

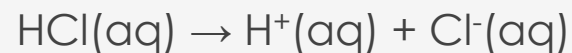
HSC Chemistry Module 6 Acid/Base Reactions

Using Bronsted-Lowry Theory:

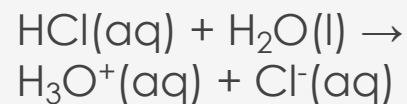
***Differences between strong,
weak, concentrated and
dilute acids***

Strong

As shown in **figures A and B** a strong acid such as hydrochloric acid (HCl) is one that ionises completely, forming hydrogen ions and chloride ions, donating protons freely.



OR



The image shows four hand-drawn diagrams labeled A, B, C, and D, each representing a different solution of an acid. Diagram A shows a concentrated solution of a strong acid (HCl) with many H⁺ and Cl⁻ ions. Diagram B shows a dilute solution of a strong acid (HCl) with fewer H⁺ and Cl⁻ ions. Diagram C shows a concentrated solution of a weak acid (CH₃COOH) with many un-ionized molecules and a few H⁺ and CH₃COO⁻ ions. Diagram D shows a dilute solution of a weak acid (CH₃COOH) with fewer un-ionized molecules and a few H⁺ and CH₃COO⁻ ions.

A) Concentrated Solution of Strong Acid (e.g. HCl)

B) Dilute Solution of Strong Acid (e.g. HCl)

C) Concentrated Solution of Weak Acid (e.g. CH₃COOH)

D) Dilute Solution of Weak Acid (e.g. CH₃COOH)

⊕ H⁺ (Positive ion)
⊖ Cl⁻ (Negative ion)

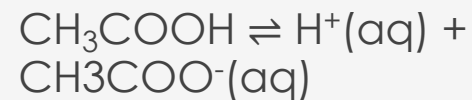
⊕ H⁺ (Positive ion)
⊖ Cl⁻ (Negative ion)

● CH₃COOH (Un-ionised neutral molecule)
⊕ H⁺ (Positive ion)
⊖ CH₃COO⁻ (Negative ion)

● CH₃COOH (Un-ionised neutral molecule)
⊕ H⁺ (Positive ion)
⊖ CH₃COO⁻ (Negative ion)

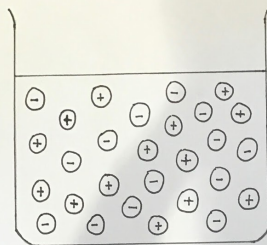
Weak

As shown in **figures C and D** a weak acid such as acetic acid (CH_3COOH) is one that only partially ionises, the rest remain as molecules, setting up an equilibrium between molecules and ions. It is not a good proton donor.



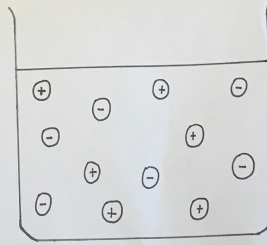
The forward reaction proceeds to a very small extent in water and very little of the acetic acid ionises to give $\text{H}^+(\text{aq})$ and $\text{CH}_3\text{COO}^-(\text{aq})$. This can be seen by the few ions and more molecules present.

A) Concentrated Solution of Strong Acid (e.g. HCl)



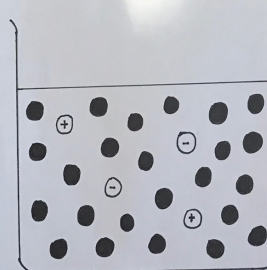
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

B) Dilute Solution of Strong Acid (e.g. HCl)



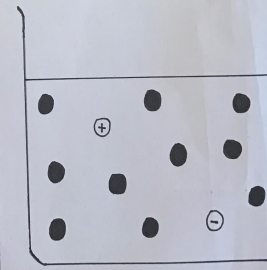
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

C) Concentrated Solution of Weak Acid (e.g. CH_3COOH)



● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)

D) Dilute Solution of Weak Acid (e.g. CH_3COOH)



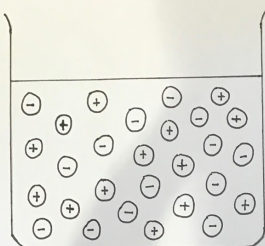
● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)

Concentrated

As shown in **figures A and C** a concentrated acid has a relatively large amount of solute dissolved in a given volume of solvent.

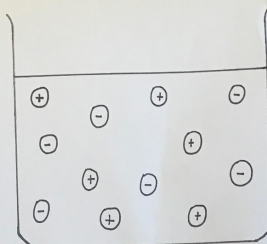
That is, contains a large number of moles of the substance per litre.

A) Concentrated Solution of Strong Acid (e.g. HCl)



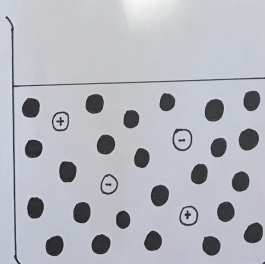
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

B) Dilute Solution of Strong Acid (e.g. HCl)



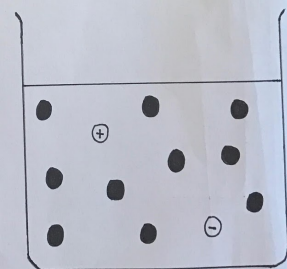
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

C) Concentrated Solution of Weak Acid (e.g. CH_3COOH)



● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)

D) Dilute Solution of Weak Acid (e.g. CH_3COOH)



● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)

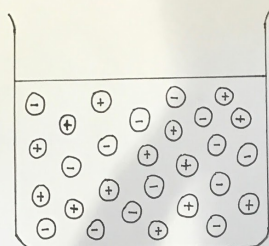
Dilute

As shown in **figures B and D** a dilute acid has a relatively small amount of solute dissolved in a given volume of solvent.

That is, it contains a small number of moles of the substance per litre.

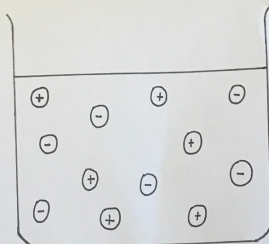
This is represented in the diagrams with the concentrated acids having more ions/molecules compared to the dilute acids, which have far fewer.

A) Concentrated Solution of Strong Acid (e.g. HCl)



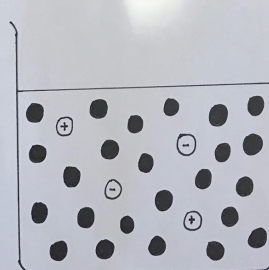
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

B) Dilute Solution of Strong Acid (e.g. HCl)



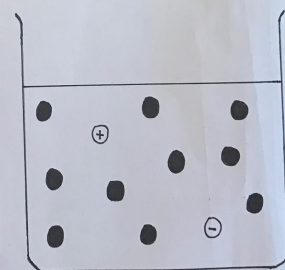
⊕ H^+ (Positive ion)
⊖ Cl^- (Negative ion)

C) Concentrated Solution of Weak Acid (e.g. CH_3COOH)



● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)

D) Dilute Solution of Weak Acid (e.g. CH_3COOH)



● CH_3COOH (Un-ionised neutral molecule)
⊕ H^+ (Positive ion)
⊖ CH_3COO^- (Negative ion)