

## Series N°2

### Exercise N° 1:

1. Define an acid and a base.
2. Define an acid/base pair
3. What is the conjugate base of each of the following acids ?  
a) H-COOH    b) C<sub>6</sub>H<sub>5</sub>-COOH    c) HCN    d) HF    e) HNO<sub>2</sub>    f) H<sub>2</sub>PO<sub>4</sub><sup>-</sup>
4. What is the conjugate acid of each of the following bases?  
a) C<sub>2</sub>H<sub>5</sub>-NH<sub>2</sub>    b) OH<sup>-</sup>    c) sulfide ion S<sup>2-</sup>    d) H<sub>2</sub>O    e) CH<sub>2</sub>Cl-COO<sup>-</sup>    f) H<sub>2</sub>PO<sub>4</sub><sup>-</sup>

### Exercise N° 2:

The pH of a lemon juice is 2.3.

- a. Calculate its [H<sub>3</sub>O<sup>+</sup>] and [OH<sup>-</sup>].

Pour 18 ml of this juice into a glass and add water. We obtain 250 ml of diluted lemon juice.

- b. What is the pH of the drink now?
- c. Calculate the molarity of a hydrochloric acid solution of the same pH as diluted lemon juice.

### Exercise N° 3:

Calculate the pH of the following mixtures:

- 1)- 50 ml (10<sup>-2</sup> M) of HCl + 25 ml (2.10<sup>-2</sup>M) of perchloric acid HClO<sub>4</sub> (2.10<sup>-2</sup>M).
- 2)- 2.5 g of NaOH + 0.83 g of Na<sub>2</sub>O (strong base) in 100 ml of pure water.

### Exercise N° 4:

What is the pH of the solution resulting from mixing 80 ml of 0.1 M NaOH with:

1. 40 ml of 0.1M HCl.
2. 80 ml of 0.1M HCl.
3. 80 ml of 0.1M CH<sub>3</sub>COOH.
4. 80 ml of 0.1M NaCl.

### Exercise N° 5:

You have the following solutions at your disposal to prepare **1L** of a buffer solution with a -1- pH= 4.9, -2-pH= 9.85.

0.5 M CH<sub>3</sub>COOH and 0.5 M CH<sub>3</sub>COO<sup>-</sup> (pK<sub>a</sub>=4.75).

0.2 M NH<sub>3</sub> and 0.1 M NH<sub>4</sub>Cl (pK<sub>a</sub>=9.25).