$$2KE + GPE = 0$$

$$2KE = -GPE$$

$$KE = \frac{3}{2}NkT$$

$$GPE = -\frac{3}{5}\frac{GM^2}{R}$$

$$N = \frac{M}{\mu\, m_H}$$

$$M = N\,\mu\, m_H$$

$$2\left[\frac{3}{2}\,\frac{M}{\mu\, m_H}\,kT\right] = \frac{3}{5}\,\frac{GM^2}{R}$$

$$M = \frac{4\pi}{3}R^3\,\rho$$

$$R = \left[\frac{3M}{4\pi\rho}\right]^{1/3}$$

$$\frac{kT}{\mu\, m_H} < \frac{1}{5}GM^{2/3}\left(\frac{4\pi\rho}{3}\right)^{1/3}$$

$$M_J = \left[\frac{5kT}{\mu\, m_H G}\right]^{3/2}\left(\frac{3}{4\pi\rho}\right)^{1/2}$$