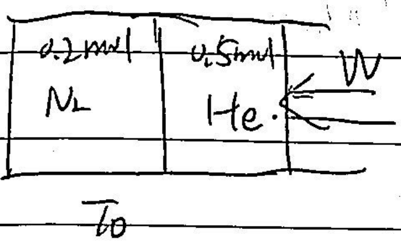
341. 9-20

$\Delta S = C_V \ln\frac{T_2}{T_1} + \nu R \ln\frac{V_2}{V_1}$

$C_V = \frac{5}{2}\nu R$. $p_1V_1 = \nu R T_1 \Rightarrow \nu R = \frac{p_1V_1}{T_1}$

$\therefore \Delta S =$ ~~$\frac{5}{2}\frac{p_1V_1}{T_1} + \frac{}{T_1}$~~ $\frac{5}{2}\frac{p_1V_1}{T_1}\ln\frac{T_2}{T_1} + \frac{p_1V_1}{T_1}\ln\frac{V_2}{V_1}$.

341. 9-21



对N_2: $Q = \Delta E = \frac{5}{2}\cdot 0.2R\Delta T$.

对He. $-Q + W =$ ~~$\frac{3}{2}\cdot 0.5 R\Delta T$~~ $\frac{3}{2}\cdot 0.5R\Delta T$

$\therefore \Delta T = \frac{4W}{5R}$, $T_1 = T_0 + \frac{4W}{5R}$

~~$\therefore C_{n,m} = \frac{-Q}{\Delta T\nu} = $ [illegible] $R = \frac{\gamma - n}{1-n} C_{V,m}$ [illegible]~~

~~$\therefore \begin{cases} pV^n = const \\ pV = \nu RT \end{cases} \Rightarrow$ [illegible] $\frac{1}{T_1}$ $\therefore$ [illegible] $V_1 : V_0 = T_0^3 : T_1^3$~~ ~~$V_1 = V_0 =$~~

~~$\therefore \Delta S = \nu C_{V,m}\ln\frac{T_1}{T_0} + \nu R\ln\frac{T_0}{T_1} = (\frac{3}{2}$ [illegible]$) \ln\frac{T_1}{T_0} = \frac{R}{4}\ln(1+\frac{4W}{5RT_0})$~~

$\Delta S_{He} + \Delta S_{N_2} = 0$. $\Delta S_{N_2} = \int \frac{\nu C_{V,m} dT}{T} = \frac{R}{2}\ln(1+\frac{4W}{5RT_0})$ $\therefore \Delta S_{He} = -\frac{R}{2}\ln(1+\frac{4W}{5RT_0})$

9-22

$\nu = \frac{m}{M}$, $i=5$, $A + Q = \Delta E = 0 \Rightarrow \Delta T = 0$.

$\Delta S = \nu R \ln\frac{V_1}{V_0} = \frac{m}{M} R \ln\frac{3}{2}$

9-2φ.

$a \to b$: $Q + A = 0 \Rightarrow Q = -A = \int p dV = \int_{V_a}^{V_b} \frac{\nu R T_a}{V} dV = \nu R T_a \ln 3$ $\therefore \Delta S = (\ln 3)\nu R$

$b \to c$: $Q = \Delta E$, $dE = C_V dT$. $P_aV_a^\gamma = P_cV_b^\gamma \Rightarrow P_c = P_a(\frac{1}{3})^{\frac{7}{5}}$ $= \frac{P_aV_a}{T_a}\ln 3$

$\therefore \Delta S = C_V \ln\frac{T_2}{T_1} = C_V \ln\frac{p}{p_0} = \frac{5}{2}\nu R \ln\frac{1}{3}\cdot\frac{7}{5} = \nu R\ln\frac{1}{3} = -\frac{P_aV_a}{T_a}\ln 3$

$c \to a$, 可逆绝热 $\Delta S = 0$

9-26.

(1) $pV = \nu RT$ ~~[illegible]~~ $A + Q = \Delta E = 0$ ∴ $T = 300.15K$ 不变.

$\Delta S = \nu R \ln 2 = \cdots$ $A = 0,\ Q = 0$

(2) 等压过程. ~~[illegible]~~, $A = -\int p dV = -p\int dV = -p\Delta V$

$Q + A = \Delta E$ ~~[illegible]~~, $Q = \nu C_{p,v} \Delta T$, $\delta Q = \nu C_{p,v} dT$

∴ $\Delta S = \int \frac{\delta Q}{T} = \int \frac{\nu C_{p,v}}{T} dT$, $pV = \nu RT \Rightarrow T_2 = 2T_1$;

$= \nu C_{p,v} \ln 2 = 1 \times \frac{i+2}{2} R \ln 2 = \frac{7}{2} R \ln 2$