339.9-1

$E = \frac{3}{2}P_0V_0 = \frac{3}{2}P'2V_0 \Rightarrow P' = \frac{1}{2}P_0$

$P_1V_0 = \nu RT_1$, $dE = \delta A = -pdV$

$\therefore \nu C_{V,m}dT = -pdV$, $pdV + Vdp = \nu R dT$

$\therefore (C_{V,m}+R)pdV + C_{V,m}Vdp = 0 \Rightarrow C_{p,m}pdV + C_{V,m}Vdp = 0$

又 $C_{p,m} : C_{V,m} = i+2 : i = 5:3$ $\therefore \frac{5}{3}\frac{dV}{V} = -\frac{dp}{p}$

$\therefore \frac{5}{3}\ln V + C_1 = -\ln p$ 由 $p = \frac{1}{2}P_0$ 时, $V = 2V_0$ 得.

$pV^{\frac{5}{3}} = \frac{1}{2}P_0(2V_0)^{\frac{5}{3}}$ 当 $V = V_0$ 时. $P_1 = 2^{\frac{2}{3}}P_0 = 4^{\frac{1}{3}}P_0$

$P_1 = P_0 = T_1 : T_0 \Rightarrow T_1 - T_0 = 166.4K$

339.9-2

$A = -W$, $A + Q = E_2 - E_1$, $Q = C_{p,m}\cdot\Delta T =$

$E_2 - E_1 = \frac{i}{2}p(V_1 - V_0)$, $i+2 : i = \gamma \Rightarrow i = \frac{2}{\gamma-1}$

$\therefore pV = \nu RT \Rightarrow \Delta T = \frac{p}{\nu R}(V_1 - V_0)$

$E_2 - E_1 = \frac{\nu R i}{2}\Delta T$

$E_2 - E_1 = \nu C_{V,m}\Delta T$ $\therefore \Delta E : Q = \gamma - 1 : \gamma$, $\Delta E + W = Q$.

$\therefore \Delta E = \frac{W}{\gamma-1}$ $\Delta\bar{\varepsilon} = \Delta E / N_A = \frac{W}{(\gamma-1)N_A}$

339.9-3

(1) $C_{V,m} = 2.2R = \frac{\bar{i}}{2}R \Rightarrow \bar{i} = 4.4$,

$\begin{cases} 4X + 2Y = 5.2 \\ \frac{3X+5Y}{X+Y} = 4.4 \end{cases} \Rightarrow \begin{cases} X = 0.6\text{mol} \\ Y = 1.4\text{mol} \end{cases}$

$\therefore 0.6\text{mol}$ He, 2.4g ; 1.4mol H_2, 2.8g.

(2) $A + Q = E_2 - E_1$, $\gamma = \frac{\bar{i}+2}{\bar{i}} = \frac{16}{11}$

$Q = \Delta E = \frac{\gamma}{\gamma-1}W = 160J$

359. 9-4

(1) ~~$Q_{ac} = \nu C_V \Delta T$~~, ~~$Q_{cb} =$~~

在ac阶段不做功. ~~$Q = \Delta E = 336$~~J

在cb阶段做功. $W = -A = 120$J

$\Delta E = Q - W = 208\text{J} = \frac{i}{2} P_0 V_1 - \frac{i}{2} P_0 V_0$

$\therefore \Delta E = Q' - W' \Rightarrow Q' = \Delta E + W' = 208 + 42 = 250$J

(2) $Q = \Delta E + A = -208 - 84 =$ ~~-114~~J $\therefore$ 放热 -292J

339. 9-5

$A = \int_{V_1}^{V_2} \frac{a^2}{V^2} dV = \cdot \frac{a^2}{V} \Big|_{V_1}^{V_2} = \left(\frac{1}{V_2} - \frac{1}{V_1}\right) a^2$

$W = -A = \left(\frac{1}{V_1} - \frac{1}{V_2}\right) \cdot a^2$

$pV = \nu RT \Rightarrow T_1 = \frac{1}{\nu R}\left(\frac{a^2}{V_1}\right) \quad T_2 = \frac{1}{\nu R}\left(\frac{a^2}{V_2}\right)$

$\therefore T_1 - T_2 = \frac{a^2}{\nu R}\left(\frac{1}{V_1} - \frac{1}{V_2}\right)$