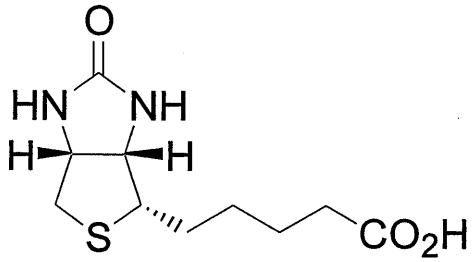
國立高雄大學九十六學年度轉學招生考試試題

科目：有機化學　　系所：應用化學系　　是否使用計算機：否
考試時間：90 分鐘　　本科原始成績：100 分

1. Name the five isomers of C_5H_{12}. (10pt)

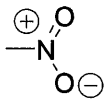
2. Assign *R* or *S* configurations to the chirality centers of biotin. (10pt)



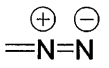
Biotin

3. Predict the major product in the following reactions. 1-methylcyclopentene is the starting material. (20pt)
   (A) BH_3, THF then H_2O_2, NaOH
   (B) O_3, then Me_2S
   (C) OsO_4, NMO then $NaHSO_{3(aq)}$
   (D) Br_2, DCM

4. Draw as many resonance structures as you can for the following species adding appropriate formal changes to each. (10pt)



nitromethane



diazomethane

5. Describe the following name reactions. (30 pt)
   (A) Michael addition
   (B) Cope elimination
   (C) Wittig olefination
   (D) Diels-Alder cycloaddition
   (E) Friedel-Crafts acylation
   (F) Wolff-Kishner reaction

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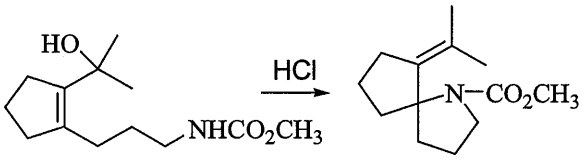
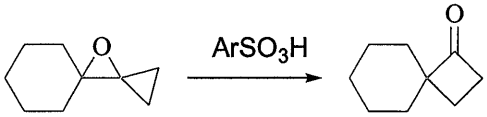
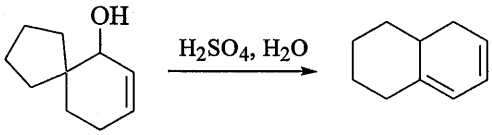
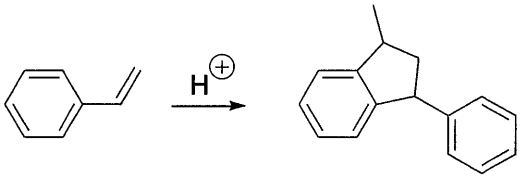
6. Provide the possible mechanism in the following reactions. (20pt)

(1)		(3)	
(2)		(4)	

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科目：分析化學　　系所：應用化學系　　是否使用計算機：是

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1. [15 pts] Define
   a、 sensitivity
   b、 red shift
   c、 titration error
   d、 partition chromatography
   e、 coprecipitation
2. [15 pts] Explain the difference between
   a、 qualitative analysis and quantitative analysis
   b、 random error and systematic error
   c、 isoelectric point and isoionic point
   d、 normal-phase chromatography and reverse-phase chromatography
   e、 blank titration and back titration
3. [10 pts] What are theoretical advantages of a FT-IR spectrometer compared with a dispersive instrument?
4. [10 pts] Explain the relationship between plate height and flow rate in chromatography.
5. [10 pts] Find a pH of a solution prepared by dissolving 0.100 mol of the weak acid HA (K_a = 1.0×10^{-5}) plus 0.100 mol of its conjugate base Na^+A^- in 1.00 L?
6. [10 pts] Calculate the molarity of HCl in a reagent labeled "37.0 wt% HCl, density = 1.188 g/mL." The molecular mass of HCl is 36.46 g/mol.
7. [10 pts] Write the absolute and relative uncertainty for the answer of following equation with a reasonable significant figures.

$$\frac{[1.76(\pm 0.03)-0.59(\pm 0.02)]}{1.89(\pm 0.02)} = 0.619 \pm ?$$

8. [10 pts] Consider the titration of 25.00 mL of 0.08364 M weak base B (K_a of BH^+ is 6.3×10^{-6}) with 0.1067 M HCl. What is the pH at the equivalence point.

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9. [10 pts] Would you reject the value 216 from the set of results 192, 216, 197, 202, 195, and 204?

Values of Q for rejection of data

Q (90% confidence)[a]	Number of observations
0.76	4
0.64	5
0.56	6
0.51	7
0.47	8
0.44	9
0.41	10