South Dakota School of Mines and Technology
Department of Materials and Metallurgical Engineering

MET 320 HQ 2 Oct 28, 2004

CLOSED BOOK & NOTES - NO CALCULATORS. SHOW ALL WORK ON THIS SHEET.
Turn in only these sheets with the problems on them. Keep or discard all other paper.

1. Write the
   a. Fundamental Equations
   b. Maxwell Relations

2. What is the entropy change for the ideal mixing of 3 moles of Neon with 7 moles of Argon?

3. How much heat is required to raise one mole of pure, solid Ag from 300K to pure, liquid Ag at 1400K?

4. Draw a calculation schematic by which you could determine the adiabatic flame temperature for the combustion of one gmole of C (graphite) starting at 400 kalvin with air (21% O_2 & 79% N_2) at 298K to form CO_2. Show how to calculate each enthalpy change and give the appropriate values for the required parameters from the data sheet. No computations or integrations are required.

5. Estimate the heat of vaporization of Mg from the following data, the vapor pressure at the melting point (922K) is 4.08×10^{-3} atm and its boiling point is 1363K.

6. Complete
   a. reduced temperature = _____
   b. reduced pressure = _____
   c. definition of chemical potential _____
   d. definition of fugacity _____
   e. criterion of equilibrium at constant T & P _____