339. 9-6.

(1) $P_0V_0 = \nu RT_1 \Rightarrow$, $V_0 = S\cdot l_1 \Rightarrow P_0 = \frac{\nu RT_1}{Sl_1} = 1.13\times10^5$ Pa.

$P = (mg + P_0S)/S = 1.52\times10^5$ Pa. $\therefore P_0 < P$

∴ 先等容，再等压.

(2) 等体: $\Delta P \cdot V = \nu R\Delta T \Rightarrow \Delta T = \frac{\Delta PV}{\nu R}$, $Q_1 + A = \Delta E_1 = \frac{3}{2}\nu R\Delta T$

又 $A_1 = 0$ ∴ $Q_1 = \frac{3}{2}R\Delta T = \frac{3}{2}\Delta P S l_1 = 1170$ J

等压: $Q_2 + A_2 = \Delta E_2 = \frac{3}{2}\nu R\Delta T'$, $P\Delta V = \nu R\Delta T' = P\cdot Sl_2$

∴ $\Delta T' = \frac{Psl_2}{\nu R}$, $A_2 = -P\cdot\Delta V$ ∴ $Q_2 = \frac{5}{2}R\frac{Psl_2}{\nu R} + P\Delta V = \frac{5}{2}Psl_2$

$= 384$ J

∴ $Q = Q_1 + Q_2 = 4920$ J

34V. 9-7

a-c: 等压过程, $Q = \Delta E - A =$

$Q + A = \Delta E = \frac{3}{2}(P_2V_2 - P_1V_1)$, $A = -\int p\,dV$

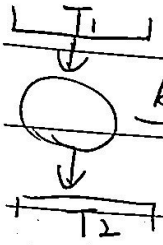
∴ $Q = \int p\,dV =$ 1.5×10⁶ J

34V. 9-9.

$Q + A = \Delta E = \frac{5}{2}(P_2V_2 - P_1V_1)$, $A = -\int p\,dV = -\frac{1}{2}(P_1+P_2)\cdot(V_2-V_1)$

∴ $W = \frac{1}{2}(P_1+P_2)(V_2-V_1)$, $Q = \Delta E - A = \Delta E + W = \frac{1}{2}(P_1V_2 - P_2V_1 + 6P_2V_2 - 6P_1V_1)$

340. 9-12



$\begin{cases} PV^\gamma = \text{Const.} \\ PV = \nu RT \end{cases}$ ⊕

$-A_1 = \Delta E = \frac{i}{2}\nu R(T_2 - T_1) \Rightarrow A_1 = \frac{i}{2}\nu R(T_1 - T_2)$.

(1) $A_2 = \frac{i}{2}\nu R(T_1' - T_2) \Rightarrow T' = \frac{A_2}{A_1}T_1 + (1 - \frac{A_2}{A_1})T_2$

(2) $\eta = \frac{A_2}{Q_1} = 1 - \frac{T_2}{T_0} = 1 - \frac{A_1 T_2}{A_2 T_1 + (A_1 - A_2)T_2} = \frac{A_2 T_1 - A_2 T_2}{A_2 T_1 + (A_1 - A_2)T_2}$

340. 9-13

(1) ~~$Q = \nu C_m \Delta T$~~, $PV^n = \text{const.}$ ∴ $2 \cdot 1 = 1 \cdot 3^n \Rightarrow n = \log_3 2$

$C_m = \frac{\gamma - n}{1 - n} C_{V,m} = \frac{\frac{5}{3} - \log_3 2}{1 - \log_3 2} \cdot \frac{5}{2} R = 43.3\ \text{J/(mol·K)}$

(2) $\eta = \frac{A}{Q}$. $A = 2 \times 2 \times 100 - 274.45 = 125.55\text{J}$

~~$Q = C_m \Delta T$~~, ~~ΔT~~ Q为吸热量. ∵ $n < \gamma$ ∴ C→a 放热.

a→b 经等压: $Q = \frac{i+2}{2}(P_b V_b - P_a V_a) = \frac{7}{2} \cdot 400 = 1400\text{J}$.

b→c 经等体: $Q = \frac{i}{2}(P_c V_c - P_b V_b) < 0$ ∴ 放热, 不计

∴ $\eta = \frac{125.55}{1400} = 8.97\%$.