

Name

Class:

Date:

Pure Substances and Mixtures

A **PURE SUBSTANCE** is matter that has a fixed composition. No matter what physical change it undergoes, it cannot be broken down into simpler parts. All elements are pure substances. Remember that elements are made up of atoms, the building blocks of all matter. An atom's identity is determined by the number of protons it has. For example, oxygen has 8 protons. This number is fixed. Change the number of protons and you change the atom.

Compounds are also examples of pure substances. Water is a good example of this. There is a fixed ratio of atoms in water: 2 hydrogen (H) with 1 oxygen (O). Whether frozen, liquid, or vaporized, it retains the same chemical formula H_2O .

Examples of pure substances:

All atoms and elements, molecules and compounds.

A **MIXTURE** is a combination of two or more substances that are **not** chemically united and do not exist in fixed proportions to each other. Most natural substances are mixtures. A mixture can be physically separated into pure compounds or elements. Just about everything that you can think of is probably a mixture. Even the purest of materials still contain other compounds as impurities. Mixtures may exhibit a changing set of physical properties. For example, mixture of alcohol and water boils over a range of temperatures.

Mixtures can be classified into two categories: *Homogeneous* and *Heterogeneous*.

Homogeneous:

A homogeneous mixture has the same uniform appearance and composition throughout. Many homogeneous mixtures are commonly referred to as solutions. Particle size distinguishes homogeneous solutions from other heterogeneous mixtures. Solutions have particles which are the size of atoms or molecules - too small to be seen.

A solution is a mixture of two or more substances in a single phase. At least two substances must be mixed in order to have a solution. The substance in the smallest amount and the one that dissolves or disperses is called the **SOLUTE**. The substance in the larger amount is called the **SOLVENT**. In most common instances water is the solvent. The gases, liquids, or solids dissolved in water are the solutes.

Examples of homogenous mixtures:

Corn oil, White vinegar, a sugar solution is homogeneous since only a colorless liquid is observed. Air with no clouds is homogeneous.

Heterogeneous:

A heterogeneous mixture consists of visibly different substances or phases. The three phases or states of matter are gas, liquid, and solid. In a heterogeneous mixture, the two or more substances have a distinct difference in particle sizes.

Examples of heterogeneous mixtures:

Beach sand is heterogeneous since you can see different colored particles. Vinegar and oil salad dressing is heterogeneous since two liquid layers are present, as well as solids. Chex party mix and raisin bran are both examples. Air with clouds is heterogeneous, as the clouds contain tiny droplets of liquid water.

1) How is a pure substance different from a mixture?

2) How does a homogenous solution or mixture differ from a heterogeneous solution or mixture?

3) Would chocolate chip ice cream be a homogenous mixture or a heterogeneous mixture? EXPLAIN YOUR ANSWER.

4) How is a solute different from a solvent?

Classify the following items as pure substances, homogenous solutions or heterogeneous solutions: Shampoo, Crunch berry cereal, orange juice, gold, a Snickers bar, nitrogen gas, a rice crispies treat, Pepsi, and salt.

pure substances	homogenous solutions	heterogeneous solutions