

CHM 152/154  
Spring '05 Diebolt

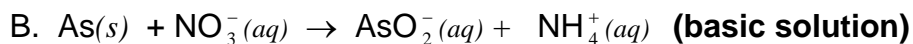
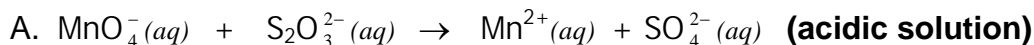
Quiz 6. Take Home.  
Must Show Work or no Credit Given!  
Attach work and Circle Answers!  
Due Wed 4/27. No Quizzes Accepted after 5:00 P.M.

Name:

Class time:

1. Consider the following reaction:  $4\text{NO}(g) \rightarrow 2\text{N}_2\text{O}(g) + \text{O}_2(g)$
- Calculate  $\Delta H^\circ$ ,  $\Delta S^\circ$ , and  $\Delta G^\circ$  for this reaction at 25 °C (Find  $\Delta H_f^\circ$ ,  $S^\circ$  and  $\Delta G_f^\circ$  values in the appendix.) (6 pts)
  - Calculate the value of the equilibrium constant,  $K_p$ , at 25 °C. (2 pts)
  - Calculate  $\Delta G$  at 25 °C when the initial pressures of the reaction mixture are  $P_{\text{NO}} = 2.05 \text{ atm}$ ,  $P_{\text{N}_2\text{O}} = 1.25 \text{ atm}$ , and  $P_{\text{O}_2} = 0.715 \text{ atm}$ . (4 pts)

2. Balance the following redox reactions (9 pts):



3. A certain voltaic cell is constructed based on the following half reactions and operates at 298 K:



- Write and label the anode and cathode half reactions for the cell. (Make sure that you write the anode and cathode reactions in the appropriate direction!) Also, write an overall balanced reaction for this voltaic cell. (3 pts)
- What is the emf of this cell,  $E^\circ$ , under standard conditions? (2 pts)
- Calculate the free energy change,  $\Delta G^\circ$ , for the overall reaction. (2 pts)
- Calculate the equilibrium constant,  $K$ , for the overall reaction. (2 pts)