

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

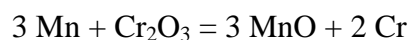
MET 320
MI 220

HQ 2
Data Sheet Provided

Nov 10, 2003
9:00 –9:50 AM

Algebraic solutions are OK. No Calculators

1. How much heat is required to raise the temperature of 2 moles of **solid** Pb at 300 K to **liquid** Pb at 600 K? Be sure to draw the calculation schematic.
2. Find the heat of reaction for the following reaction at 298 K. All reactants and products are pure solids.



3. The vapor pressure of ice at its melting point (273 K) is 4.579 Torr (1 mm Hg) and drops to 1.012 Torr at -17.2 C. Determine the heat of sublimation from these data.
4. Draw the calculation schematic for determining the Adiabatic Flame Temperature for the combustion of Methane with air. In that combustion one mole of CH_4 burns with two moles of O_2 to form CO_2 and H_2O (balance the reaction!). Since the O_2 is supplied by air, there are also 7.52 moles of N_2 accompanying the process that do not react but go along for the ride. Assume everything starts at 400 K and that you have data for the heats of formation at 298 K only.
5. Use the Attached JANAF tables to answer the following questions:
 - a) How much heat is required to raise one gram mole of solid Cu from 298 K to liquid Cu at 1500 K?
 - b) How much heat is required to raise solid Cu from 298 K to hypothetical, solid Cu at 1500 K?
 - c) How much heat is required to vaporize solid Cu at 1000 K to gaseous Cu at 1000 K?
6. Real Gas Problem:
 - a) What volume would one gram mole of ideal gas occupy at 304 K and 73 atm?
 - b) What volume would one gram mole of CO_2 gas occupy at 304 K and 73 atm?