

國立成功大學

112學年度碩士班招生考試試題

編 號： 153

系 所： 生物醫學工程學系

科 目： 熱力學

日 期： 0206

節 次： 第 1 節

備 註： 可使用計算機

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

1. An ideal gas is originally confined to a volume V_1 in an insulated container of volume $V_1 + V_2$. The remainder of the container is evacuated. The partition is then removed and the gas expands to fill the entire container. If the initial temperature of the gas was T , what is the final temperature? (25%)
2. Define heat capacity C_v , and calculate from the first principle the numerical value (in calories/°C) for a copper of your circle token with 32 g. (25%)
3. One mole of gas obeys Van der Waals equation of state. If its molar internal energy is given by $u = cT - a/V$ (in which V is the molar volume, a is one of the constants in the equation of state, and c is a constant), please calculate the molar heat capacities C_v and C_p . (25%)
4. Consider a cylinder with a frictionless piston composed of a semipermeable membrane permeable to water only. Let the piston separate a volume V of N moles of pure water from a volume V' of a dilute salt (NaCl) solution. There are N' moles of water and n moles of the salt in the solution. The system is in contact with a heat reservoir at temperature T . (25%)
 - (1) Evaluate an expression for entropy of mixing in the salt solution. (10%)
 - (2) If the piston moves so that the amount of water in the salt solution. (10%)
 - (3) Derive an expression for the pressure π across the semipermeable membrane as a function of the volume of the salt solution. (05%)