

PURE SUBSTANCES AND IMPURE MATERIALS

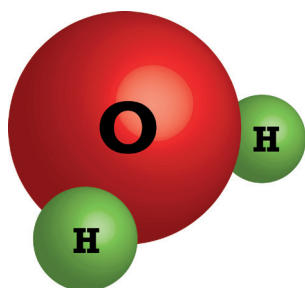
as: *since, because*
 closer: *more precise*
 evenly: *uniformly*
 glance: *look*
 ratio: *proportion*
 spread out: *distributed*
 to stand (stood-stood): *to remain immobile*
 thoroughly: *completely*



Understanding mixtures

The key to understanding mixtures is that you can separate the substance into other substances physically, while you cannot do so with a compound.

An example of compound: water



Matter
 Anything that has mass and takes up space (solid, liquid or gas)

Mixture
 A system of matter that is made up of 2 or more substances that are not chemically combined

Pure Substance
 A substance that cannot be physically separated any further into other substances

Element
 The simplest form of matter that cannot be separated by chemical or physical process

Compound
 Elements that are chemically compound in fixed ratios

In science, a **pure substance** contains only one element or compound. Impure materials may be mixtures of elements, mixtures of compounds, or mixtures of elements and compounds.

Elements

- consist of only one type of atom;
- can exist as either atoms or molecules;
- cannot be broken down into a simpler type of matter by either physical or chemical means.

Compounds

- consist of atoms of two or more different elements chemically joined together;
- always contain the same **ratio** of their component atoms;
- have fixed properties that are different from their component elements **as** a new substance is formed when the constituents are chemically combined;
- can only be separated into their elements by chemical means.

Mixtures

- consist of two or more different elements and/or compounds joined together physically, not chemically;
- have constituents which are present in varying ratios;
- do not have fixed properties;
- form no new substance and each substance in the mixture keeps its own properties;
- can be separated into their constituent parts by physical means.

Mixtures are absolutely everywhere. They may be made by dissolution of a solute in a solvent, or by diffusion, in which particles of different substances mix together.

There are different types of mixtures.

Homogeneous Mixtures – in which the two or more substances that form the mixture are **evenly** distributed throughout the mixture. Solutions are a special type of homogeneous mixtures in which one substance (the solute) is evenly **spread out** and **thoroughly** mixed in another substance (the solvent). They are the best mixed of all mixtures. Alloys are usually homogeneous mixtures in which the main element (or elements) are metal(s). Amalgams are special types of alloys that combine mercury and other metals.

Heterogeneous Mixtures – in which the two or more substances that form the mixture are not evenly distributed throughout the mixture. Suspensions are heterogeneous fluid mixtures containing solid particles large enough for sedimentation. The solid particles may be separated from the liquid by leaving it to **stand** or by filtration. Colloids are heterogeneous mixtures in which one substance is microscopically dispersed evenly throughout another substance. Emulsions are special colloids which have a mixture of oils and waters. Some mixtures that appear homogeneous at first **glance** are heterogeneous upon **closer** inspection. Examples include blood and sand.

- 1  Based on your experience, can you say which of these are elements, compounds, homogeneous or heterogeneous mixtures, solutions, suspensions, colloids and alloys? Write them in the correct column, then compare your choices in groups.

aluminium foil • brass • bronze • cereal and milk • copper wire • dishwashing liquid • fruit salad • gasoline • gold • ice cubes in a drink • ice tea • mayonnaise • milk • salad dressing • salt • sand in water • sea water • snow globe • stainless steel • sugar • vinegar • vodka • water • whip cream

ELEMENT	COMPOUND	HOMOGENEOUS MIXTURE	HETEROGENEOUS MIXTURE	SOLUTION	SUSPENSION	COLLOID	ALLOY

- 2  Use the prepositions/adverbs in the box to complete the summary of the reading passage.

by • down • from • in • into • of • throughout • up

An element is as a pure substance made (1) (2) one type (3) atom or molecule. An element cannot be broken (4) (5) simpler substances or transformed (6) a chemical reaction. A compound is a pure substance made (7) (8) two or more types (9) elements (atoms) chemically combined (10) a fixed proportion. It can be further subdivided (11) simpler substances (12) chemical means only.

A mixture is a combination (13) elements or compounds not chemically joined together. It can be further subdivided (14) simpler substances (15) physical means. Each substance keeps its own properties and can be separated (16) the mixture.

The constituents (17) a homogenous mixture are uniformly mixed (18) the mixture. The constituents (19) a heterogeneous mixture are not uniformly mixed (20) the mixture. (21) a solution, the solute is the dissolved substance; the solvent is the substance doing the dissolving. A suspension is a mixture (22) liquids with particles (23) a solid which may not dissolve (24) the liquid. A colloid is a mixture (25) which one substance (26) microscopically dispersed insoluble particles is suspended (27) another substance. Basically alloys are a mixture (28) two or more metals.

