Chemistry-4311
September 19, 2014

Quiz #3 **Name** Key

R = 8.314 J/mol-K = 0.08206 L-atm/mol-K = 1.987 cal/mol-K, $N_A = 6.02 \times 10^{23}$

1. Matching (Use a letter only once)

The enthalpy H equals e.

For an ideal gas, Cp – Cv equals h.

The probability a molecule has energy E, is proportional to the Boltzmann factor a.

For an adiabatic process, c is zero.

For a constant volume process and only P-V work, q_v equals f.

a. $\exp(-E/k_BT)$
b. RT
c. q
d. exp(-RT)
e. U + PV
f. ΔU
g. w
h. R ← should be nR
i. ΔH
j. U + PΔV

2. One mole of an ideal gas is heated a constant pressure from 25 to 100 °C. Determine (4) ΔU, ΔH, q, and w for this heating. Cp = 5/2R for this one mole. 5/2 R

$\Delta H = C_p \Delta T = 5/2 \times 8.314 \times 75 = 1559\ J = 15.39\ L\text{-}atm$

$\Delta U = C_V \Delta T = 3/2 \times 8.314 \times 75 = 935\ J = 9.23\ L\text{-}atm$

$q_p = \Delta H = 1559\ J$

$\Delta U = q_p + w, \quad w = \Delta U - q_p = 935 - 1559$
$= -624\ J$

3. The heat transfer for heating one mole of liquid water from 10 to 50 °C is 3012 J. (1) What is the molar heat capacity for liquid water?

$q = C\ \Delta T$

$C = 3012\ J/40\ K = 75.3\ J/K$