

# pH – 1

- ✦ A very important concept in chemistry and in biology is that of **concentration** – a measure of how much solute is dissolved in a solvent, i.e. the ratio between the solute and the solvent molecules
- ✦ The **molecular weight** is the total sum of all the atomic masses of the atoms constituting the molecule
  - For example, the molecular weight of NaCl (sodium chloride) is 58  $\Rightarrow$  by definition, 58 grams of NaCl constitutes a mole of NaCl
- ✦ The number of molecules in one **mole** is  $6.02 \times 10^{23}$ 
  - The number of molecules present in 58 grams of NaCl is equal to the number of molecules in 40 grams of NaOH (sodium hydroxide), given that the molecular weight of NaOH is 40
- ✦ A solution that has a mole dissolved in a liter is said to be **1 molar** (1M)

# pH – 2

- ✦ Water is a molecule whose atoms have a very differentiated electronegativity
  - Sometimes, the oxygen atoms of a water molecule “rip off” one of the hydrogen electrons, which results in the formation of ions  $\text{H}^+$  and  $\text{OH}^-$
  - In a bottle of pure water, approximately one molecule over 554 millions is ionized  $\Rightarrow 1 \times 10^{-7}$  molar
  - Although this is a rare and reversible dissociation, it is of great biological importance because  $\text{H}^+$  and  $\text{OH}^-$  are very reactive
- ✦ The concentration of hydrogen ions has a name and a measurement unit: **pH**, where p describes both the extraction of the base 10 logarithm and, subsequently, the negation of the obtained value
  - ▶ Pure water has a pH of 7 (neutral)

# pH – 3

- ✦ Since living organisms are formed, in large part, of water, pH plays a central role in all biological reactions
- ✦ Substances which, placed into the water, dissociate themselves, releasing free  $H^+$  ions are called **acid**, whereas substances that release  $OH^-$  ions are called **basic**
- ✦ The acid solutions, which contain a relatively high concentration of free protons, have a low pH value, while the basic solutions, which contain few free protons, have a high pH

# pH – 4

- ✦ The pH value ranges from 0 (very acid) to 14 (very basic)
- ✦ The internal environment of the cells is usually close to the neutral value

