

b) after reaching the above temperature the process is constant volume / density when more heat is added.

$$dg = \cancel{de} + P \cancel{dV} \quad \text{O, const. vol.}$$

$$\text{specific} \uparrow = \frac{dQ}{m} \quad C_v dT$$

⇒

$$\frac{Q}{m} = C_v (T - T_i)$$

↑ initial temp at start of extra heat addition

$$T_i = \frac{Mg}{mR} (H-d)$$

⇒

$$T = \frac{Mg}{mR} (H-d) + \frac{Q}{mC_v}$$

and

$$P = \rho R T$$

$$\uparrow \text{const } \rho = \frac{m}{xA} = \frac{m}{(H-d)A}$$

⇒

$$P = \frac{mR}{(H-d)A} \left[\frac{Mg}{mR} (H-d) + \frac{Q}{mC_v} \right]$$