

CHEM 1100 Practice

Each question is worth 2 points.

$$PV = nRT$$

$$R = 0.0821 \text{ L}\cdot\text{atm}/(\text{mole}\cdot\text{K})$$

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

$$760 \text{ mm Hg} = 1 \text{ atm}$$

$$1 \text{ torr} = 1 \text{ mm Hg}$$

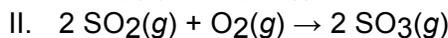
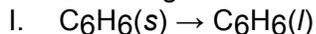
1) At a given temperature and pressure, which of the following would be expected to have the greatest molar entropy?

- A)  $\text{Br}_2(\text{s})$     B)  $\text{Br}_2(\text{l})$     C)  $\text{Br}_2(\text{g})$     D) All of these would be expected to have the same molar entropy.

2) For the following:  $\text{NH}_3(\text{g}) \rightarrow \text{N}(\text{g}) + 3 \text{H}(\text{g})$ , one would expect

- A)  $\Delta H^\circ$  to be negative and  $\Delta S^\circ$  to be negative.    B)  $\Delta H^\circ$  to be negative and  $\Delta S^\circ$  to be positive.  
C)  $\Delta H^\circ$  to be positive and  $\Delta S^\circ$  to be negative.    D)  $\Delta H^\circ$  to be positive and  $\Delta S^\circ$  to be positive.

3) Determine the sign of  $\Delta S^\circ$  for each of the following:



4) Define entropy.

5) Calculate  $\Delta G^\circ$  for the reaction below and tell whether it is spontaneous or nonspontaneous under standard conditions at  $25^\circ\text{C}$ .



6) Which combination always results in a reaction being spontaneous?

- A)  $\Delta H$  is negative and  $\Delta S$  is negative.    B)  $\Delta H$  is negative and  $\Delta S$  is positive.  
C)  $\Delta H$  is positive and  $\Delta S$  is negative.    D)  $\Delta H$  is positive and  $\Delta S$  is positive.

7) Methanol can be produced from carbon monoxide and hydrogen with suitable catalysts:



Find  $\Delta G^\circ$  at  $25^\circ\text{C}$ .

8) An "empty" aerosol can at  $25^\circ\text{C}$  still contains gas at 1.00 atmosphere pressure. If an "empty" can is thrown into a  $475^\circ\text{C}$  fire, what is the final pressure in the heated can?

9) Three identical flasks contain three different gases at standard temperature and pressure. Flask A contains  $\text{CH}_4$ , flask B contains  $\text{CO}_2$ , flask C contains  $\text{N}_2$ . Which flask contains the largest number of molecules?

- A) flask A    B) flask B    C) flask C    D) All flasks contain the same number of molecules.

10) The volume of 350. mL of gas at  $25^\circ\text{C}$  is decreased to 125 mL at constant pressure. What is the final temperature of the gas?