1. a. In the absence of changing the chemical analysis method, describe a way to reduce the confidence interval of a result.

   b. Describe the condition that the method of standard addition is more appropriate than the method of linear calibration.   16%

2. Describe the procedures in preparing a buffer solution.   Please include the criteria of choosing a buffer reagent.   8%

3. Please draw the titration curve for the titration of a weak acid HA with a strong base and describe how you would calculate the pH in the regions of
   a. before the addition of base.
   b. before the equivalence point.
   c. at the equivalence point.
   d. after the equivalence point.   12%

4. Explain the difficulty in titration a very weak acid.   8%

5. The base B has pKb = 5.00, what is the quotient [B] / [BH$^+$] at pH 12.00 ?   6%

6. What is the difference between the titration reaction and the cell reaction in a potentiometric titration?   8%

7. What are the advantages of square wave polarography over sampled current polarography ?   8%

8. What is the difference between faradaic and charging current ?   8%

9 a. Please draw an intensity vs. wavelength diagram to show the relative line width of hollow cathode emission, atomic absorption, and a monochromator.

   b. Describe and explain the difference in detection limits between flame atomic absorption and furnace atomic absorption.   12%

10. Explain the mechanism of "electroosmosis" in capillary electropheresis.   8%

11. Please describe the most common method to increase the eluent strength during a gradient reversed phase HPLC analysis ?   6%

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