國立成功大學
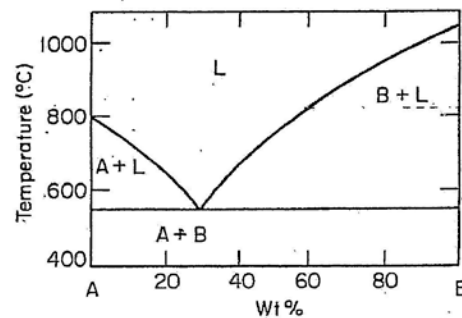# 110學年度碩士班招生考試試題

編　號：83

系　所：資源工程學系

科　目：熱力學

日　期：0202

節　次：第 2 節

備　註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

(1) In the binary system A-B, determine:

(a) The temperature at which 30 wt% of B crystals are in equilibrium with a liquid composed of 60 wt% B and 40 wt% A.

(b) The composition of the sample described in part (a) (20 %)

(2) Classify the following systems as monovarient, divariant, or invariant. Explain your answer. (20 %)

(a) Alpha quartz in equilibrium with beta quartz at transition temperature.

(b) Monoclinic at room temperature.

(c) Ice in equilibrium with its vapor.

(3) At 970℃ the following equilibrium reaction:

$CaCO_3 \rightleftharpoons CaO + CO_2$　　$\Delta H = +39$ kcal/mol
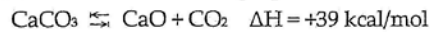
Which direction would you expect the equilibrium to shift if heat were added to the system? If the pressure on the system were decreases? Explain how you arrived at your answer. (20 %)

(4) Calculate the percentage change in the equilibrium constant K_x of the reaction $H_2CO_{(g)} = CO_{(g)} + H_{2(g)}$ when the total pressure is increased from 1.0 bar to 2.0 bar at constant temperature. (K_x: part of the equilibrium constant expression that contains the equilibrium mole fractions of reactants and products) (20 %)

(5) Please derive Gibbs-Duhem equation (10 %)

(6) Derived the relationship between V_i ,V_f ,T_i ,T_f for a reversible adiabatic expansion of ideal gas. (10%)