

系所組別：環境醫學研究所乙組

考試科目：化學儀器分析

考試日期：0223，節次：3

※ 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. Describe how the precision, bias, sensitivity, detection limit, dynamic range, and selectivity 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. (15%)
2. Describe how standard addition method can be applied to measure the concentration of di(2-ethylhexyl) phthalate in human urinary matrix and the advantages provided by the method. (10%)
3. Describe how the confidence limit (uncertainty) of a measurement can be assessed and reported. Then write down an equation that describes how the measurement uncertainties of three measurements, p , q , and r , propagate into the uncertainty of x , where $x = f(p, q, r)$. (10%)
4. Draw block diagrams to illustrate the components of the following three types of instruments for optical spectroscopy: absorption, fluorescence, and chemiluminescence spectrometers. Use the diagrams to explain how these instruments work and the major differences among them. (15%)
5. Construct a hypothetical van Deemter plot for a packed liquid chromatographic column. Explain the meanings of A, B, and C terms. (10%)
6. How does the particle size in a packed HPLC column affect the column efficiency and the pressure required for pumping mobile phase through the column? (10%)
7. Draw a diagram showing components of a GC system and describe the functions of these components. (10%)
8. Draw a diagram showing components of a mass spectrometer system and describe the functions of these components. (10%)
9. Describe the working principles and applications of MALDI and ESI. Make a comparison between these two ionization techniques. (10%)