ELECTROSTATICS SYMBOLS AND DEFINITIONS

PARAMETER NAME	SYMBOL	FORMULA	DEFINITION
ion	-	-	an atom, molecule, or radical that has gained or lost one or more electrons
ionization	-	-	any process by which an electrically neutral atom or molecule is converted into an electrically charged atom or molecule
counterion	-	-	oppositely charged free ion in solution relative to surface charge
coion	-	-	free ion in solution with same sign charge as surface charge
electrolyte solution	-		solution containing free ions, salt solution
dielectric material	-	-	an insulating material or a very poor conductor of electric current, when dielectrics are placed in an electric field, practically no current flows in them because, unlike metals, they have no loosely bound, or free, electrons that may drift through the material
electrical field	E	$E=F/q$ (Volt/meter)	region around an electric charge, q, in which an electric force, F, is exerted on another charge
electrical potential	ψ (or Φ depending on the text)	$E=\partial\psi/\partial x$ (Φ is in Volt)	the amount of work needed to move a unit charge from a reference point to a specific point against an electric field
permittivity	ε	($C^2J^{-1}m^{-1}$)	a universal electric constant which is a generalized, or large-scale, description of electric behavior that does not specify detailed features on the atomic dimension. It is a measure of the relative effectiveness of that substance as an electrical insulator or the extent of reduction of electric fields and consequently reduced strength of electrostatic interactions in a medium.
dielectric permittivity of free space	ε_o	$8.854 \bullet 10^{-12}$ $C^2J^{-1}m^{-1}$	Also known as, dielectric permittivity of free vacuum
static dielectric constant relative dielectric permittivity specific inductive capacity	DC ε_s	$\varepsilon_s=\frac{\varepsilon}{\varepsilon_o}$ (unitless)	dielectric permittivity of a substance normalized by dielectric permittivity of free vacuum

dielectric constant of free vacuum	ε_V	$\varepsilon_V = \frac{\varepsilon_o}{\varepsilon_o} = 1$	The perfect electrical insulator is a vacuum, which has a DC of 1.00000. By comparison, air has a DC of 1.00059, almost the same as a vacuum, and water (ε_w) has a DC value of 78.2.
polyelectrolyte ionomer	–	–	polymer with ionizable groups along its chain, carries fixed charge
electrical migration forces			Electrical force an ion feels in solution in response to the electrical field present.
electroquasistatic	$\frac{\partial}{\partial t}(\mu \mathbf{H}) \approx 0$		Negligible time-varying magnetic fields are present and therefore an electrical potential can be defined. (this is usually true unless you are standing in an MRI machine, for example)
magnetic field	H	(Tesla)	Field produced by either a magnet or by current flows.
Faraday's constant	*F*	96,500 C/mole	Amount of charge in one mole of electrons
Universal Gas constant	*R*	8.314 J/(moleK)	It's defined in terms of the Boltzman constant and Avogadro's number: $R = N_A k_B$
Debye Length	κ^{-1}	(nm)	Characteristic length of electrostatic interactions
Other handy references:			In Cartesian Coordinates:
	$\nabla \cdot \mathbf{E}$	Divergence of E	$= \frac{\partial E_x}{\partial x} + \frac{\partial E_y}{\partial y} + \frac{\partial E_z}{\partial z}$ E_x is the x, E_y is the y, and E_x is the z components of the E vector (takes a vector and makes a scalar)
	$\nabla \Phi$	Gradient of Φ	$= \hat{i}_x \frac{\partial \Phi}{\partial x} + \hat{i}_y \frac{\partial \Phi}{\partial y} + \hat{i}_z \frac{\partial \Phi}{\partial z}$ the î's are the unit directional vectors (so this takes a scalar and makes a vector)
	$\nabla^2 \Phi$	Laplacian of Φ (div grad Φ)	$= \frac{\partial^2 \Phi}{\partial x^2} + \frac{\partial^2 \Phi}{\partial y^2} + \frac{\partial^2 \Phi}{\partial z^2}$ (scalar in -> scalar out!)