Ch19. 4, 14, 21, 26, 27, 28, 37, 51.

4. (a) $W = p\Delta V = 5.1\,J$. $\Delta E_{int} = 22.5 - 5.1 = 17.4\,J$

(b). $pV_i = nRT_i$. $T_i = 304.83K$.

$T_f = 609.66$ $\therefore C_p = \frac{Q}{n\cdot\Delta T} = 36.9\,J/mol\cdot K$

(c). $C_v = C_p - R = 28.59\,J\cdot mol^{-1}\cdot K^{-1}$.

14. $\Delta E_{int} = 5.5\times10^3 \times 2 \times \frac{1}{2} = 5.5\times10^3\,J$.

(a) $Q = n\cdot C_v\cdot\Delta t$

For diatomic gas $C_v = \frac{5}{2}R$ $PV = nRT$.

$\Delta E_{int} = n\cdot C_v\Delta t = \frac{5}{2}n\cdot R\cdot\Delta t$

$= \frac{5}{2}nR\left(\frac{P_cV_c}{nR} - \frac{P_aV_a}{nR}\right) = \frac{5}{2}(P_cV_c - P_aV_a) = -20kJ$.

(b) $Q - W = \Delta E_{int}$ $\therefore Q = -20\times10^3 + 5.5\times10^3$.

$= -14.5\,kJ$.

(c). $W' = 10kJ$. $\therefore Q = -10kJ$

21. $W = nRT\cdot\ln\frac{V_f}{V_i}$ $\therefore Q = nRT\ln\frac{V_f}{V_i}$

$\int p\,dV$.

$\frac{V_f}{V_i} = e^{\frac{Q}{nRT}}$ $V_i = \frac{V_f}{e^{\frac{Q}{nRT}}} = 0.2m^3$

$T = \frac{1000}{\ln\frac{0.3}{0.2}\cdot 0.845\times 8.314} = 529.33K$.

$C_v = \frac{5}{2}R$. $C_p = \frac{7}{2}R$ $\gamma = \frac{7}{5}$.

$P_i V_i^{\gamma} = P_f V_f^{\gamma}$. $V_f = V_i \left(\frac{P_i}{P_f}\right)^{\frac{1}{\gamma}}$

$W = -n C_v (T_f - T_i)$.

$C_v = \frac{R}{\gamma - 1}$. $W = -\frac{nR}{\gamma - 1}(T_f - T_i)$

代入 $W = -2345.5\,J$.

2)

(a) $P_i V_i^{1.4} = P_f V_f^{1.4}$. $\therefore P_f = 0.0106\ atm$

(b) $P_i V_i = nRT_i$ $T_f = T_i \cdot \frac{P_f V_f}{P_i V_i} = 1999.1\,K$.

$T_i V_i^{0.4} = T_f V_f^{0.4}$.

28. $v_{avg} = \sqrt{\frac{8RT_1}{\pi M}}$. $v_p = \sqrt{\frac{2RT}{M}}$

$v_{avg} = v_p \therefore \frac{T_2}{T_1} = \frac{4}{\pi}$

37. $v_{rms} = \sqrt{\frac{3RT}{M}}$. $\therefore v = 182.6\,m/s$

$M(H_2)$ 查得.

51. (a) $\lambda = \frac{1}{\sqrt{2}\pi d^2 N/V}$. $N/V = 1 \times 10^6\ molecules/m^3$

$\lambda = 5.63 \times 10^{12}\,m$

(b). value is too large so it's meaningful.