# 中原大學 100 學年度 碩士班 入學考試

3 月 19 日 13:30~15:00　　　化學系

科目：　分析化學

誠實是我們珍視的美德，
我們喜愛「拒絕作弊，堅守正直」的你！

（共 1 頁第 1 頁）

■可使用計算機，惟僅限不具可程式及多重記憶者　　□不可使用計算機

1. List the types of substances to which each of the following chromatographic methods are most applicable:　(25%)

(a) GSC

(b) GLC

(c) Partition chromatography

(d) Gel permeation chromatography

(e) Micellar electrokinetic chromatography

2. What is the excepted order of elution for these three compounds in a capillary zone electrophoresis using a pH 9.0 buffer solution?　Please provide the reasons for your answer (15 %).
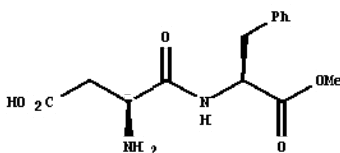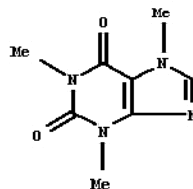


Aspartame
$pK_{a1}=3.0$, $pK_{a2}=7.4$
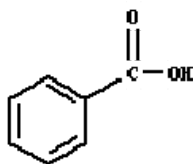
Benzoic acid
$pK_a=4.2$

Caffeine
$pK_a <0$

3. Compare the differences in (a) interference type, (b) light source, (c) nonmetal element analysis, and (d) isotopic analysis for the three atomic spectrometry (graphite AAS, ICP-AES and ICP-MS). Please provide the reasons for your answer. (20 %)

4. (a) Describe how to do "depth profile analysis" by a GDOES (glow-discharge optical emission spectroscopy). (b) What information can the depth profile analyses provide? (10%)

5. Please describe (a) the similarity and (b) the differences for an IR spectroscopy and a Raman spectroscopy. (10%)

6. Please calculate the pH in the following solution: (20%)

(a) 0.25 M $H_3His^{2+}$　　　　(b) 0.25 M HHis

(c) What is the principal form of histidine at pH 7? What is the second most abundant form at this pH?　　(His: amino acid histidine, $pK_{a1}=1.6$, $pK_{a2}=5.97$, $pK_{a3}=9.28$)