| 招生學年度 | 101 | 招生類別 | 碩士班 |
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| 系所班別 | 生命科學系 生物技術碩士班(甲組)、材料科學與工程學系碩士班 | | |
| 科目 | 物理化學 | | |
| 注意事項 | 本考科可使用掌上型計算機 | | |

1. The initial state of a perfect gas (1 mol) is 10 atm and 600 K. It expands isothermally to a pressure of 1 atm. Determine the value of ΔS. ($R = 8.314\ JK^{-1}mol^{-1} = 0.082\ LatmK^{-1}mol^{-1}$) (20 分).

2. It was found that $x_A = 0.220$ (mole fraction of A in the liquid phase) and $y_A = 0.314$ (mole fraction of A in the vapor phase) for a binary mixture at 30°C and 101.3 kPa. Calculate the activity coefficient of both components ($\gamma_A$ and $\gamma_B$) on the Raoult's law basis. Assume $P_A^* = 73.0$ kPa and $P_B^* = 92.1$ kPa for vapor pressure of pure A and pure B, respectively. (20 分)

3. Prove that ΔG is the maximum amount of non-PV work can be extracted at constant T and P. (Use G = H-TS) (20 分)

4. The wavefunction for the motion of a particle in a ring is of the form $\Psi = Ne^{im\phi}$. Determine the normalization constant N. (20 分)

5. A rate constant is $1.78*10^{-4}\ Lmol^{-1}s^{-1}$ at 19°C and $1.38*10^{-3}\ Lmol^{-1}s^{-1}$ at 37°C. Find the Arrhenius parameters of the reaction. ($R = 8.314\ JK^{-1}mol^{-1}$) (20 分)