



# 淡江大學八十七學年度碩士班入學考試試題

系列：化學系

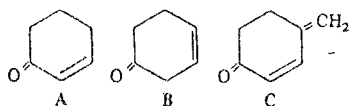
科目：分析化學

本試題共 2 頁

※不得在本試題紙上作答，否則不予計分※

5. How can spin-spin splitting lines be differentiated from chemical shift lines? (10%)

6. Which of the following would be expected to absorb light of the longest and shortest wavelength? Why? Consider only the  $\pi \rightarrow \pi^*$  transition. (10%)



7. What would be the effect of the following on the plate height of a column? Explain. (20%)

- (a) Decreasing the rate of sample injection.
- (b) Increasing the injection port temperature.
- (c) Increasing the flow rate.
- (d) Reducing the particle size of the packing.
- (e) Decreasing the column temperature.

8. A silver electrode immersed in  $1.00 \times 10^{-2}$  M  $\text{Na}_2\text{SeO}_3$  saturated with  $\text{Ag}_2\text{SeO}_3$  acts as a cathode when coupled with a standard hydrogen electrode. Calculate  $K_{sp}$  for  $\text{Ag}_2\text{SeO}_3$  if this cell develops a potential of 0.450 V. (10%)

Standard Electrode Potentials\*

Reaction	$E^\circ$ at 25°C, V
$\text{Cl}_2(\text{g}) + 2\text{e}^- \rightleftharpoons 2\text{Cl}^-$	+1.359
$\text{O}_2(\text{g}) + 4\text{H}^+ + 4\text{e}^- \rightleftharpoons 2\text{H}_2\text{O}$	+1.229
$\text{Br}_2(\text{aq}) + 2\text{e}^- \rightleftharpoons 2\text{Br}^-$	+1.087
$\text{Br}_2(\text{l}) + 2\text{e}^- \rightleftharpoons 2\text{Br}^-$	+1.065
$\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}(\text{s})$	+0.799
$\text{Fe}^{3+} + \text{e}^- \rightleftharpoons \text{Fe}^{2+}$	+0.771
$\text{I}_2 + 2\text{e}^- \rightleftharpoons 2\text{I}^-$	+0.536
$\text{Hg}_2\text{Cl}_2(\text{s}) + 2\text{e}^- \rightleftharpoons 2\text{Hg}(\text{l}) + 2\text{Cl}^-$	+0.268
$\text{AgCl}(\text{s}) + \text{e}^- \rightleftharpoons \text{Ag}(\text{s}) + \text{Cl}^-$	+0.222
$\text{Ag}(\text{S}_2\text{O}_3)_2^{3-} + \text{e}^- \rightleftharpoons \text{Ag}(\text{s}) + 2\text{S}_2\text{O}_3^{2-}$	+0.010
$2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2(\text{g})$	0.000
$\text{AgI}(\text{s}) + \text{e}^- \rightleftharpoons \text{Ag}(\text{s}) + \text{I}^-$	-0.151

9. Calculate the PH of a solution that is 0.200 M in  $\text{NH}_3$  and 0.300 M in  $\text{NH}_4\text{Cl}$ . The acid dissociation constant  $K_a$  for  $\text{NH}_4^+$  is  $5.70 \times 10^{-10}$ . (10%)