

Chemistry 832: Solid State Structural Methods

Lecture Exercise #1, The Unit Cell

[G., L., & R. pp 105 - 108: Figure 4.1, p107 in particular]

- (1) There are rolls of wall paper in the X-ray lab. Select a roll of wallpaper that no one else is using and cut two sections that are approximately square.
- (2) On one of your samples, identify the two-dimensional repeating pattern “in your minds eye”. On this sample draw five different unit cells including one that is a primitive unit cell (i.e. chose one with the angles as close to 90 degrees as possible and with the origin being on the center of an object). Clearly indicate which is the primitive unit cell.
- (3) On the other sample, draw in all of the cells “tiled together” to fill up your piece of wall paper.
- (4) Think about your unit cells and the diffraction patterns they would generate. Answer the following questions giving your reasoning:
 - (a) What are the dimensions of each of these unit cells?
 - (b) Would the diffraction pattern of the paper depend upon the unit cell you chose?

Why or why not?

Hand in your wallpaper samples with your answers.