

Chem 1515.001 – 1515.006

Name _____

InClass Exercise #1

TA Name _____

Week of January 28, 2001

Lab Section # _____

ICE1.1a. Under what circumstances will an endothermic reaction be spontaneous?

b) Under what circumstances of ΔH and ΔS will a reaction be spontaneous at one temperature and nonspontaneous at a higher temperature?

c) Under what circumstances of ΔH and ΔS will a reaction never be spontaneous?

ICE1.2a. What is the sign for ΔH and for ΔS when water melts?

b) At what temperature(s) is melting spontaneous? At what temperature(s) is melting of water nonspontaneous?

c) Does your answer in part a) agree with your answer in part b)?

ICE1.3. For each of the following pairs, choose the substance with the higher entropy (per mole) at a given temperature? In each case include a brief explanation.

- a) $\text{O}_2(\text{g})$ at 5 atm or $\text{O}_2(\text{g})$ at 0.5 atm;
- b) $\text{Br}_2(\text{l})$ or $\text{Br}_2(\text{g})$;
- c) 1 mol of $\text{N}_2(\text{g})$ in 22.4 L or 1 mol of $\text{N}_2(\text{g})$ in 2.24 L;
- d) $\text{CO}_2(\text{g})$ or $\text{CO}_2(\text{aq})$.

ICE1.4. Calculate ΔH° , ΔS° and ΔG° for each of the following reactions. Also show that in each case $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$

- a) $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$

- b) $\text{NOCl}(\text{g}) + \text{Cl}(\text{g}) \rightarrow \text{NO}(\text{g}) + \text{Cl}_2(\text{g})$;

- c) $6\text{Cl}_2(\text{g}) + 2\text{Fe}_2\text{O}_3(\text{s}) \rightarrow 2\text{FeCl}_3(\text{s}) + 3\text{O}_2(\text{g})$

ICE1.5. Write the chemical formula(s) of the product(s) and balance the following reactions. Identify all products phases as either (g)as, (l)iquid, (s)olid or (aq)ueous. Soluble ionic compounds should be written in the form of their component ions.

