

## Worksheet #8 (Total number of points you can get is 3 pts)

1. For a certain chemical reaction one finds a enthalpy difference  $\Delta H = -150 \text{ kJ/mol}$  and an entropy difference  $\Delta S = -300 \text{ J/(K mol)}$ . Assume that these two values do not depend on temperature. At what temperature will be the Gibb's energy difference  $\Delta G = 0$ ?

$$\Delta G = \Delta H - T \Delta S = 0$$

$$\Rightarrow T \Delta S = \Delta H$$

$$\Rightarrow T = \frac{\Delta H}{\Delta S}$$

$$\frac{-150 \cdot 10^3 \text{ J/mol}}{-300 \text{ J/(K mol)}} = 500 \text{ K}$$

2. The equilibrium constant for the reaction



in benzene solution at 280 K is  $K_c = 0.0022 \text{ mol/dm}^3$ . Calculate  $\Delta G^\circ$ .

$$\Delta G^\circ = -RT \ln K_c^\circ$$

$$= -8.3145 \cdot 280 \cdot \ln(2.2 \cdot 10^{-3}) \text{ J/mol}$$

$$= -8.3145 \cdot 280 \cdot (-6.1193) \text{ J/mol}$$

$$14.25 \text{ kJ/mol}$$