

Characterization of Materials

Exam 1 will cover:

I) Terminology from crystallography:

Point and plane descriptions, miller indices, unit cells, bravais lattices, meaning of symmetry elements and use in crystal class, atoms in unit cell, lattice points in unit cell of crystals given in Cullity (ch 2).

II) X-ray generation:

How x-rays are produced, role of energy levels of electrons in atoms, equations in ch 1, various spectra, labels of xrays ($K\alpha$, etc.) and emitted electrons, relation of this info regarding interactions of electrons or photons with atoms in various analysis techniques.

III) Absorption:

Equations, mechanisms of absorption, graphs, problem-solving.

IV) Diffraction:

Bragg's law, peak broadening, equations in C ch 3.

V) Technique acronyms and full names.

VI) Know 'particles in' and 'particles out' for each technique covered so far (and the underlying similarities of a 'particle in' creating several 'particles out').

VII) Intensity of XRD peaks, factors in the I_{INT} equation, effects of these factors in I_{INT} on intensity of specific (hkl) lines in 2θ , especially form factor and the Structure Factor and their importance. Know how to solve for F_{hkl} .

IN GENERAL:

Of course, anything discussed in class should be understood and much of it is also in the chapters in Cullity, the homework and the answers covered in class will help.

You need to know terminology – just like any professional field, you need to know the language of the participants.

Plus, THINK about this stuff in general – why do things happen, how do I apply them to the analysis of materials, etc.