

Thermodynamics

1st Law of Thermodynamics	$du = dq - dw$
TDS Equation 1	$Tds = du + pdv$
TDS Equation 2	$Tds = dh - vdp$
Enthalpy	$h = u + pv$

Ideal Gas

Ideal Gas Equation	$pv = RT$
Constant Volume	$c_v = (\partial u / \partial T)_v$ $du = c_v(T) dT$
Constant Pressure	$c_p = (\partial h / \partial T)_p$ $dh = c_p(T) dT$
Thermal coefficients	$c_p = c_v + R$ $\gamma = k = \frac{c_p}{c_v}$
Specific Enthalpy of Gases	$h = u + pv = u(T) + RT = h(T)$ \Rightarrow does not depend on pressure

Ideal Gas – Isentropic Conditions

$$\frac{T_2}{T_1} = \left(\frac{p_2}{p_1} \right)^{\frac{\gamma-1}{\gamma}} \quad \frac{T_2}{T_1} = \left(\frac{v_2}{v_1} \right)^{\gamma-1}$$
$$\frac{p_2}{p_1} = \left(\frac{v_1}{v_2} \right)^{\gamma}$$