

$$(P_0, V_0, T_0) \rightarrow (P_1, V_1, T_1)$$

(a) Isothermal at T_0 ; change P_0 to P_1 } Process
isobaric at P_1 , change T_0 to T_1 } B.

(b) Isobaric at P_0 , change T_0 to T_1 }
Isothermal at T_1 , change P_0 to P_1 } Process A

(c) Isochoric at V_0 , change T_0 to T_1 }
Isothermal at T_1 , change V_0 to V_1 } Process D.

(d) Isochoric at V_0 , change P_0 to P_1 }
Isobaric at P_1 , change V_0 to V_1 } "Process E"

(e) Isothermal at T_0 , $V_0 \rightarrow V_1$ } Process C.
Isochoric at V_0 , $T_0 \rightarrow T_1$ } "Missed writing this"

Process B:

(a) Isothermal at T_0 ; $P_0 \rightarrow P_1$.

$$\Delta U_1 = 0, q_1 = -w_1 = +RT_0 \ln\left(\frac{V_1}{V_0}\right)$$

Isobaric at P_1 ; $T_0 \rightarrow T_1$.

$$P_1 \frac{V_0}{T_0} = \frac{V_1}{T_1} \cdot P_1 \text{ or } V_1 = \left(\frac{T_1}{T_0}\right) \cdot V_0.$$

$$w_2 = -P_1(V_1 - V_0) = -P_1 \left[\left(\frac{T_1}{T_0}\right) - 1\right] V_0 \\ = -P_1 V_0 \left(\frac{T_1}{T_0} - 1\right)$$

$$q_2 = C_p(T_1 - T_0)$$

$$\Phi = q_1 + q_2 = +RT_0 \ln\left(\frac{V_1}{V_0}\right) + C_p(T_1 - T_0)$$

$$W = w_1 + w_2 = -RT_0 \ln\left(\frac{V_1}{V_0}\right) - P_1 V_0 \left(\frac{T_1}{T_0} - 1\right)$$

$$= -RT_0 \ln\left(\frac{V_1}{V_0}\right) - \frac{RT_1}{V_1} \left(\frac{V_0}{V_1}\right) \left(\frac{T_1}{T_0} - 1\right)$$

$$= -RT_0 \ln\left(\frac{V_1}{V_0}\right) - RT_1 \left(\frac{V_0}{V_1}\right) \left(\frac{V_1}{V_0} - 1\right)$$

$$W = -RT_0 \ln\left(\frac{V_1}{V_0}\right) - RT_1 + RT_1 \left(\frac{V_0}{V_1}\right)$$

$$\Delta U = \Delta U_1 + \Delta U_2$$

$$= C_p(T_1 - T_0) - P_1 V_0 \left(\frac{T_1}{T_0} - 1\right)$$