Bruker QUANTAX User School Outline

Lecture 1: X-ray Basic Physics, System Parameters and Qualitative Analysis
- I.   System Description
  - A. Who's Who
  - B. History of Microanalysis
  - C. . Components
    - 1. Spectrometer
    - 2. Electronics
  - D. Spectrometer resolution
  - E. Spectrometer efficiency
- II. Data Collection
  - A. Energy calibration
  - B. Count rate considerations
    - 1. Statistics
    - 2. (3 Sigma Rule)
- III. X-ray Physics
  - A. Generation of x-rays
    - 1. Characteristics of x-rays
    - 2. Continuum
    - 3. Artifact peaks
  - B. Moseley's Law
  - C. Beer's Law
- IV. Microscope/Detector Parameters
  - A. Sample/Detector geometry
  - B. Probe current
  - C. X-ray range (volume)
- V. Qualitative Analysis
  - A. Parameters
    - 1. Accelerating voltage
    - 2. Sample/Detector geometry
    - 3. Probe current/Count rate
  - B. Identification
  - C. Dealing with overlaps

Laboratory 1: X-ray Basic operation and Qualitative Analysis
- I. Overview of System
  - A. Detector
  - B. Analyzer
    - 1. Components
    - 2. Software
      - a. Version
      - b. Booting system
    - 3. Display
    - 4. Mouse/Keyboard operation
  - C. Calibration
  - D. General X-ray data collection
- II. Qualitative analysis and general operation
  - A. Display spectra
  - B. Spectra control
  - C. Identification
    - 1. Manual
    - 2. Computer-assisted
    - 3. Automatic

D. Checking detector efficiency
E. Handling overlaps

Lecture 2: Comparative Analysis
I. Comparative Analysis
    A. Relative ratio/Match/Fingerprint Analysis
    B. K-ratio
    C. Concentration curve
    D. Graphic techniques (Mapping, LPA, HyperMaps)
II. General X-ray Techniques
    A. Ideal sample
    B. Sample charging
    C. Rough surface/powder
    D. Multi-phase
    E. Thin films
    F. Foils
    G. Particles on substrate

Laboratory 2: Mapping, Line scan and Comparative Techniques
I. Collection of SpotLight / Multi-point, X-ray maps, line profiles, PTS / HyperMap. (Group)
II. Comparative Analysis

Lecture 3: Quantitative Analysis
I. Theory
II. Background subtraction
III. K-ratio/Deconvolution
IV. Matrix correction
V. Standards versus standardless
VI. Microscope parameters
VII. Description of Bruker Quantitative Programs

Laboratory 3: Quantitative Analysis
I. Setting up quant
    A. Take-off angle
    B. Efficiency
II. Standardless Analysis
III. Partial standards analysis
IV. Full standards analysis
V. Rough surface/powder
VI. Thin section (Cliff-Lorimar)
VII. Hall
VIII. Output

Lecture 4: Digital Image; Analysis and Processing
I. Terminology
II. What is digital imaging?
III. Calibration
IV. Image Processing
V. Image Analysis

Laboratory 4: Digital Imaging
I. Optimize image collection
II. Basic display operations
III. Feature Analysis