

國立成功大學

112學年度碩士班招生考試試題

編 號：284

系 所：環境醫學研究所

科 目：化學儀器分析

日 期：0207

節 次：第 3 節

備 註：不可使用計算機

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

1. Provide reasonable explanations to the fact that laser-induced fluorescence detectors, as detectors for liquid chromatography, are often able to yield much lower detection limits than those operated using UV-VIS absorption. (5%)
2. What are effects of poor vacuum conditions to the operations of mass spectrometers? Describe the working principles of the two commonly used high vacuum pumps, diffusion and turbo-molecular pumps, for mass spectrometers. (5%)
3. What are the three most common types of optical spectrometers? List the names of the three types of instruments, then draw three block diagrams to illustrate the components of these instruments for optical spectroscopy. Use the diagrams to explain why laser-induced fluorescence detectors for liquid chromatography are often able to yield much lower detection limits than those operated using UV-VIS absorption. (10%)
4. Describe how the six numerical criteria of an HRGC-HRMS (high resolution gas chromatography-high resolution mass spectrometry) method for measuring trace dioxin levels in human blood samples can be assessed. List appropriate terms first, and then explain what they mean and how they can be calculated. (15%)
5. Construct two hypothetical van Deemter plots and write down the related equations for gas and liquid chromatographic columns. Is there any significant difference between these two plots? Why? Explain the meanings of A, B, and C terms. Then use the equations to explain how and why the particle size in a packed HPLC column affects the column efficiency and the pressure required for pumping mobile phase through the column. (15%)
6. Describe the applications and working principles of the following two related techniques/terms. Try to explain the major similarity and/or difference between them. (50%)
 - (a) APPI and APCI
 - (b) SDS-PAGE and IEF
 - (c) Fluorescence and Chemiluminescence
 - (d) Electrospray ionization and Electron ionization
 - (e) Calibration sensitivity and Analytical sensitivity
 - (f) Internal standard and Standard addition method
 - (g) Limit of detection (LOD) and Limit of quantitation (LOQ)
 - (h) Electron capture detector and Electrochemical detector
 - (i) Partition chromatography and Adsorption chromatography
 - (j) Linear iontrap/orbitrap hybrid and Triple quadrupole tandem mass spectrometer