

# 國立成功大學

## 114學年度碩士班招生考試試題

編 號：206

系 所：環境醫學研究所

科 目：化學儀器分析

日 期：0211

節 次：第 3 節

注 意：1.不可使用計算機  
2.請於答案卷(卡)作答，於  
試題上作答，不予計分。

1. Describe the working principle and applications of an ESI-Orbitrap mass spectrometer? (20%)
2. What is HRGC-HRMS? Describe how the six numerical criteria of the analytical procedure 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. (20%)
3. Answer the following questions related to “signal resolution”. (A) How is chromatographic resolution calculated? (B) How is mass spectrometric resolution calculated? (C) Why different procedures are used to calculate chromatographic and mass spectrometric resolutions? Discuss the advantages and disadvantages of these two procedures. (20%)
4. 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. (20%)
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. (20%)