solubility refers to the ability of a solute to dissolve in a solution at a given temperature.
5. Describe what happens to the chemical bonds in solutes and solvents when dissolving substances. (Solubility, p. 20-23)
   1. In order to create a solution, solutes and solvents must be broken down and mixed together. The bonds that hold the solute together must be broken down so they can form new bonds with the solvent to create a fully dissolved solution.
6. What is meant when a scientist describes solutions as saturated or unsaturated? (Saturation, p.24-27)
   1. Scientists classify solutions as saturated or unsaturated based on whether the solute can dissolve more solvent. Solutions are unsaturated when they can dissolve more solute than they currently hold and are saturated when no more of a substance will dissolve in a solvent at a particular temperature.
7. How can one use heat to dissolve solutes and create saturated and even supersaturated solutions? (Saturation, p. 24-27)
   1. Solutions can be saturated or unsaturated depending on their solubility. One way to alter a solution’s solubility is by adjusting its temperature. For most solutes, the higher the temperature, the more solute can be dissolved by the solvent. This can help saturate solutions quickly or even create supersaturated solutions!
8. Describe the process of filtration and how it is used to separate heterogeneous mixtures. (Separating Mixtures, p. 28-33)
   1. Sometimes, scientists need to separate mixtures. In mixtures with large enough particles, they can do this by physically sorting out the components. However, some heterogeneous mixtures must be separated in other ways. Filtration is a separation process that involves using a screen or paper filter to catch the larger particles, letting the rest of the mixture pass through. For example, people use filters in their car engines to remove impurities from the air and fuel before they are turned into energy.
9. Which process would you use to separate a mixture to produce pure water? Why? (Separating Mixtures, p. 28-33)
   1. Homogeneous mixtures can only be separated by evaporation or distillation. Evaporation occurs when a liquid or solid is turned into a gas through the use of heat. Distillation is used to separated substances from a solution through vaporization, a process that turns them into a gases. In order to separate a mixture to produce pure water, it is best to use distillation because evaporation will leave a byproduct of salt, whereas distillation relies on condensation to collect pure water.

1. What is a mixture? Compare heterogeneous and homogeneous mixtures. (General)
   1. A mixture consists of two substances that have been mixed together but remain chemically separate. A heterogeneous mixture is one in which particles of each substance are not evenly spread throughout, and a homogeneous mixture is one in which particles of one substance are spread evenly throughout the other.