CH 223
Sample Quiz #1 Name: _____ Lab Section: _____

Be sure to show all work, use the correct number of significant figures, circle final answers and use correct units in all problems.

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1. Comment on the probable **sign** of the thermodynamic property for the following scenarios. **Circle** positive, negative or zero in each case. (6 points)

Thermodynamic Property	***Sign** of Thermodynamic Property (**circle** one)*	*Description:*
ΔH	positive / negative / zero	My reaction 'feels cold' after the chemicals react
ΔG	positive / negative / zero	A solid dissolves when placed in water
ΔS	positive / negative / zero	Liquid gasoline burns as you drive to MHCC
ΔH	positive / negative / zero	A camp fire started while camping in the woods
ΔG	positive / negative / zero	The acidic properties of a weak acid in water
ΔS	positive / negative / zero	You help your sister organize a messy bedroom

2. This reaction was studied at 25.0 °C: **$P_4O_{10}(s) + 6\ H_2O(l) \rightarrow 4\ H_3PO_4(l)$**
Use the data acquired to **calculate values for ΔH°_{rxn}, ΔS°_{rxn}** and finally **ΔG°_{rxn}.** (10 points)

Species	ΔH_f°(kJ/mol)	S°(J/K· mol)
$P_4O_{10}(s)$	–2984.0	228.9
$H_2O(l)$	–285.8	69.95
$H_3PO_4(l)$	–1279.0	110.5

3. Answer the following questions using the following: (4 points)

NaCl(g), He(g), third, second, first, always, never, positive, negative, zero

a - Which of the above has a $\Delta H_f^\circ = 0$? _____

b - The _____ law of thermodynamics states that $\Delta S_{universe}$ must be greater than zero for all spontaneous processes.

c - If $\Delta H^\circ < 0$ and $\Delta S^\circ > 0$, then ΔG° will _____ be spontaneous.

d - A perfectly formed elemental crystal at 0 K will have a S° which is _____.

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Answers
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1. Comment on the probable **sign** of the thermodynamic property for the following scenarios. **Circle** positive, negative or zero in each case. (6 points)

positive
negative
positive
negative
positive
negative

2. This reaction was studied at 25.0 °C: **$P_4O_{10}(s) + 6\ H_2O(l) \rightarrow 4\ H_3PO_4(l)$**
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Species	ΔH_f°(kJ/mol)	S°(J/K· mol)
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ΔH_{rxn} = -417.2 kJ/mol

ΔS_{rxn} = -206.6 J/mol

ΔG_{rxn} = -355.6 kJ/mol

3. Answer the following questions using the following: (4 points)

He(g)
second
always
zero