COULTER STKS

- Most popular, 1st introduced in 1987

3 SIMULTANEOUS MEASURMENTS

1. **VOLUMETRIC IMPEDANCE**
- For cell size

2. **HIGH-FREQUENCY ELECTROMAGNETIC ENERGY**
- For nuclear constituents

3. **LASER SCATTERING**
- Cell shape and granularity

ABOTT CELL-DYN

- Integrate the impedance method and flow cytometry method
- Accurately measure WBC
- PENTRA

ELECTROCHEMISTRY

- Involves the measurement of electrical signals associated with chemical system that are incorporated into an electrochemical cell

ELECTROANALYTICAL CHEMISTRY

- Makes use of electrochemistry for the purpose analysis
- The magnitude of a voltage or current signal originating from an electrochemical cell is related to the activity or concentration of a particular chemical species in the cell

ELECTROCHEMICAL TECHNIQUES

1. **POTENTIOMETRY**
- The most widely used clinical application of electrochemistry and involves the measurement of a cell potential (voltage) under equilibrium conditions

2. **COULOMETRY**
- Is an electrochemical titration in which the titrant is electrochemically generated and the endpoint is detected by amperometry

AMPEROMETRY

- The measurement of the electrical current at single applied potential

3. **VOLTAMETRY**
- Used to measure solution composition based on the current-potential relationship in an electrochemical cell when the potential is applied

POTENTIOMETRIC METHODS

- Based on the measurement of a potential or voltage difference between two electrodes immersed in solution under the condition of essentially zero current
- The measured potential is related to the molar concentration by the **Nernst equation**

ELECTRODES

1. **REFERENCE ELECTRODES**
- Produces constant potential

2. **INDICATOR ELECTRODES**
- Responds to changes in the activity of the particular species in solution

COULOMETRIC METHODS

- Involves the application of a constant current to generate a titrating agent
- The time required to titrate a sample at a constant current is measured and is related to the amount of analyte in a sample by **Faraday's equation**

VOLTAMETRIC METHODS (3 electrodes)

1. **WORKING**
2. **REFERENCE**
3. **AUXILLARY-** to sustain electrolysis

ELECTROLYSIS

- A nonspontaneous electrochemical reaction that results from the application of potential to an electrochemical cell

GLUCOSE ELECTRODE

- Based on amperometric determination

AMPEROMETRY

- A controlled-potential technique in which current is measured at a fixed applied potential
- Uses the enzyme ***glucose oxidase,*** immobilized between two membranes

Glucose oxidase
GLUCOSE ------→ Gluconic Acid + Hydrogen Peroxide

ELECTROPHOTORESIS

- The movement of charged particles because of an external electric field

ELECTRODES:

1. **CATHODE** – negatively charged
2. **ANODE** – positively charged

Thus;
Cations (+) ----------> Cathode (-)
Anions (-) ----------> Anode (+)