

Emphasize the following areas

1. Equilibrium and Solubility: calculation of minimum concentrations for pptn. Know how to calculate the concentrations of all other species (e.g., 50 mL of 0.10 M CaCl_2 is mixed with 50 mL of 0.12 M AgNO_3 - calculate the concentrations of all the species in solution.). Titration of halide mixture with Ag^+ .
2. Acid-Base: Know how to calculate the concentration of all the species (not just pH) in a solution of monoprotic, diprotic and triprotic weak acid, weak base and salts of weak acids and bases. Know how to calculate percent dissociation and fractional concentrations of species. Know how to compare pH and pK and find principal species. Interpret species distribution diagram.
3. Buffers: Know common ion effect and the concept of buffer. Acid -base mixing problems - both strong and weak.
4. Titration: The above is related to titration. Clearly understand weak-strong titration for monoprotic acid. Know how to calculate pH at those important locations from a titration curve for mono and di and tri-protic acid or base. Clearly understand the titration of carbonate/bicarbonate system. EDTA titration- calculation of pM (check example calculations in the book).
5. Electrochemistry: Cell diagram, cell setup, cell reaction and cell notation. Direction of electron flow. Calculation of E^0 , E_{cell} , free energy, K, K_{sp} for a cell reaction. Know the makeup of various ISE including pH electrode. Check examples in chapter 14.
6. Spectroscopy: Know the mechanisms of various electronic transitions. How a diffraction grating works? Beers law and associated problems.
7. Chromatography: Know all examples and ask-yourself questions. Know mechanisms of separation and band broadening. Know basic instrumentation for GC, HPLC and CZE. Know how CZE works.

NOTE:

No equation sheet will be given. Instead, you are allowed to bring in an 8 x 11 paper with anything written on it.