

CHE260: Tutorial Problems

Tutorial 2 Solutions

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1. We have

$$W = - \int_{V_1}^{V_2} A/V + B \, dV \quad (1)$$

$$= [A \ln(V_1) + BV_1] - [A \ln(V_2) + BV_2] \quad (2)$$

$$= A \ln(V_1/V_2) + B(V_1 - V_2) = -12.59 \text{ kJ} \quad (3)$$

2. We first find the final pressure:

$$P_2 = P_1 \left(\frac{V_1}{V_2} \right)^{1.35} = 2.00 \text{ bar}. \quad (4)$$

$$W = \frac{P_2 V_2 - P_1 V_1}{n - 1} = -1284 \text{ kJ}. \quad (5)$$

3. The initial volume is given by V_1 such that

$$P_1 V_1 = mRT \implies V_1 = \frac{mRT}{P_1} = 0.1259 \text{ m}^3. \quad (6)$$

so $PV^{1.2} = 49.91$. and the final gas pressure is given by

$$P_2 V_2 = mRT \implies P_2 \left(\frac{85.87}{P_2} \right)^{0.833} = mRT \quad (7)$$

or

$$25.67 P_2^{0.167} = mRT \implies P_2 = 1.10 \text{ bar} \quad (8)$$

where the error comes from lazy rounding.