5/27/2012

$$\frac{dP}{d\tau} = \frac{g}{\kappa} \qquad g \equiv -\frac{GM_*}{r^2}$$

$$dP = \frac{g}{\kappa} d\tau$$

$$P = \frac{R_g}{\mu} \rho T \leftarrow \text{ideal gas EoS}$$

$$\frac{\mu P}{R_g T} = \rho$$

μ = mean molecular weight. can calc. this fr. the ~~matter~~ metallicity if we assume all elements are completely ionized w/in the atmos, which I don't believe is entirely true.

$$P = \frac{k}{(\mu m_u)} \rho T \rightarrow \rho = \frac{\bar{\mu} P}{k_B T}$$

(k ← boltzman const.; μm_u ↑ avg. mass, i.e. mean molecular weight, $\bar{\mu}$)

$$\frac{1}{\bar{\mu}} = 2X + \frac{3}{4}Y + \frac{1}{2}Z$$

$X = 0.71 \quad Y = 0.272930 \quad Z = 0.01707$

$\bar{\mu} = 0.613308$