

Centurion UNIVERSITY Shaping Lives... Empowering Communities... PRINCIPLE, ELECTROCHEMICAL CELL

BY, LIPSA SAMAL ASST. PROF (PA & QA), SPLS, CUTM

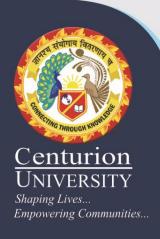
<u>Centric potentiometry</u>, the potential of an electrochemical cell is UNIVERSITY Shaping Lives... Empower Monassered under static conditions because no current flows while measuring a solution's potential, its composition remains unchanged.

- Information on a composition of the sample is obtained through the potential appearing between two electrodes.
- The first quantitative potentiometric applications appeared soon after the formulation of Nernst equation.
 - In 1889, the Nernst equation relating an electrochemical cell's potential to the concentration of electroactive species in the cell.

•

PRINCIPLE: The principle involved in the Potentiometry is when the pair of electrodes is placed in the sample solution it shows the potential difference by the addition of the titrant or by the change in the concentration of the ions.

 Potentiometric methods of analysis are based upon measurements of the potential of electrochemical cells under conditions of zero current, where the Nernst equation governs the operation of potentiometry



Nernst equation:

- Ecell = E0cell (RT/nF) lnQ
- Ecell = cell potential under nonstandard conditions (V)
- **E0cell** = cell potential under standard conditions
- **R** = gas constant, which is 8.31 (volt-coulomb)/(mol-K)
- T = temperature (K)
- n = number of moles of electrons exchanged in the electro chemical reaction (mol)
- F = Faradays constant, 96500 coulombs/mol
- \mathbf{Q} = reaction quotient



weil Reminischerence electrode is the electrode which contains of its own potential value and it is stable when dipped into sample solution.

- The salt bridge is used to prevent the interference of the analyte solution with that of reference solution.
- Here analyte solution is the solution whose potential is to be measured. The indicator electrode is the electrode which responds to change in the potential of analyte solution The electromotive force of the complete cell is given by the following equation

enturio **Ecell = Ereference + Eindicator + Ejunction** where E reference is the electromotive force of the reference electrode **E** indicator is electromotive force of indicator electrod, **E** junction is the electromotive force at the junction of the liquid WORKING OF ELECTROCHEMICAL CELL At its most basic, a potentiometer consists of two electrodes, whose reduction potentials differ, inserted in a test solution. The **voltmeter** is attached to the electrodes to measure the potential difference between them. One of the electrodes is a reference electrode, whose electrode potential is known.

<u>Centhron</u>other electrode is the test electrode. The test electrode is <u>UNIVERSITIES</u> either a metal immersed in a solution of its own ions, whose <u>Empowering Concentration</u> you wish to discover, or a carbon rod electrode sitting a solution which contains the ions of interest in two different oxidation states.

- Oxidation take place at anode. For example on zinc electrode Zn \rightarrow Zn2+ + 2e- 1.
- Reduction take place at cathode. For example on copper electrode Cu2+ + 2e→ Cu When redox reaction take place than potential is develop which is measured by galvanometer.
- Electrode Potential is the potential of electrochemical cell and can be represented as : E cell = E indicator - E reference +E j Ej= potential develops across the liquid junction at each end of salt bridge it is negligible.



THANK YOU