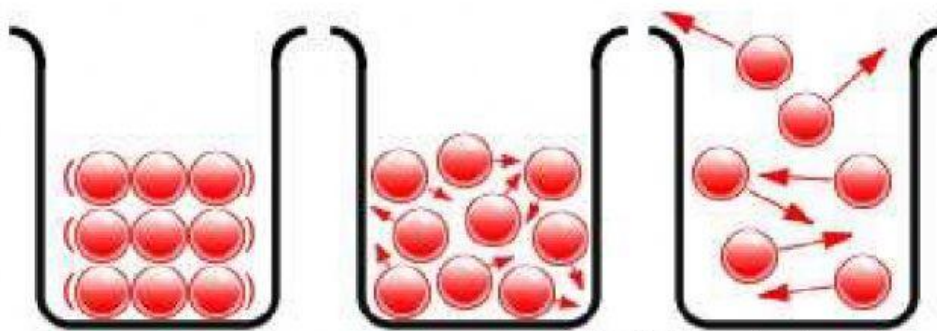


# MATTER AND MATERIALS

Matter: Any substance that has \_\_\_\_\_  
and occupies \_\_\_\_\_

Matter most commonly exists in one of 3 STATES:

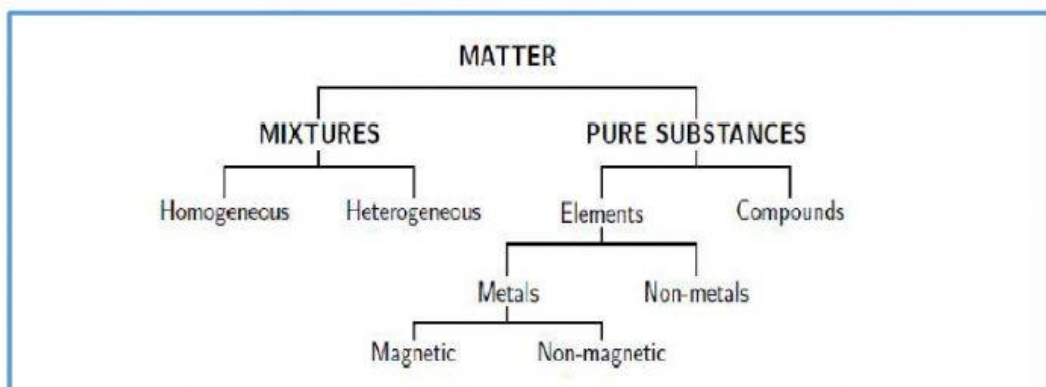


<https://schoolsequella.det.nsw.edu.au>

- definite volume
- definite shape
- tightly packed molecules

- definite volume
- takes shape of container
- loosely packed molecules

- takes volume and shape of container
- very loosely packed molecules



**Pure substances** - Any material that is not a \_\_\_\_\_  
is called a **pure substance**.

Pure substances include \_\_\_\_\_ and \_\_\_\_\_.

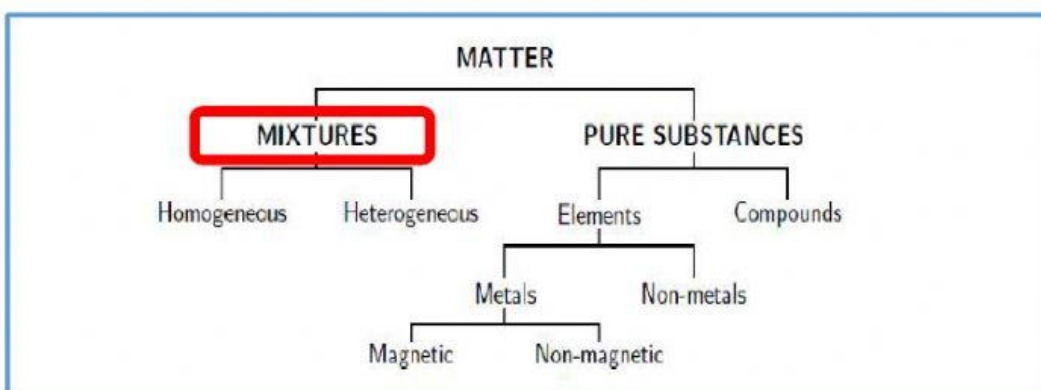
Pure substances have a sharply defined (one temperature) melting or boiling point. Impure substances have a temperature range over which they melt or boil.

The following **elements** are gases at room temperature:

H, N, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

The following are liquids at room temperature: \_\_\_\_\_,

All other elements are \_\_\_\_\_ at room temperature.



A \_\_\_\_\_ is a combination of two or more substances where these substances are not bonded (or joined) to each other.

#### Mixtures:

- *are not in a fixed ratio* Imagine, for example, that you have a 250 ml beaker of water. It doesn't matter whether you add 20 g, 40 g, 100 g or any other mass of sand to the water; it will still be called a mixture of sand and water.
- *keep their physical properties* In the example we used of the sand and water, neither of these substances has changed in any way when they are mixed together. Even though the sand is in water, it still has the same properties as when it was out of the water.
- *can be separated by mechanical means* To separate something by 'mechanical means', means that there is no chemical process involved. In our sand and water example, it is possible to separate the mixture by simply pouring the water through a filter. Something *physical* is done to the mixture, rather than something *chemical*.

mixture: A mixture that is non-uniform, and where the different components of the mixture can be identified.

Choose the examples below that fit this description:

beach sand	bottled still water
muesli	bottled fizzy water
cup of black coffee	glass of Oros juice with ice
fruit salad	liquorice allsorts
copper wire	table salt

mixture: A mixture of uniform composition where all components are in the same .

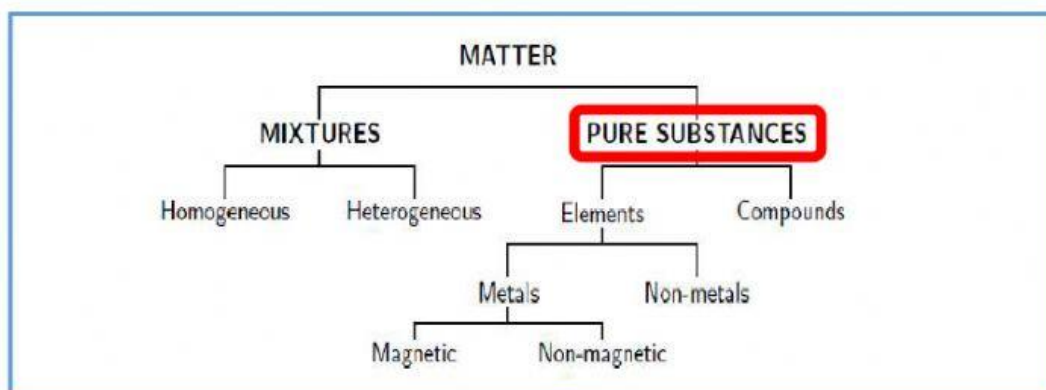
Choose the examples below that fit this description:

beach sand	bottled still water
muesli	bottled fizzy water
cup of black coffee	glass of Oros juice with ice
fruit salad	liquorice allsorts
copper wire	table salt

- Liquid mixtures can be:
  - miscible (substances that mix; homogeneous – e.g. orange juice & water)
  - immiscible (do not mix; heterogeneous – e.g. oil and water).
- Miscible liquids are called .
- Homogeneous solid mixtures are called .

Brass is an alloy of \_\_\_\_\_ and \_\_\_\_\_

Steel is an alloy of \_\_\_\_\_ and \_\_\_\_\_



An **element** is a pure substance that consists of one type of atom (cannot be broken down into other substances through chemical reaction)

A **compound** is a pure substance made up of two or more elements that are joined together in a fixed ratio.

1

Substance	Mixture or pure	Homogeneous or heterogeneous mixture
fizzy cold drink	mix / pure	homogeneous / heterogeneous / Pure
steel	mix / pure	homogeneous / heterogeneous / Pure
oxygen	mix / pure	homogeneous / heterogeneous / Pure
iron filings	mix / pure	homogeneous / heterogeneous / Pure
smoke	mix / pure	homogeneous / heterogeneous / Pure
limestone ( $\text{CaCO}_3$ )	mix / pure	homogeneous / heterogeneous / Pure
blood	mix / pure	homogeneous / heterogeneous / Pure

2. In each of the following cases, say whether the substance is an element, a mixture or a compound.

- Cu
- iron and sulphur
- Al
- $\text{H}_2\text{SO}_4$
- $\text{SO}_3$



## End of chapter exercises:

1. Which of the following can be classified as a mixture:

- a) sugar
- b) table salt
- c) air
- d) iron

2. An element can be defined as:

- a) A substance with constant composition
- b) A substance that contains two or more substances, in definite proportion by weight
- c) A uniform substance
- d) A substance that cannot be separated into two or more substances by ordinary chemical (or physical) means

4. Matching columns - Write the correct LETTER next to each number.

Column A	Column B
1. Iron	A. A compound containing 2 elements
2. $H_2S$	B. A heterogeneous mixture
3. Sugar solution	C. A metal alloy
4. Sand and stones	D. An element
5. steel	E. A homogeneous mixture

### Exercise 2-1:

Complete the following table:

Substance	Non-mixture or mixture	Heterogeneous mixture	Homogeneous mixture
tap water	mix / pure	Yes	Yes
brass (an alloy of copper and zinc)	mix / pure	Yes	Yes
concrete	mix / pure	Yes	Yes
aluminium foil (tinfoil)	mix / pure	Yes	Yes
Coca Cola	mix / pure	Yes	Yes
soapy water	mix / pure	Yes	Yes
black tea	mix / pure	Yes	Yes
sugar water	mix / pure	Yes	Yes
baby milk formula	mix / pure	Yes	Yes