

南臺科技大學 104 學年度研究所考試入學招生考試

系組：化材系

准考證號碼：□□□□□□□□

科目：熱力學 (108)

(請考生自行填寫)

注意事項	一、請先檢查准考證號碼、報考系(組)別、考試科目名稱，確定無誤後再作答。 二、所有答案應寫於答案紙上，否則不予計分。 三、作答時應依試題題號，依序由上而下書寫，作答及未作答之題號均應抄寫。
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- 2.5 莫耳理想氣體進行絕熱壓縮過程時，溫度由 13.5°C 上升至 55.1°C ，假設 $C_v = (3/2)R$ ，計算此過程之 Q (熱傳量)， W (功)， ΔU (內能改變量) 及 ΔH (焓改變量)。($R = 8.314 \text{ J/mol} \cdot \text{K}$) (15%)
- 進行以下程序時，溫度差(ΔT)、enthalpy change (ΔH)、internal energy change (ΔU)、entropy change (ΔS)、Gibbs free energy change (ΔG)、heat (Q)、work (W) 中，哪幾項為零？
 - ideal gas 進行 isothermal process。
 - ideal gas 進行 free expansion。
 - ideal gas 進行 reversible and adiabatic process。(15%)
- 有一圓柱筒/活塞裝置內含 2 mole 的 ideal gas，其溫度與體積為 300 K 及 5 升，現以恆溫可逆的方式將此氣體壓縮至 2 升，求此程序的 enthalpy change(ΔH)、entropy change (ΔS)和 Gibbs free energy change (ΔG)？(20%)
- An ideal gas has a volume of $0.0124 \text{ m}^3 \text{ mol}^{-1}$ at 25°C and 2 bar. In the following problem, air may be considered an ideal gas with the constant heat capacities $C_v = 20.785 \text{ J/mol} \cdot \text{K}$ and $C_p = 29.099 \text{ J/mol} \cdot \text{K}$. The initial conditions of the air are 2 bar and 25°C . It is compressed to 6 bar and 25°C by the following process: cooling at constant pressure followed by heating at constant volume. Calculate the heat and work requirements and internal energy change ΔU and enthalpy change ΔH of the air for the process. (20%)
- With respect to 3 kg of liquid water($C_p = 4.184 \text{ kJ/kg} \cdot \text{K}$): Initially at 0°C , it is heated to 100°C by contact with a heat reservoir at 100°C . What is the entropy change of the water? Of the heat reservoir? What is the total entropy change ΔS_{total} ? (15%)
- The molar heat capacity of an ideal gas A is given by the formula,
$$\hat{C}_p (\text{JK}^{-1}\text{mol}^{-1}) = 8 + 0.006 T$$
Find the enthalpy and entropy change if 3 moles of the ideal gas are heated from 27°C to 127°C ? (15%)