

TABLE 19.1 Summary of ideal-gas processes

Process	Gas law	Work W_s	Heat Q	Thermal energy
Isochoric	$p_i/T_i = p_f/T_f$	0	$nC_V \Delta T$	$\Delta E_{th} = Q$
Isobaric	$V_i/T_i = V_f/T_f$	$p \Delta V$	$nC_P \Delta T$	$\Delta E_{th} = Q - W_s$
Isothermal	$p_i V_i = p_f V_f$	$nRT \ln(V_f/V_i)$ $pV \ln(V_f/V_i)$	$Q = W_s$	$\Delta E_{th} = 0$
Adiabatic	$p_i V_i^\gamma = p_f V_f^\gamma$ $T_i V_i^{\gamma-1} = T_f V_f^{\gamma-1}$	$(p_f V_f - p_i V_i)/(1 - \gamma)$ $-nC_V \Delta T$	0	$\Delta E_{th} = -W_s$
Any	$p_i V_i/T_i = p_f V_f/T_f$	area under curve		$\Delta E_{th} = nC_V \Delta T$