Faculty of sciences and technology
Department of engeneering process 4 nd worksheet for directed works
3 rd year students

Exercise 01 :

$CaSO_4$, 1/2 H_2O construction plaster is produced in an oven by deshydratation of $CaSO_4$, $2H_2O$ gypsum at 400°C.

1- show that : $\Delta H°\ (T) = \Delta H°\ (T0) + \int_{T0}^{T} \Delta C°p\ dT$
1-calculate the standard enthalpy of plaster formation reaction at 25°C then at 400°C. This reaction produces water in a vapor state.

Data :

ΔH_f at 25°C by KJ/mol : H_2O(g) : -241,83 ; gypsum (s) : -2021 ; plaster (s) : -1575.

C°p by J/mol.K : H_2O (g) :29,59 +11,38.10^{-3}T ; gypsum (s) :186 ; plaster (s) :120

Exercise 02 :

The molar entropies of $CaCO_3$ calcite and $CaCO_3$ aragonite are 22.20 and 21.20 cal/K.mol at 25°C under 1 atm. Their enthalpies of formation under the same conditions are -288.45 and -288.49 Kcal/mol. The transition from aragonite to calcite occurs with an increase in volume of 2.75 ml.

1-Determine the change in free enthalpy for the transformation from aragonite to calcite at 25°C under 1atm.Which of the two forms is more stable.

2- by how much should the pressure be increased, the temperature remains constant so that the other form becomes stable.