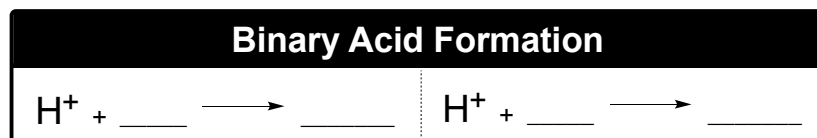


## CONCEPT: BINARY ACIDS

- Represent covalent compounds containing the  $\text{H}^+$  ion bonded to a nonmetal anion not including \_\_\_\_\_.



**EXAMPLE:** Which of the following represents the possible structure of a binary acid?

a) HCNO

b)  $\text{BaCl}_2$

c) HF

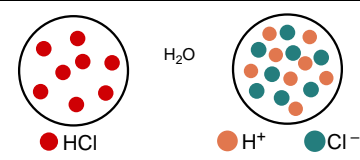
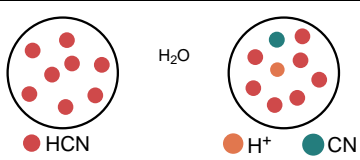
d) LiH

## Binary Acid Strength

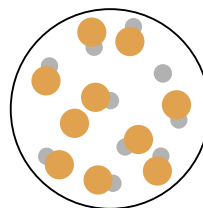
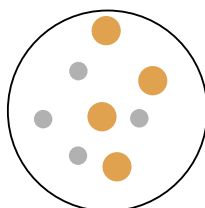
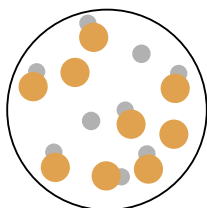
- \_\_\_\_\_ acids: The only **Strong Binary Acids** that exist and involve an  $\text{H}^+$  ion attached to a halogen.

Strong Binary Acids			Weak Binary Acid
_____ Hydroiodic acid	_____ Hydrobromic acid	_____ Hydrochloric acid	_____ Hydrofluoric acid

- Recall, **Strong Acids** are \_\_\_\_\_ electrolytes and **Weak Acids** are \_\_\_\_\_ electrolytes.
  - Strong Acids** dissociate (ionize) \_\_\_\_\_ in water and \_\_\_\_\_ a proton ( $\text{H}^+$ ) easily.
  - Weak Acids** only partially dissociate, donates a proton \_\_\_\_\_ readily, favor \_\_\_\_\_.

Strong Acid	Weak Acid
 <p>● HCl</p> <p>● <math>\text{H}^+</math> ● <math>\text{Cl}^-</math></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Dissociates completely</li><li><input type="checkbox"/> Easily donates proton (<math>\text{H}^+</math>)</li><li><input type="checkbox"/> Favors product formation</li></ul>	 <p>● HCN</p> <p>● <math>\text{H}^+</math> ● <math>\text{CN}^-</math></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Dissociates partially</li><li><input type="checkbox"/> Less readily donates proton (<math>\text{H}^+</math>)</li><li><input type="checkbox"/> Favors reactant formation</li></ul>

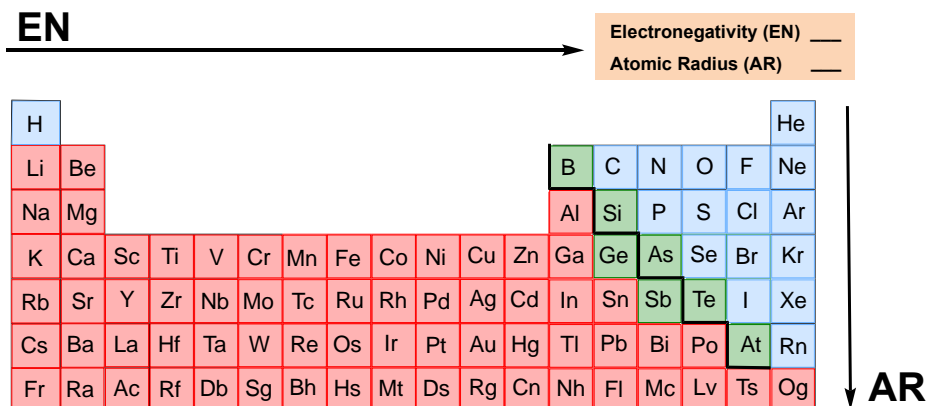
**EXAMPLE:** The following represent aqueous acid solutions. Identify the strong acid, weak acid and weakest acid.



## CONCEPT: BINARY ACIDS

### Comparing Binary Acid Strength

- The strength of Binary Acids is based on the electronegativity or atomic radius of the non-\_\_\_\_\_ element.



- When comparing the strengths of Binary Acids:
  - ☐ If the elements are in the same period then use \_\_\_\_\_ to compare their acid strengths.
    - The \_\_\_\_\_ then the \_\_\_\_\_ acidic.
  - ☐ If the elements are in the same group then use \_\_\_\_\_ to compare their acid strengths.
    - The \_\_\_\_\_ then the \_\_\_\_\_ acidic.

**EXAMPLE:** Which is the weakest acid from the following?

- a) HF                      b) HCl                      c) HI                      e) HBr                      d) All are equal.

- If the Binary Acids are separated by \_\_\_\_\_ period then use electronegativity to compare their acid strengths.
  - ☐ If separated by \_\_\_\_\_ period then use atomic radius to compare their acid strengths.

**EXAMPLE:** Which is the weakest acid from the following?

- a) H<sub>2</sub>Se                      b) HF                      c) H<sub>2</sub>Te                      e) H<sub>2</sub>S                      d) All are equal

**PRACTICE:** Which of the following acids would be classified as the strongest?

- a) CH<sub>4</sub>                      b) H<sub>2</sub>Te                      c) H<sub>2</sub>S                      d) PH<sub>3</sub>                      e) BH<sub>3</sub>