Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Chemistry

Course Code: CHC-108

Course Title : Physical Chemistry

Unit: Section B- Electrochemistry II

Module Name: Existence of dipolar ions and strong electrolytes

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Notes

Existence of dipolar ions:

- The **dipolar ions** in other words are known as **'Zwitterions'**
- The term 'Zwitterion' is derived from the ***German word 'zwitter',*** which means ***'hybrid'.***
- It contains two functional groups one with positive and other negative electrical charge.
- **Thus, zwitterions are mostly electrically neutral (the net formal charge is usually zero).**
- Also sometimes referred to as ***"inner salts".***
- Whether a substance is zwitterionic or not, the pH range must be specified (if alkaline solution then it changes the zwitterion to an anion, and if acid solution then it changes to a cation).

Characteristics of Zwitterion :

- These are formed from compounds like ampholytes which contain both acid and base groups in their molecules.
- In this type of ions, the charged atoms are usually held together by one or more covalent bonds.
- Zwitterionic compounds have stable, separated unit electrical charges on atoms.

- These compounds contain quaternary ammonium cations.

Zwitterion Structure:

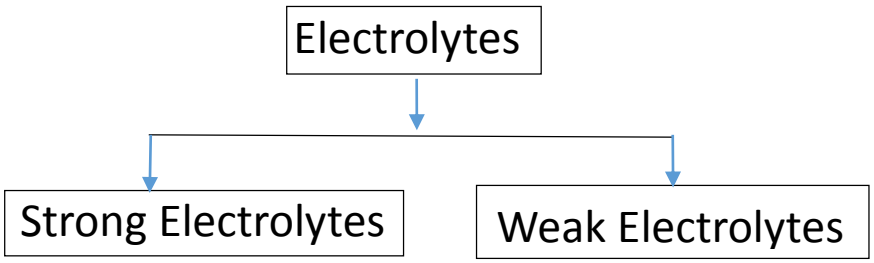
- Most common example of Zwitterion is **Amino Acids**
- They are made up of an ammonium or amino group which contains a positive charge as well as a carboxyl group with a negative charge.
- The zwitterion form of an amino acid is given below.
- Any compound that contains acid and base centres can obtain a Zwitterion form.
- Some more examples include tricine, bicine, solid sulfamic acid, alkaloids like psilocybin etc.

Applications of Zwitterions:

- These are widely used in molecular biology for the separation process of protein molecules via SDS PAGE method, i.e.(sodium dodecyl sulfate-polyacrylamide gel electrophoresis).
- They also have great potential to be applied in a wide range of medical implants, drug delivery and biological related fields.
- They are also used as antifouling coatings of biomedical implants to prevent the build-up of microbial adhesion and biofilm formation.
- In the marine industry, they are used to prevent subaquatic organisms from building up on boats and piers.

Classification of Electrolytes:

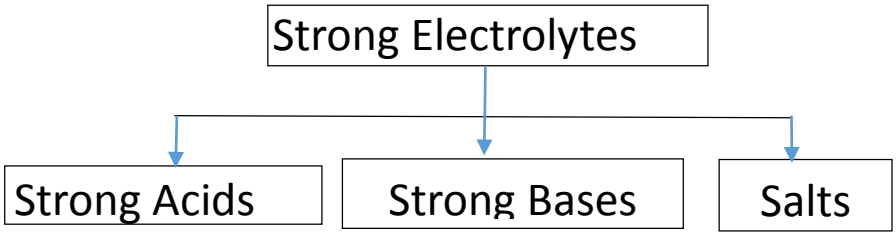
- Electrolytes are substances which on dissolving in water, break up into cations and anions. i.e they ionize.
- They are classified into two types. i.e



- Strong electrolytes ionize completely (100%), while weak electrolytes ionize only partially (usually on the order of 1–10%).

Strong electrolytes

- Strong electrolytes fall into three categories: i.e.



- Strong electrolytes are good conductors of electricity, but only in aqueous solutions or in molten form.
- A strong electrolyte has a high degree of dissociation (ionisation) in solution.
- The stronger an electrolyte the greater the voltage produced when used in a galvanic cell.
- Ostwald's dilution law is not applicable.
- Examples of strong electrolytes are given below:

Strong Electrolytes	Strong acids	HCl, HBr, HI, HNO_3, $HClO_3$, $HClO_4$, and H_2SO_4
	Strong bases	NaOH, KOH, LiOH, $Ba(OH)_2$, and $Ca(OH)_2$
	Salts	NaCl, KBr, $MgCl_2$, etc.