Correction DT7

1) a) $m_0 = m_0 M_0 = \dfrac{P_{A_0} d_{A_0} S}{RT_{A_0}} M_0 = 2{,}56 g$

de la même façon on trouve $m_1 = 1{,}68 g$

b) O_2 : isochore + monotherme

$\llcorner_D d_{B_0} = 0{,}2m$ $\llcorner_D T_{B_0} = 600K$ $\Rightarrow P_{B_0} = 2P_{A_0} = 2 bar$

c) N_2 : monotherme + monobare

$\llcorner_D T_{B_1} = 600K$ $\llcorner_D P_{B_1} = 1 bar$ $\Rightarrow V_{B_1} = 2V_{A_1} \Rightarrow d_{B_1} = 0{,}3m$

d) $\left(W_{A\to B}\right)_0 = 0$ car isochore $\left(W_{A\to B}\right)_1 = -P_{atm} S(d_{B_1} - d_{A_1}) = -150 J$

(car monobare)

e) $\left(Q_{A\to B}\right)_0 = \left(\Delta U_{A\to B}\right)_0 = \dfrac{m_0 R}{M_0 (\gamma - 1)} \times (T_{B_0} - T_{A_0}) = 499 J$

$\left(Q_{A\to B}\right)_1 = \left(\Delta U_{A\to B}\right)_1 - \left(W_{A\to B}\right)_1$ ou $= \left(\Delta H_{A\to B}\right)_1 = \dfrac{m_1 R \gamma}{M_1 (\gamma - 1)}(T_{B_1} - T_{A_1})$

$= \dfrac{m_1 R}{M_1 (\gamma - 1)}(T_{B_1} - T_{A_1}) - \left(W_{A\to B}\right)_1$ (car $P_i = P_f = P_{ext} = Cte$)

$= 524 J$

f) $\left(\Delta S_{AB}\right)_0 = \dfrac{m_0 R}{M_0 (\gamma - 1)} \ell u \dfrac{T_{B_0}}{T_{A_0}} = 1{,}15 J.K^{-1}$

$\left(\Delta S_{AB}\right)_1 = \dfrac{m_1 R}{M_1 (\gamma - 1)} \ell u \dfrac{T_{B_1}}{T_{A_1}} + \dfrac{m_1 R}{M_1} \ell u \underbrace{\left(\dfrac{V_{B_1}}{V_{A_1}}\right)}_{= d_{B_1}/d_{A_1}} = 1{,}21 J.K^{-1}$

h) $\Delta S_{total} = 1{,}15 + 1{,}21 = 2{,}36 \ J.K^{-1}$

$S^e = S^e_1 + S^e_0 = \dfrac{(Q_{A\to B})_0}{T_S} + \dfrac{(Q_{AB})_1}{T_S} = 1{,}7 \ J.K^{-1}$ $S^c = \Delta S_{total} - S^e = 0{,}66 \ J.K^{-1}$

2) a) $T_{C_0} = T_{C_1} = 600K$ $P_{C_0} = P_{C_1}$

b) $\Rightarrow \left.\begin{array}{l} P_{C_0} V_{C_0} = m_0 R T_{C_0} \\ P_{C_1} V_{C_1} = m_1 R T_{C_1} \end{array}\right\} \Rightarrow \dfrac{d_{C_0}}{d_{C_1}} = \dfrac{m_0 R}{m_1 R} = \dfrac{m_0 M_0}{m_1 M_1} = 1{,}334$ $\left|\begin{array}{l} \text{on résout} \\ \text{le système} \end{array}\right.$

$d_{C_0} + d_{C_1} = d_{B_1} + d_{B_0} = 0{,}5 m$ $\left|\begin{array}{l} d_{C_0} = 0{,}286 m \\ d_{C_1} = 0{,}214 m \end{array}\right.$

$\Rightarrow P_{C_0} = P_{C_1} = 1{,}4 bar$

c) $\Delta U_{BC} = (\Delta U_{BC})_0 + (\Delta U_{BC})_1 = 0 + 0 = 0$ car $T_i = T_f$ pr 1 et 0.

$\Delta S_{BC} = m_1 R \ell u \dfrac{V_{C_1}}{V_{B_1}} + m_0 R \ell u \dfrac{V_{C_0}}{V_{B_0}} = 0{,}0695 J.K^{-1}$

d) $S^e = \dfrac{Q_{total}}{T_i} = -\dfrac{W_{total}}{T_i}$ car $\Delta U_{BC} = 0$ n $W_{total} = 0$ car $V_{total} = Cte \Rightarrow S^e = 0 \Rightarrow S^c = \Delta S_{BC}$