**Conductance - 02**

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1. Variation of Conductivity with dilution for strong and weak electrolytes-
2. Molar Conductivity at infinite dilution-

**Weak electrolyte & Strong electrolyte:**

**Weak Electrolyte -**

A weak electrolyte is an electrolyte that does not completely dissociate in aqueous [solution](https://www.thoughtco.com/definition-of-solution-604650). The solution will contain both [ions](https://www.thoughtco.com/definition-of-ion-604535) and [molecules](https://www.thoughtco.com/what-is-a-molecule-definition-examples-608506) of the electrolyte. Weak electrolytes only partially ionize in water (usually 1% to 10%). Examples

**Examples of Weak Electrolyte -**

CH3COOH (acetic acid), CO(OH)2 (carbonic acid), NH3 (ammonia), and H3PO4 (phosphoric acid) are all examples of weak electrolytes. [Weak acids and weak bases](https://www.thoughtco.com/strong-and-weak-acids-and-bases-603667) are weak electrolytes. Whether or not a substance dissolves in water is not the determining factor in its strength as an electrolyte. In other words, dissociation and dissolution are not the same things.

For example, acetic acid (the acid found in vinegar) is extremely soluble in water. However, most of the acetic acid remains intact as its original molecule rather than its ionized form, ethanoate (CH3COO-).

An equilibrium reaction plays a big role in this. Acetic acid dissolves in water an ionizes into ethanoate and the hydronium ion, but the equilibrium position is to the left (reactants are favoured). In other words, when ethanoate and hydronium form, they readily return to acetic acid and water:

CH3COOH + H2O ⇆ CH3COO- + H3O+

The small amount of product (ethanoate) makes acetic acid a weak electrolyte rather than a strong electrolyte.

**Strong electrolyte-**

A strong electrolyte is a solute or solution that is an electrolyte that completely dissociates in [solution](https://www.thoughtco.com/definition-of-solution-604650). The solution will contain only [ions](https://www.thoughtco.com/definition-of-ion-604535) and no [molecules](https://www.thoughtco.com/what-is-a-molecule-definition-examples-608506) of the electrolyte. Strong electrolytes are good conductors of electricity, but only in aqueous solutions or in molten form.

The comparative strength of an electrolyte may be gauged using a [galvanic cell](https://www.thoughtco.com/galvanic-cell-definition-604080). The stronger the electrolyte, the greater the voltage produced.

**Examples of Strong Electrolyte-**

The dissociation of a strong electrolyte is apparent by its reaction arrow, which only points toward products. In contrast, the reaction arrow of a weak electrolyte points in both directions.

The general form of the strong electrolyte equation is:

strong electrolyte (a) → cation+ (aq) + anion- (aq)

Strong acids like HCl (hydrochloric acid), H2SO4 (sulfuric acid) and strong bases like NaOH ([sodium hydroxide](https://www.thoughtco.com/prepare-sodium-hydroxide-or-naoh-solution-608150)) and KOH (potassium hydroxide) and ionic salts like NaCl (sodium [chloride](https://www.thoughtco.com/prepare-sodium-hydroxide-or-naoh-solution-608150)), KCl (potassium [chloride](https://www.thoughtco.com/prepare-sodium-hydroxide-or-naoh-solution-608150)) are strong electrolytes. Salts much have high solubility in the solvent to act as strong electrolytes.

1. **Variation of Conductivity with dilution for strong and weak electrolytes-**

The **Molar Conductance** of strong electrolytes (HCl, KCl, KNO3) as well as of weak electrolytes (CH3COOH, NH4OH) increase with decrease in concentration or increase in dilution. **Equivalent Conductivity** also increases with dilution because of increase in volume containing one gram equivalent of the electrolyte. The variation of conductivity withconcentration is shown in the figure below.



1. **Molar Conductivity at infinite dilution-**

Molar conductance is dependent on the concentration of the electrolyte. When the solution is dilute the number of ions available per unit volume reduces, resulting in the reduction of the conductivity. Molar conductivity is defined for 1 mole of ions.

On dilution as volume of solution increases. Thus, the number of ions per ml decreases and hence conductivity decreases. As Molar conductivity is defined for 1 mole of ions. Thus, on dilution, ions get more apart and mobility of ions increases which leads to increase in molar conductivity of the solution.

When a solution contains so much solvent that if one adds more solvent to it there will be no longer change in the concentration of the solution, such solution is called solution infinite dilution. The molar conductance of a solution at infinite dilution is known as limiting molar conductivity. This increase in molar conductivity is because of the increase in the total volume containing one mole of the electrolyte. Thus, on dilution, ions get more apart and mobility of ions increases which leads to increase in molar conductivity of the solution at infinite dilution. Variation of molar conductivity with concentration is different for strong and weak electrolytes.

Greater in size of ions high conductivity at infinite dilution. The cations H+ has highest conductivity and anion OH/ highest conductivity.

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