

# Unit 3. Classifying matter

# Chemical substances and mixtures

- A **chemical substance** is a type of matter that has **constant chemical composition** and characteristic properties.
- A **mixture** is made up by two or more chemical substances and it **does not have a definite composition**.

# Types of mixtures

- **Homogeneous.** The composition is uniform, having the same appearance and properties in all the portions.
- **Heterogeneous.** The composition is not uniform, so their portions have different appearance and properties.
- **Colloid.** Heterogeneous mixture that seems homogeneous at first sight.

# Solutions

- Solutions are a homogeneous mixture.
- Two components can be distinguished:
  - **Solute**. The component present in smaller amount.
  - **Solvent**. Component present in greater amount.
- A substance is **soluble** if it is able to be dissolved in a particular solvent.
- The physical state of a solution depends on the physical state of the solvent.

<b>solute\solvent</b>	<b>solid</b>	<b>liquid</b>	<b>gas</b>
solid	alloys (steel, bronze,...)	sea water	none
liquid	gold/mercury amalgam	gasoline, beer, wine	none
gas	Hydrogen in metals	soft drinks, home ammonia	air

# Concentration of a solution

- Relationship between the amount of solute and the amount of solvent.
- It can be expressed in several ways (for liquids and gases):

- **Grams per litre:**  $c(g/L) = \frac{\text{mass of solute (g)}}{\text{volume of solution (L)}}$
- **Mass percentage:**  $\% \text{ mass} = \frac{m_{\text{solute}}(g)}{m_{\text{solution}}(g)} \times 100$
- **Volume %:**  $\% \text{ volume} = \frac{v_{\text{solute}}(mL)}{v_{\text{solution}}(mL)} \times 100$

# Separation of the components of a solution

1. **Vaporization.** This method is based on that the two substances have different *boiling points*.
2. **Crystallization.** Also based on the different boiling points, with the difference that the solutions must be saturated.
3. **Distillation.** It uses the same principle. The desired substance is collected as liquid.