

Chemistry-4311  
September 16, 2016

Quiz #2

Name Ker

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

1. Matching (Use a letter only once)

The enthalpy, H, is defined as g.

Mathematically, a statement of the First Law is e.

For a constant pressure process, work is a.

If the only work is P,V work and V is constant, q equals f.

The expression for the work of a reversible and isothermal expansion/compression of an ideal gas is j.

- a.  $-P_{\text{ex}}\Delta V$
- b.  $U - PV$
- c.  $\Delta H$
- d.  $V\Delta P$
- e.  $\Delta U = q + w$
- f.  $\Delta U$
- g.  $U + PV$
- h.  $\Delta U = -nRT \ln V$
- i.  $-nRT(V_2/V_1)$
- j.  $-nRT \ln(V_2/V_1)$

2. Calculate the work in joules when one mole of 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.

$$W = -nRT \ln \frac{V_2}{V_1} = -8.314 \times 298 \times \ln \frac{1}{2} \\ = 1,717 \text{ J} = 1.72 \text{ kJ}$$

3. Carbon dioxide, CO<sub>2</sub>, has a heat capacity of 29 J/K-mol. What is the heat when 22 g of CO<sub>2</sub> are heated from 25 to 100 °C?

$$q = n \bar{C} \Delta T$$

$$n = 22 \text{ g} / 44 \text{ g} = 0.5$$

$$= 0.5 \text{ moles} \times \frac{29 \text{ J}}{\text{K-mol}} \times 75 \text{ }^\circ\text{C}$$

$$= 1,087.5 \text{ J} \approx 1.088 \text{ kJ}$$