

## Tutorial N° 2

### Exercise 1

Calculate the hydrogen ion concentration  $[H_3O^+]$  for the solutions with the following pH values: **(a)** 3.47, **(b)** 0.20, **(c)** 8.60

Calculate the change in pH for 0.01 M HCl solution on 10 times dilution.

### Exercise 2

What is the change in the concentration of hydronium ions  $[H_3O^+]$  and hydroxide ions  $[OH^-]$  when a 0.1 M solution of HCl is diluted 10 times?

Similarly, what happens to these concentrations when a 0.1 M solution of acetic acid ( $CH_3COOH$ ), with  $K_a=10^{-4.75}$ , is diluted 10 times?

### Exercise 3

We have an aqueous solution of an acid AH with a concentration  $C$  equal to 0.05 mol/L. The concentration of hydronium ions is  $3.16 \times 10^{-4}$  mol/L.

1. Is this acid strong or weak?
2. What is its  $K_a$  value if it is weak ?
3. What is its degree of dissociation  $\alpha$ ?
4. What are the concentrations of the dissolved species?

### Exercise 4

A weak base B is dissolved in water to prepare a solution with a concentration of  $C = 0.10$  mol/L

1. Determine the pOH of the solution.
2. From this result, calculate the corresponding pH

**Given:** The base dissociation constant is  $pK_b = 5$

### Exercise 5

Aspirin (acetylsalicylic acid) is a weak monoprotic acid denoted (AH). A 500 mg aspirin tablet (molar mass:  $180 \text{ g}\cdot\text{mol}^{-1}$ ) is dissolved in 200 mL of water, giving a solution with a measured pH of 2.7.

1. Calculate the acid dissociation constant ( $K_a$ ).
2. Deduce the  $pK_a$  of aspirin.