Problem 2.48

From 0 to 10K, heat capacity is given by

\[ C(T) = aT^3 \]

\[ a = \frac{0.009}{10^3} \]

\[ a = 9 \times 10^{-6} \]

\[ H_1 = \int_{0}^{10} a \, dT \]

\[ H_1 = 9 \times 10^{-5} \]

For the region 10 to 296, I used EXCEL program to make third order polynomial fit

\[ C_p(T) = -0.00000589 \cdot T^3 + 0.0030914 \cdot T^2 - 0.11516665 \cdot T + 0.63237988 \]

\[ H_2 = \int_{10}^{296} C_p(T) \, dT \]

\[ H_2 = 1.002 \times 10^4 \]

So, let \( H_{296} - H_0 = \eta \)

\[ \eta = H_1 + H_2 \]

\[ \eta = 1.002 \times 10^4 \, \frac{J}{\text{mol}} \]