strong acid

→ the formula of muriatic acid is HCl. when it is added to swimming pool, the pH decreases, so it will be more acidic

$HCl + H_2O \longrightarrow H_3O^+ + Cl^-$

↳ its concentration increased so pH is decreased.

Hydronium ion (H_3O^+)

Prelabboratory Assignment: **Acids, Bases, and Salts**

1. In an aqueous solution,
   a. name and write the formula of the ion that makes a solution acidic. Hydrogen ion (H^+) or
   b. name and write the formula of the ion that makes a solution basic. Hydroxyl ion (OH^-)
2. a. Muriatic acid is used to adjust the pH of swimming pools. What is the formula of muriatic acid? Does the pH of the swimming pool increase or decrease as a result of adding muriatic acid? Explain.

   b. Battery acid is a rather concentrated solution of sulfuric acid. What is the formula of sulfuric acid? H_2SO_4 (H_2SO_4)
3. Aqueous salt solutions often are *not* neutral with respect to pH. Explain.
4. a. Milk of magnesia is used as a laxative and to treat upset stomachs. What is the formula of milk of magnesia?
5. Washing soda is often added to detergent formulations to make the wash water more basic. What is the formula of the anhydrous form of washing soda? Does it increase or decrease the pH of the wash water? Explain.

5. Three solutions have the following pH:

- Solution 1: pH 7.4, basic
- Solution 2: pH 10.6, basic
- Solution 3: pH 3.7 acidic

pH ↓

a. Which solution contains the highest H_3O^+ ion concentration? solution (3)

↑pH

b. Which solution is the most acidic? solution (3)

↓pH

c. Which solution is the most basic? solution (2)

أكثر حمضية lower pH

6. Metallic ions with a higher positive charge are more strongly hydrated and tend to be more acidic in solution. Comparing a 0.12 *M* $FeCl_3$ (+3 -1) solution to a 0.12 *M* $FeCl_2$ (+2 -1) solution, which solution would have a lower pH? Explain. .12 M FeCl3 would have lower pH compared to the .12M FeCl2

e. What spectator ions remain in solution in the reaction mixture?

f. Write the **net ionic reaction** that accounts for the appearance of the precipitate. (سبب) (ppt)

because Fe^{+2} ions have lower tendency to release H^+ ions into the solution, making the solution less acidic and higher pH value.

strong acid

** (2) ملح

will be acidic (pH < 7) and if both (cations and anions) are from strong acid/base the solution will be neutral (pH = 7)

e.g

*the reaction between cation or anion with water is called hydration reaction.

① $NaCl \xrightarrow{H_2O} Na^+ + Cl^-$ (don't react) ∴ pH = 7

② $KF \xrightarrow{H_2O} K^+ + F^-$ anion reacts with H_2O

$F^- + H_2O \rightarrow HF + OH^-$ pH > 7 قاعدي

③ $NH_4Cl \xrightarrow{H_2O} NH_4^+ + Cl^-$ cation reacts with water

$NH_4^+ + H_2O \rightarrow NH_3 + H_3O^+$ pH < 7 حمضي

1. In an aqueous solution (aq)

a. identify the "species" that makes a solution acidic. Hydrogen ion (H^+) or Hydronium ion (H_3O^+)

b, identify the "species" that makes a solution basic. Hydroxyl ion (OH^-)

the conjugate acid of a weak base as cation or both. If only anions react with water the solution will be basic (pH > 7), if only cations react with water the solution (فيما يتعلق)

2. Aqueous salt solutions often are not neutral (with respect to) pH. Explain.

a salt can dissolve in water, so it will produce neutral, basic or acidic solutions depending on whether it contains the conjugate base of a weak acid as anion or

3. a. Milk of magnesia is used as a laxative (ملين) and to treat upset stomachs (اضطراب). What is the formula of milk of magnesia? $Mg(OH)_2$

hydrated form ($Na_2CO_3 \cdot 10H_2O$) called sodium carbonate decahydrate

b. Washing soda (صودا الغسيل) is often added to detergent formulations (تركيبات المنظفات) to make the wash water more basic. What is the formula of the anhydrous form of washing soda? Does it increase or decrease the pH of the wash water? Explain.

*anhydrous form of washing soda is Na_2CO_3 and it is increasing the pH of wash water because when it is dissolving in water produces strong basic solution

$Na_2CO_3 + 2H_2O \rightarrow 2NaOH + H_2O + CO_2$

strong base → pH ↑

H_2CO_3 الأحماض من جزء الكربونيك

4. Three solutions have the following pH:

- Solution 1: pH 12.1 (basic)
- Solution 2: pH 6.2 (acidic)
- Solution 3: pH 10.2 (basic)

$[H_3O^+]$ ↑ pH ↓

a. Which solution contains the highest H_3O^+ ion concentration? solution 2

b. Which solution is the most acidic? ↓pH solution 2

c. Which solution is the most basic? ↑pH solution 1