Chem 112 **Spring 2020** **Quiz 8** **Whelan**

SID | | | | | | | | | **Last** _____ **First** _____

Question 1
3 Points

Consider the reaction: $2\ C_2H_6(g) + 7\ O_2(g) \longrightarrow 4\ CO_2(g) + 6\ H_2O(g)$

for which **$\Delta H°$ = -2855 kJ** and **$\Delta S°$ = 92.70 J/K** at **298 K**.

Calculate **the entropy change** of the **UNIVERSE when 1.606 moles of $C_2H_6(g)$** react under standard conditions at **298 K**. **$\Delta S°_{Universe}$** = _____ **J/K**

- Is this reaction **reactant** or **product** favored? _____
- **If the reaction is product favored**, is it **enthalpy favored**, **entropy favored**, or favored by **both** enthalpy and entropy? **If the reaction is reactant favored**, choose **reactant favored**. _____

Question 2
4 Points

A student determines the value of the **equilibrium constant** to be **3.9×10^{13}** for the following reaction. $4\ HCl(g) + O_2(g) \longrightarrow 2\ H_2O(g) + 2\ Cl_2(g)$

Based on this value of K:

- **$\Delta G°$** for this reaction is expected to be **>0** or **<0**: _____
- Calculate the free energy change for the reaction of **1.57 moles** of **HCl(g)** at standard conditions at **298K**. **Must show work for full credit**

$\Delta G°_{rxn}$ = _____ **kJ**

Question 3
3 Points

Without doing any calculations, **match** the following **thermodynamic properties** with their appropriate numerical value given on the right for the following **exothermic reaction**.

$2\ NH_3(g) + 3\ N_2O(g) \longrightarrow 4\ N_2(g) + 3\ H_2O(g)$

- **ΔS_{rxn}** _____
- **ΔG_{rxn}** _____
- **$\Delta S_{universe}$** _____

1. **> 0**
2. **< 0**
3. **= 0**
4. **> 0 at low T, < 0 at high T**
5. **< 0 at low T, > 0 at high T**