Answer on Question #48131 – Chemistry – Physical Chemistry

Question:

Calculate the value of Delta H when the temperature of 1 mole of a monatomic gas is increased from 25 degree C to 300 degree C.

Answer:

Because $Q = \Delta H$ when the volume is constant, the change in enthalpy can always be written:

$$\Delta H = n*C_V*\Delta T$$

where

n is amount of substance;

C_V is the molar heat capacity at constant volume of the gas;

ΔT is the change of temperature.

For a monatomic ideal gas:

$$C_V = (3/2)*R = (3/2)*8.314 = 49.86 \text{ J/(mol*K)}$$

Then

$$\Delta H = 1*49.86*(300-25)= 13711.5 \text{ J/mol} \approx 13.7 \text{ kJ/mol}$$

Answer: 13.7 kJ/mole