

國立臺北教育大學 99 學年度碩士班招生入學考試
自然科學教育學系碩士班 化學 科試題

1. Write an equation for a possible substitution reaction of ethane with Cl_2 . (10 分)
2. The heat of vaporization of carbon tetrachloride at 25°C is 39.4 kJ/mol . If 1 mol of liquid carbon tetrachloride at 25°C has an entropy of 216 J/K , what is the entropy of 1 mol of the vapor in equilibrium with the liquid at this temperature? (10 分)
3. Light with a wavelength of 425 nm fell on a potassium surface, and electrons were ejected at a speed of $4.88 \times 10^5 \text{ m/s}$. What energy was expending in removing an electron from the metal. (10 分)
4. Briefly describe the structure of a lead storage cell and write the reaction therein. (10 分)
5. Briefly describe the major differences between the instruments HPLC and GC. (10 分)
6. 請以氣體動力論的觀點來解釋理想氣體方程式？(10 分)
7. 請以分子軌域(M.O.)的觀點，說明氦氣不易像氫氣一樣結合成兩原子之分子？(10 分)
8. 甲苯 (toluene) 進行硝化取代反應時，甲苯的反應速率比苯的反應速率約快 25 倍，且以鄰-硝基甲苯 (*o*-nitrotoluene) 和對-硝基甲苯 (*p*-nitrotoluene) 之產物產率較高。請解釋此現象並畫出甲苯進行硝化反應之反應機構。(15 分)
9. 請說明核磁共振光譜儀(NMR)的原理，並以實例說明其在分析上的應用。(15 分)