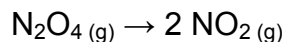


Name: _____ Block: _____

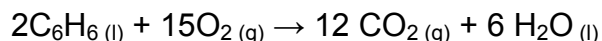
1. Predict whether entropy is increasing ($\Delta S > 0$) or decreasing ($\Delta S < 0$)? Give a short reason for your answer.

steam condenses to water

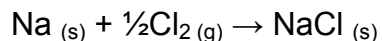
solid CO_2 sublimates



water is heated from 25°C to 50°C



2. Using your Table of Thermochemical Data, calculate ΔS for the following reaction. Is entropy increasing or decreasing? Is the system becoming more random or less random? Based on entropy changes **only**, would you predict the reaction to be spontaneous or not?

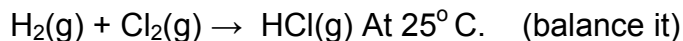


3. The Second Law states:
- A. Energy is neither created nor destroyed
 - B. Gas pressures are determined independently in a mixture
 - C. Heat flows to a more concentrated medium
 - D. Matter is neither created nor destroyed
 - E. Systems tend toward increasing disorder
4. True or False? A process with $\Delta H < 0$ is more likely to be spontaneous than one with $\Delta H > 0$

5. Calculate ΔH , $2\text{Na}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{NaOH}(\text{s}) + \text{H}_2(\text{g})$

6. $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}(\text{g})$ ΔG° is $+174 \text{ KJ}$. Is the reaction spontaneous?

7. Use the equation and table to complete 7-10



8. Calculate ΔH° for the reaction above:

9. Calculate ΔS° for the reaction above:

10. Calculate ΔG° for the reaction above:

11. Is the reaction spontaneous?

12. Calculate ΔG° for the reaction that involves solid magnesium and oxygen gas going to solid magnesium oxide. (on first glance does this seem like it should be spontaneous?)
13. Calculate the standard entropy change for the single replacement reaction between solid Al and solid ZnO (solid products).
14. Find the temperatures at which the following ΔH and ΔS values would become spontaneous (in terms of ΔG – start at 298K): a) $\Delta H = -126 \text{ kJ}$, $\Delta S = 84 \text{ J/K}$ and b) $\Delta H = -11.7 \text{ kJ}$, $\Delta S = -105 \text{ J/K}$.