**Name: Period: Seat#:**

**Worksheet #1**

1. For each system below, indicate whether ΔS and ΔH is a positive or negative value. Then indicate if the reaction is entropy driven, enthalpy driven, both or neither. Qualitative, you do not need to do calculations for this part.

|  |  |  |
| --- | --- | --- |
| 1. NaCl (s) + H2O (*l*) + heat → NaCl (aq)
 | 1. O2 (g) + H2O (l) → O2 (aq) + heat
 | 1. CO2 (s) + heat → CO2 (g)
 |
| ΔS = | ΔS = | ΔS = |
| ΔH = | ΔH = | ΔH = |
| Driven? | Driven? | Driven? |

1. Calculate ΔH°rxn, ΔS°rxn, ΔG°rxn, Then, indicate whether ΔH°, ΔS°, ΔG° are positive or negative values. Then indicate if the reaction is spontaneous or not. Then indicate if the reaction is entropy driven, enthalpy driven, both, or neither.

|  |  |  |
| --- | --- | --- |
| $$∆H°= Σ∆H\_{f}^{°} prod.-Σ∆H\_{f}^{°} react.$$ | $$∆S°= ΣS^{°} prod.-ΣS^{°} react.$$ | $$∆G°= Σ∆G prod.-Σ∆G^{°} react.$$ |
| **Substance** | **ΔH˚formation (kJ/mole)** | **S˚formation (J/mole•K)** | **ΔG˚formation (kJ/mole)** |
| C3H8 (*l*) | -103.8 | 269.9 | -23.5 |
| O2 (g) | 0 | 205.1 | 0 |
| CO2 (g) | -393.5 | 213.7 | -394.4 |
| H2O (g) | -241.8 | 188.8 | -228.6 |
| TiO2 (s) | -939.7 | 49.9 | -884.5 |
| TiCl4 (*l*) | -804.2 | 252.3 | -737.2 |
| C (s) | 0 | 5.7 | 0 |
| Cl2 (g) | 0 | 223.1 | 0 |
| 1. C3H8 (*l*) + 5 O2 (g) → 3CO2 (g) + 4H2O (g)

*After calculations circle/highlight:**ΔH°* + or -*ΔS°* + or -*ΔG°* + or -*Spontaneous /”thermodynamically favorable”:*  Yes No*Driven:*  Enthalpy Entropy Both Neither |
| 1. TiO2 (s) + C (s) + 2Cl2 (g) → TiCl4 (*l*) + CO2­ (g)

*After calculations circle/highlight:**ΔH°* + or -*ΔS°* + or -*ΔG°* + or -*Spontaneous /”thermodynamically favorable”:*  Yes No*Driven:*  Enthalpy Entropy Both Neither |