The analytical qualifier consists of the ACS exam in Instrumental Methods. This test examines material that is typically covered in an undergraduate course in Instrumental Analysis or Chemical Analysis. A good text for review is FJ Holler, TA Nieman, DA Skoog, Principles of Instrumental Analysis, 5th Ed.; Harcourt Brace & Co., 1998, or DA Skoog, DM West, FJ Holler, Fundamentals of Analytical Chemistry, 8th Ed., Thomas (Brookes/Cole), 2004 (or any recent text on the same subject).

In your review, the most important topics to cover are:

I. General Principles of Analytical Chemistry
   A. Quantitation methods: calibration curves, internal standardization, standard addition method, signal vs. noise
   B. Simple electronics: operational amplifiers, electrical components and circuits in chemical instrumentation
   C. Chemometrics: use of linear relationships, curve fitting methods simplex optimization

II. Spectrochemical Analysis: know the terminology, basic instrumental components, advantages, disadvantages, and applications (qualitative or quantitative technique, useful concentration range, etc.) of the following techniques:
   A. Molecular spectroscopy: uv/visible absorption, IR absorption, Raman scattering, fluorescence, phosphorescence, NMR, mass spectrometry, surface characterization
   B. Atomic spectroscopy: AAS (flame and furnace), ICP, neutron activation, X-ray and particle techniques (ESCA, SEM)

III. Electroanalytical Chemistry: know the terminology, electrochemical cells, cell potentials, types of electrodes, basic instrumental components, advantages, disadvantages, and applications of the following techniques:
   A. Potentiometric methods (pH, ISE)
   B. Voltammetry (DC Polarography, Pulsed polarography, Stripping analysis)
   C. Coulometry

IV. Chemical Separations: know the terminology, basic instrumental components, advantages, disadvantages, applications, and be able to predict elution characteristics for the following techniques:
   A. HPLC
   B. GC
   C. TLC (or planar chromatography)
   D. CE and CEC
   E. Extraction

V. Miscellaneous:
   A. Thermal analysis (TG, DTA, DSC, etc.)
   B. Radiochemical methods

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