Chemistry-4311
September 12, 2014

Quiz #2 **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 number of collisions a molecule undergoes per unit time is called the g .

The rate of effusion for CO_2 is i than that for H_2.

The first law of thermodynamics says the e of the universe is constant.

The work associated with the expansion/compression of a gas at constant pressure is j .

The heat for a temperature change is given by b .

a. faster
b. $q = \int C dT$
c. mean free path
d. $w = -nRT\ln(V_2/V_1)$
e. energy
f. heat
g. collision frequency
h. $q = \int dT/C$
i. slower
j. $w = -P_{ex}\Delta V$

2. Calculate the work in joules when one mole on an ideal gas is compressed isothermally at 25 °C from 2.0 atm and 2.0 L to 4.0 atm and 1.0 L.

(2) $w = -nRT \ln V_2/V_1 = -1 \times 8.314 \times 298 \times \ln(1/2)$

$= 1,717\ J = 1.717\ kJ$

3. a. Show that for a constant volume process, with only P-V work, that $\Delta U = q$.

(1) $\Delta U = q + w$

with only P-V work

$\Delta U = q - P_{ex}\Delta V$

$\Delta V = 0$

$\Delta U = q_V$

b. The internal energy U for an ideal gas is 3RT/2. Calculate q in joules for heating an ideal gas at constant volume from 25 °C to 100 °C. I should have said one mole!!

(2) $q_V = \Delta U = 3/2\ R(T_2 - T_1) = 3/2 \times 8.314 \times (100°C - 25°C)$

$= 3/2 \times 8.314 \times 75\ J$

$= 935\ J$