Take home Discussion Quiz #7(two sides)

Your Name: _____

TF's name:_____ Discussion /dayTime: _____

1. (1 points) Write the chemical equation for which $\Delta_r H = 4\Delta_f H$ (H_2O, *l*) – $2\Delta_f H$ (CH_3OH, g) + $2\Delta_f H$ (CO_2, *g*).

2 CH3OH(g) + 3O2(g) → $2CO_2(g)$+ $4H_2O(l)$

2 CH_3OH(g) + 3O_2(g) → $2CO_2(g)$+ $4H_2O(l)$

2. (1point) The reaction **2 CH_4(*g*) + O_2(*g*) → 2 H_3COH(*g*)** is exothermic, $\Delta_r H < 0$.

Write down the expression for the bond enthalpy of O_2, in terms of $\Delta_r H$ and the bond enthalpies $\Delta_b H$(C–H), $\Delta_b H$(C–O), and $\Delta_b H$(O–H).

$\Delta_b H$(O=O) = $\Delta_r H$ -2 $\Delta_b H$(C–H)+ 2 $\Delta_b H$(C–O) +2 $\Delta_b H$(O–H).

3. (1 points) The enthalpy of formation of coal, $\Delta_f H^o$[C(coal,s)], is −10. kJ/mol and the enthalpy of formation of carbon monoxide, $\Delta_f H^o$ [CO(*g*)] is −110. kJ/mol. When 10. moles of coal is burned to form carbon monoxide, 850 kJ of heat is released. Calculate the percent yield of the reaction.

$$2C(coal,s) + O_2(g) \rightarrow 2CO(g)$$

$\Delta_r H$ =*(-110* kJ/mol *)·2 −2·(-10*. kJ/mol)=*-200kJ/mol theoretical*

$$\frac{850kJ}{10mol} = \frac{xkJ}{2mol}$$

10mol is 850kJ

2moles is 170 kJ

Percent yield: $\frac{170kJ}{200kJ} \cdot 100\% = 85\%$

4. (2 points) If ΔH_{rxn} = 12.00 J and w = -3.00 J, what is q_v? If the heat capacity is 3.00 J/K and the initial temperature is 300.K, what would the final temperature be if the reaction is run both at (1) constant pressure and (2) constant volume? Draw an energy diagram.

$q_{rxn} + q_{sur} = 0$

$q_v = \Delta_{rxn}H + w = 9.00J$ at V-const $q_{sur} = -q_v = 9J = mc\Delta T$ $T_f = 297K$

$q_p = \Delta_{rxn}H = 12.00J$

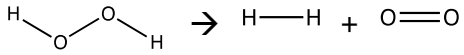
Take home Discussion Quiz #7(two sides)

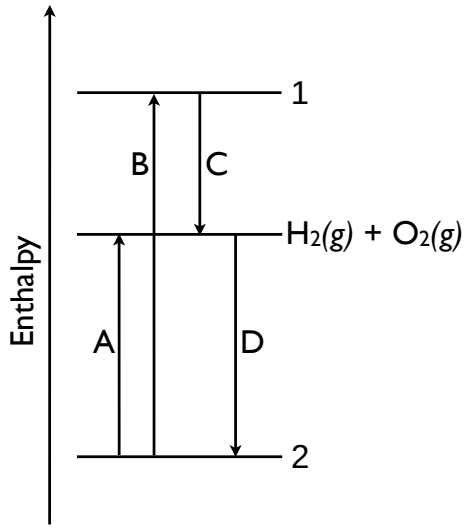
Your Name: _____

TF's name:_____ Discussion /dayTime: _____

5. Below is an enthalpy diagram for the following reaction:

$H_2O_2(g) \rightarrow H_2(g) + O_2(g)$ $\Delta_r H$ = 190 kJ/mol





a) (2 points) Using $H_2O_2(g)$, H*(atom)*, O*(atom)* and their stoichiometric coefficients, fill in the species for the horizontal lines.

1) $2H(g) + 2O(g)$

2) $H_2O_2(g)$

b) (4 points) Match the processes indicated by the vertical arrows (A, B, C, D, or None) in the diagram to the following expressions for $\Delta_r H$. (R or W)

___A_____ $\Delta_r H = -\Delta_f H(H_2O_2(g))$

____NONE__ $\Delta_r H = \Delta_f H(H_2O_2(g)) + \Delta_b H(O=O)$

___NONE_____ $\Delta_r H = -\Delta_{vap} H(H_2O_2(g))$

_____D___ $\Delta_r H = \Delta_f H(H_2O_2(g))$

___C_____ $\Delta_r H = -\Delta_b H(H\text{-}H) - \Delta_b H(O=O)$

_____B___ $\Delta_r H = 2\Delta_b H(H\text{-}O) + \Delta_b H(O\text{-}O)$

_____NONE___ $\Delta_r H = -2\Delta_b H(H\text{-}O) - \Delta_b H(O\text{-}O)$

____NONE_____ $\Delta_r H = \Delta_b H(H\text{-}H) + \Delta_b H(O=O)$