

The first law of thermodynamics is defined as $de = \delta q + \delta w$.

Enthalpy is defined as $h = u + p\nu$.

The ideal gas law is defined as $P = \rho RT$.

Specific heats are c_p and c_ν .

The change in entropy can be expressed as $ds = \frac{\delta q}{T} + ds_{irreversible}$.

$$Tds = dh - \nu dp$$

$$Tds = de + \nu dp$$

$$s_2 - s_1 = c_p \ln\left(\frac{T_2}{T_1}\right) - R \ln\left(\frac{p_2}{p_1}\right)$$

$$\frac{p_2}{p_1} = \left(\frac{\rho_2}{\rho_1}\right)^\gamma$$

$$\frac{p_2}{p_1} = \left(\frac{T_2}{T_1}\right)^{\frac{\gamma}{\gamma-1}}$$