Chem 119H - Fall 2020

Equations You Should Know

Energy

Kinetic Energy of a Particle	$E_K = \frac{1}{2}mv^2$	(m = mass, v = velocity)
Coulomb Potential Energy	$E_P = \frac{q_1 q_2}{4\pi\varepsilon_0 r}$	(q_1, q_2 = charges, r = separation distance, ε_0 = vacuum permittivity)

Quantum Mechanics

Electromagnetic Radiation	$c = \lambda\nu$	(c = speed of light, λ = wavelength, ν = frequency)
Planck's Equation	$E = h\nu = \frac{hc}{\lambda}$	(h = Planck's constant)
DeBroglie Equation	$\lambda = \frac{h}{mv} = \frac{h}{p}$	(m = mass, p = momentum)
Heisenberg Uncertainty	$\Delta p \Delta x \geq \frac{h}{4\pi}$	(p = momentum, x = position)

Gases

Ideal Gas Law	$PV = nRT$	

Equations Whose Implications You Should Know

Quantum Mechanics

Particle-in-a-Box Energies	$E_n = \frac{n^2h^2}{8mL^2}$	(n = 1, 2, 3, ..., E_n = energy of n^{th} state, m = mass, L = length)
Hydrogen Atom	$E_n = -\frac{Z^2e^4m_e}{8\varepsilon_0^2n^2h^2}$	(n = 1, 2, 3, ..., E_n = energy of n^{th} state, e = charge on electron)
Rydberg Equation	$\nu = \Re\left\{\frac{1}{n_1^2} - \frac{1}{n_2^2}\right\}$ $E_n = -\frac{Z^2h\Re}{n^2}$	(n = 1, 2, 3, ..., E_n = energy of n^{th} state, Z = Atomic number, $\Re$ = Rydberg constant)