Gas Formulas

Name	Formula	
Boyle's Law	$P_1V_1 = P_2V_2$	As the volume of a gas increases, pressure decreases (& vice-versa), as long as mass and temperature remain constant.
Charles' Law	$V_1T_2 = V_2T_1$	As the temperature of a gas increases, volume increases (& vice-versa), as long as mass and pressure remain constant
Gay-Lussac's Law	$P_1T_2 = P_2T_1$	As the temperature of a gas increases, pressure increases (& vice-versa), as long as mass and volume remain constant.
Combined Gas Law	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$	Rearrangement of Charles' and Boyle's Laws.
Avogadro's Law	$\frac{V_1}{n_1} = \frac{V_2}{n_2}$	As the amount of moles of a gas increases, volume increases (vice-versa), as long as pressure and temperature remain constant.
Ideal Gas Law	$PV = nRT$	n = Number of moles, R = Gas constant = 0.0821 L·atm/mol·K
Density/Molar Mass	$mmP = dRT$	mm = Molar Mass (grams) d = density (grams/Liter)
Graham's Law of Effusion	$\frac{Rate_{GasA}}{Rate_{GasB}} = \frac{\sqrt{Molar\,Mass_{GasB}}}{\sqrt{Molar\,Mass_{GasA}}}$	The lighter gas will diffuse more than the heavier gas.
Root Mean Square Velocity	$U_{rms} = \sqrt{\frac{3RT}{M}}$	Urms = Root Mean Square M = Molar Mass (kilograms) R = 8.3145 J/mol·K
Dalton's Law	$P_{total} = P_1 + P_2 + P_3 \ldots + P_n$	The total pressure of a mixture of gases is equal to the sumof the partial pressures of the component gases.
Mole Fraction	$X_a = \frac{n_a}{n_{total}}$	Ratio of moles of gas A to the total number of moles of all components.
Van der Waal's Equation	$(P + \frac{n^2a}{V^2}) \cdot (V - nb) = nRT$	Corrects the Ideal Gas Law for the volume of, and attractive forces between, gas molecules. **a** corrects pressure, taking into account molecular interactions. **b** corrects volume, as molecules in real gases have volume and take up space. (Van der Waals Constants)
Standard Pressures	$1atm = 760mmHg = 760torr = 101.325kPa = 1.01325bar$	
Standard Temperatures	$0°C = 32°F = 273.15K$	