中國文化大學 98 學年度碩士班考試入學招生考試

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系組:應用化學研究所碩士班

日期節次:98年3月21日第4節15:30-17:00

科目: 物理化學[2231]

1. What are the term symbols ${}^{2S+1}L_J$ of the electron configuration $2s^12p^1$? (20%)

2. Prove that
$$[\hat{A}\hat{B}, \hat{C}] = \hat{A}[\hat{B}, \hat{C}] + [\hat{A}, \hat{C}]\hat{B}$$
. (15%)

- 3. Prove that we do not exactly know the momentum of a free particle with wave function $\cos kx$. (15%)
- 4. Prove that $\left(\frac{\partial U}{\partial T}\right)_p = \left(\frac{\partial U}{\partial T}\right)_v$ for an ideal gas, where U is the internal energy. (15%)
- 5. The Lindemann mechanism is

$$A + M \xrightarrow{k_1} A^* + M$$

$$A^* + M \xrightarrow{k_2} A + M$$

$$A^* \xrightarrow{k_2} P$$
Prove that
$$\frac{d[P]}{dt} = \frac{k_2 k_1 [A][M]}{k_{-1}[M] + k_2}$$
(15%)

- 6. What is standard boiling point? What is normal boiling point? (10%)
- 7. What is ideal solution? What is ideal-dilute solution? (10%)

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