

Name: _____

Period: _____

Seat#: _____

- 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, or neither. Will the reaction be spontaneous at high temperatures, low temperatures, always or never? Qualitative, you do not need to do calculations for this part.

a) $\text{NaCl}_{(s)} + \text{H}_2\text{O}_{(l)} + \text{heat} \rightarrow \text{NaCl}_{(aq)}$	b) $\text{O}_2_{(g)} + \text{H}_2\text{O}_{(l)} \rightarrow \text{O}_2_{(aq)} + \text{heat}$	c) $\text{CO}_2_{(s)} + \text{heat} \rightarrow \text{CO}_2_{(g)}$
$\Delta S =$	$\Delta S =$	$\Delta S =$
$\Delta H =$	$\Delta H =$	$\Delta H =$
Driven?	Driven?	Driven?

- 2) Calculate the ΔH_{rxn} , ΔS_{rxn} , $\Delta S_{\text{universe}}$, ΔG_{rxn} . For each system below, indicate whether ΔS and ΔH is a positive or negative value. Then indicate of the reaction is entropy driven, enthalpy driven, or neither. Quantitative, do calculations for this part. *Hint* must solve for temperature first before you can find ΔG° !

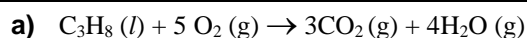
Substance	$\Delta H^\circ_{\text{formation}} \text{ (kJ/mole)}$	$\Delta S^\circ_{\text{formation}} \text{ (J/mole}^\circ\text{K)}$	$\Delta G^\circ_{\text{formation}} \text{ (kJ/mole)}$
$\text{C}_3\text{H}_8 \text{ (l)}$	-103.8	269.9	-23.5
$\text{O}_2 \text{ (g)}$	0	205.1	0
$\text{CO}_2 \text{ (g)}$	-393.5	213.7	394.4
$\text{H}_2\text{O} \text{ (g)}$	-241.8	188.8	-228.6
$\text{TiO}_2 \text{ (s)}$	-939.7	49.9	-884.5
$\text{TiCl}_4 \text{ (l)}$	-804.2	252.3	-737.2
$\text{C} \text{ (s)}$	0	5.7	0
$\text{Cl}_2 \text{ (g)}$	0	223.1	0

$$\Delta H^\circ = \sum \Delta H_f^\circ \text{ prod.} - \sum \Delta H_f^\circ \text{ react.}$$

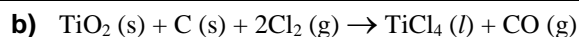
$$\Delta S^\circ = \sum \Delta S^\circ \text{ prod.} - \sum \Delta S^\circ \text{ react.}$$

$$\Delta S_{\text{universe}} = \frac{-\Delta H}{T}$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$



6840 J/molK



847 J/molK