(b) Exocytosis:-

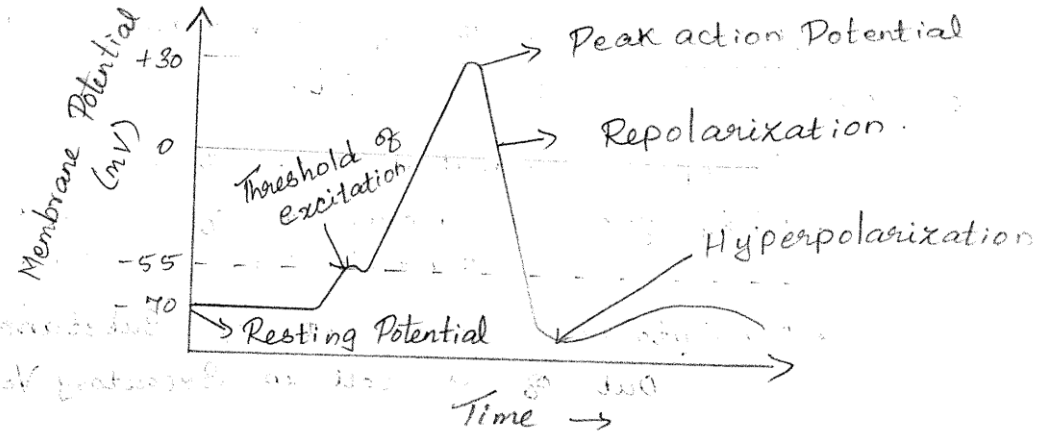
It is the movement of Substances out of a Cell in Secretory Vesicles that fuse with Plasma membrane and release their Contents into the extracellular fluid.

(c) Transcytosis

It is the movement of a Substance through a Cell as a result of endocytosis on one side and exocytosis on the opposite side.

Action Potential.

An action Potential is a rapid, transient Change in the electrical Potential across a Cell's membrane, Specifically a neuron or muscle Cell, that Propagates along the Cell.



Nernst Equation:-

The Nernst equation Provides the relation between the cell Potential of an electrochemical cell, the Standard Cell Potential, temperature and the reaction quotient.

It is often used to Calculate the Cell Potential of an electro-Chemical Cell. The equation was introduced by a German Chemist, Walther Hermann Nernst.

$$E_{cell} = E^\circ - \left[\frac{RT}{nF}\right] \ln Q$$

where,

E_{cell} = Cell Potential of the Cell.

E° = Cell Potential under Standard Conditions

R = Universal gas Constant. [8.314 J/K mole]

T = Temperature

n = number of electrons transferred in the redox reaction.

F = Faraday Constant. [≈ 96500 Coulomb/mole]

Q = reaction quotient.

The Calculation of Single electrode reduction Potential (E_{red}) from the Standard Single electrode reduction Potential (E°_{red}) for an atom/ion is given by the Nernst equation.

Derivation:-

Let us Consider a reversible equation.

$$M^{n+} + ne^- \overset{K}{\longleftrightarrow} M$$

$$K = \frac{[\text{Product}]}{[\text{Reactants}]} = \frac{[M]}{[M^{n+}]} \longrightarrow (1)$$

$$W_{max} = -nFE$$

But, $\Delta G = -nFE$, $\Delta G^* = -nFE^\circ$ —— (2).

We have,

$$\Delta G = \Delta G^\circ + RT \ln K.$$

Substituting (1) in (2) we get,

$$-nFE = -nFE^\circ + RT \ln \left[\frac{[M]}{[M^{n+}]}\right]$$

$$\frac{-nFE}{-nF} = \frac{-nFE^\circ}{-nF} + \frac{RT}{-nF} \ln \frac{[M]}{[M^{n+}]}$$

$$E = E^\circ - \frac{RT}{nF} \ln \frac{[M]}{[M^{n+}]}$$

Consisting Natural log(ln) to log.

$$E = E^\circ + \frac{RT}{nF} 2.303 \log \frac{[M^{n+}]}{[M]}$$

Substituting, R, T, & F, we get.

$$E = E^\circ + \frac{0.0591}{n} \log \frac{[M^{n+}]}{[M]}$$

↳ Nernst Equation

Application:-

* Single electrode reduction or oxidation Potential.
* Standard electrode Potentials.
* Comparing the relative ability as a reductive or oxidative agent.
* Emf of an electrochemical cell.

Solved Examples:-

1. The Standard electrode Potential of Zinc iorn is 0.76V. What will be the Potential of a 2M Solution at 300K?

Solu:-

Given: $E^\circ = 0.76\,V$, $n = 2$,
$F = 96500\ C/mole$, $[M^{n+}] = 2M$.
$R = 8.314\ J/K\ mole$, $T = 300K$.

$$E\left[\frac{M^{n+}}{M}\right] = E^\circ - \left[\frac{2.303RT}{nF}\right] \log \frac{1}{[M^{n+}]}$$

$$E\left[\frac{Zn^{2+}}{Zn}\right] = 0.76 - \left[\frac{(2.303 \times 8.314 \times 300)}{2 \times 96500}\right] \times \log\left[\frac{1}{2}\right]$$

$$= 0.76 + 0.009$$

$$= 0.769\ V$$

2. What is the cell Potential of the electro-chemical Cell in which the Cell reaction is $Pb^{2+} + Cd \rightarrow Pb + Cd^{2+}$? Given that $E^{\circ}_{cell} = 0.277$ Volts, temperature $= 25^{\circ}C$, $[Cd^{2+}] = 0.02\ M$, and $[Pb^{2+}] = 0.2\ M$.

Solu:- Given:- $E^{\circ} = 0.277\ V$, $T = 25^{\circ}C$, $n = 2$

$[Cd^{2+}] = 0.02\ M$ $[Pb^{2+}] = 0.2\ M$.

$$E_{cell} = E^{\circ} - \left(\frac{0.0592}{n}\right) \log_{10} Q$$

$$\frac{Cd^{2+}}{Pb^{2+}} = \frac{0.02\ M}{0.2\ M} = 0.1.$$

$$E = 0.277 - \left(\frac{0.0592}{2}\right) \log_{10}(0.1)$$

$$= 0.277 - (0.0296)(-1)$$

$$= 0.3066 \text{ Volts}.$$