

* While I prefer you turn in a hard copy of the worksheet, I will accept scanned copies sent to my email address, joensj@fiu.edu

Section: (circle one) M,W,F

Tu,Tr

For problems involving calculations you must show your work for credit.

1) For a particular process a system expands by an amount $\Delta V = 600.0$ mL against a constant external pressure $p_{\text{ex}} = 2.50$ atm. During the process, 2200. J of heat is added to the system. Find q , w , and ΔU for the process. (NOTE: $1 \text{ L}\cdot\text{atm} = 101.3 \text{ J}$).

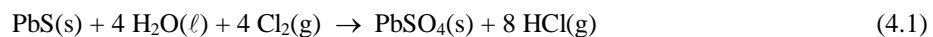
2) Give the correctly balanced formation reaction for the following substances. Be sure to indicate the state (s, ℓ , g, aq) for all reactants and products.

a) $\text{HNO}_3(\text{aq})$ b) $\text{CaSiO}_3(\ell)$

3) For the chart below, fill in the missing information.

	$\Delta S_{\text{sys}} \text{ (J/K)}$	$\Delta S_{\text{surr}} \text{ (J/K)}$	$\Delta S_{\text{univ}} \text{ (J/K)}$	spontaneous (yes or no)
process 1	18.6	- 27.8	_____	_____
process 2	- 3.6	_____	18.7	_____
process 3	_____	58.4	- 3.2	_____

4) Using the table of thermochemical data below (for $T = 298. \text{ K}$) find the following for the chemical reaction



Substance	$\Delta H^\circ_f(\text{kJ/mole})$	$\Delta G^\circ_f(\text{kJ/mole})$	$S^\circ(\text{J/mole}\cdot\text{K})$
$\text{Cl}_2(\text{g})$	0.0	0.0	223.0
$\text{HCl}(\text{g})$	- 92.3	- 95.3	187.0
$\text{H}_2\text{O}(\ell)$	- 285.8	- 237.2	69.9
$\text{PbS}(\text{s})$	- 94.3	- 92.7	91.2
$\text{PbSO}_4(\text{s})$	- 918.4	- 811.2	147.3

a) $\Delta H^\circ_{\text{rxn}}$ and $\Delta S^\circ_{\text{rxn}}$

b) ΔS_{syst} , ΔS_{surr} , and ΔS_{univ}

c) Is the reaction spontaneous for standard conditions and at $T = 298 \text{ K}$ (yes/no) and a brief justification for your answer)?