系所別: ___化學學系___   科目: ___物理化學與分析化學___

1. Define following term: (each 4 points) (total 20 points)
   (a) Back titration, (b) Systematic error and Random error,
   (c) Henderson-Hasselbalch Equation, (d) Calomel electrode,
   (e) Solid-phase microextraction.

2. How the column and flow rate affect the plate height in the separation of capillary-column GC, HPLC and capillary electrophoresis, explain detailed through van Deemter equation? (10 points)

3. What is electroosmotic flow, and describe the separation mechanism of capillary electrophoresis? (10 points)

4. Explain detailed how the following background correction techniques work in atomic spectroscopy: (a) Zeeman effect correction, and (b) Smith-hieftje correction. (10 points)

5. (10%) The data below show the temperature variation of the equilibrium constant of the reaction $Ag_2CO_3(s) \Leftrightarrow Ag_2O(s) + CO_2(g)$
   Calculate the standard reaction enthalpy of the decomposition.

T/K	350	400	450	500
K	3.98×10^{-4}	1.41×10^{-2}	1.86×10^{-1}	1.48

6. (15%) The standard Gibbs energy of reaction for the decomposition
   $H_2O(g) \Leftrightarrow H_2(g) + \frac{1}{2}O_2(g)$ is +118.08 kj/mol at 2300 K. What is the degree of dissociation of H_2O at 2300K and 1.00 bar. ?

7. (10%) Adiabatic, reversible expansion of 0.02 mol Ar, initially at 25°C. from 0.50 L to 1.00L. Determine (a) the final temperature and (b) the adiabatic work done on the system. ($C_{v,m}$=3R/2)

8. (15%) The reaction A →P can be zeroth, first and second order. With the initial concentration being $[A]_0$, Derive the (a) rate law, (b) time dependent concentration [A(t)], and (c) half life for each order of reaction.

參考用