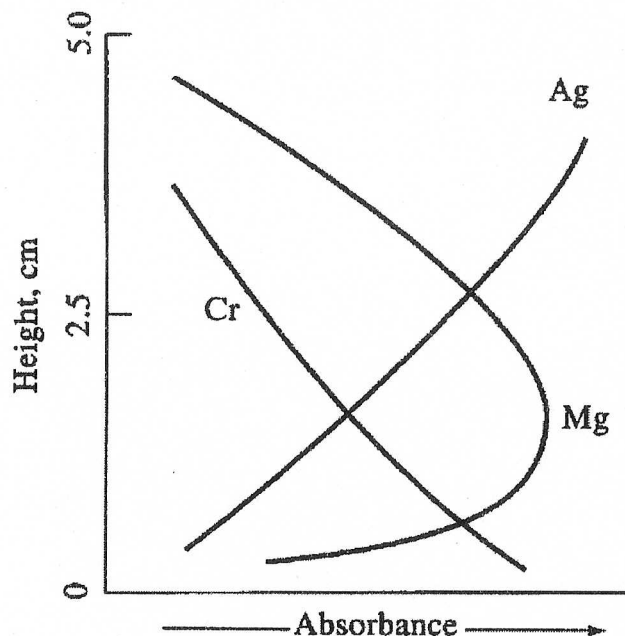


1. (30%) Please define following terms and explain the difference
- gravimetric precipitation method and gravimetric volatilization method
 - equivalence point and end point of a titration
 - primary standard and secondary standard
 - electrode potential and formal potential
 - alkaline error and acid error in the measurement of pH by glass electrode.
 - concentration polarization and kinetic polarization
 - voltammetry and polarography
 - single-beam and double-beam instruments for absorbance measurements.
 - resonance fluorescence and stock shift
 - atomic emission and atomic absorption spectroscopy.
2. (10%) Please give appropriate answer to following two question
- Why are the lines from a hollow-cathode lamp generally narrower than the lines emitted by atoms in a flame?
 - Why are ionization interferences usually not as severe in the ICP as they are in flame?
3. (5%) Please describe the characteristics of organic compounds that fluoresce.
4. (10%) Pd(II) and Au(III) can be analyzed simultaneously through their reaction with methiomeprazine. The absorption maximum for the Pd complex occurs at 480 nm, while that for au complex is at 635 nm. Molar absorptivity data at these wavelengths are
- | | | |
|------------|--------------------------------------|--------------------------------------|
| Pd complex | $\epsilon=3.55 \times 10^3$ (480 nm) | $\epsilon=5.64 \times 10^2$ (635 nm) |
| Au complex | $\epsilon=2.96 \times 10^3$ (480 nm) | $\epsilon=1.45 \times 10^2$ (635 nm) |
- A 25.0 mL sample was treated with an excess of methiomeprazine and subsequently diluted to 50.0 mL. Calculate the molar concentrations of Ps(II) and Au(III) in the sample if the diluted solution had an absorbance of 0.533 at 480 nm and 0.590 at 635 nm when measured in a 1-cm cell.

5. (5%) According to following figure, please explain the reasons for the changes in the absorbance of three elements as function of distance above the burner head of atomic absorption spectrometer.



6. (10%) (1) Please describe the fundamental difference between adsorption and partition chromatography.
(2) Please describe the fundamental difference between ion-exchange and size-exclusion chromatography.
7. (10%) A solution is 0.150 M in Co^{2+} and Cd^{2+} . Calculate
(a) The Co^{2+} concentration in the solution as the first cadmium starts to deposit.
(b) The cathode potential needed to lower the Co^{2+} concentration to 1×10^{-5} M.
($E^\circ \text{ Co} = -0.277$ V; $\text{Cd} = -0.403$ V)
8. (5%) What is the pH of a 2.0×10^{-8} M HCl solution?
9. (10%) The Cr plating on a surface that measured 3.00×4.00 cm was dissolved in HCl. The pH was suitably adjusted, following which 15.00 mL of 0.01768 M EDTA were introduced. The excess reagent required a 4.60-mL back-titration with 0.008120 M Cu^{2+} . Calculate the average weight of Cr on each square centimeter of surface. (Atomic weight of Cr = 51.996)

10. (5%) Please explain the effect of acid strength on the titration curve, based on the following graph.

