MM 209, Tutorial 6

1. Can you reduce NiO(s) by Cu(s) at 1000K to give Ni(s) and Cu_2O(s)? Assume All compounds and elements are immiscible in each other. Use the data :

$4Cu(s) + O_2(g) = 2Cu_2O(s)$; $\Delta G^0 = -334400+151.24T$, J/mol.

$NiO(s) = Ni(s) + 1/2\ O_2(g)$, $\Delta G^0 = 235600-86.1T$, J/mol.

2. Carbon has two allotropes: graphite and diamond. Calculate the pressure that must be applied to graphite to convert it to diamond at 298K. Assume that the isothermal compressibility of the two phases to be negligible.

$\Delta H^o_{gr-d} = 1883$ kJ/mol, $S^o_{gr} = 5.73$; $S^o_D = 2.43$ J/mol/K; $\rho_{gr}=2550 kg/m^3$, $\rho_D=3510$ kg/m^3.