

My Mineral _____

GEOL3010 Mineralogy

Adopt-a-Mineral

This course requires a brief research paper on a pure mineral end-member. Each person will have a different mineral. One purpose is to familiarize you with the mineralogical and geological literature and procedures for searching for and extracting information. Another is to link the various laboratory exercises and focus them on making measurements to test or confirm literature observations. Another is to familiarize you with proper writing, report, and citation procedures. A sample research paper on quartz will be on reserve in the library.

The due date of the paper is November 25, 2003. However, in order to assure timely utilization of library resources, the bibliography (references) will be due Nov. 13, 2001

Your literature search should probably include an Internet search. You may want to begin with a quick search through *Glossary of Mineral Species* (Fleischer) if you have any question about the composition of your mineral. You should also check *Georef*. You may also check *Mineralogical Abstracts*, *Chemical Abstracts*, MSA's *Reviews in Mineralogy*, and/or *Science Citation Index* <<http://isi1.med.iacnet.com/ISI/CIW.cgi>>

In order to make your drawing and calculated X-ray powder pattern, you will need to find a paper or source that contains the space group and atom positional coordinates. A reference to original crystallographic data the common minerals may be found in Smyth and McCormick (1995) [*Crystallographic data for minerals. Mineral Physics and Crystallography A Handbook of Physical Constants, Vol.2, AGU, 1-17.*]

The paper should consist of the following sections in correct prose with proper citation procedure.

I. Introduction:

A paragraph introducing general information on your mineral such as the origin of the name, formula, and chemical and structural affinities.

II. Physical and Optical Properties

This section will include reference to the following tabulated data (Tables 1).

Table 1. General and Physical Properties (Tabulated)

- a) Chemical Formula
- b) Optical Properties
- c) Cleavage common crystal forms
- d) Color, Opacity and Luster
- e) Hardness

III. Chemistry

This section will cover the principal chemical variations and substitutions in the mineral species and will include a table (Table 2) of chemical analyses as weight percent oxides and as atoms per formula unit.

Table 2. Three typical chemical analyses (Tabulated). These may be imported from Excel with calculations of cation ratios as done in your homework.

IV. Structure

This section will include a paragraph briefly describing the structure of the mineral. This section will include reference to data in Table 3 and Figures 1, 2, and 3.

Table 3. Crystallographic Information (Tabulated)

- a) Crystal System
- b) Point Group
- c) Space Group
- d) Unit Cell Parameters
- e) Z (No. of Formula Units per Cell)
- f) Density (Literature values and your calculation)
- g) Fractional Coordinates for each unique atom (This may be a separate table for complex structures)

Figure 1. A Drawing of the Crystal Structure from XTALDRAW

V. X-ray Diffraction

Give a brief description of the X-ray powder diffraction experiment you did and the powder pattern you calculated using XPOW.

Figure 2. Your raw pattern

Figure 3. Your processed X-ray powder diffraction pattern with peaks and the standard pattern.

Figure 4. A Calculated X-ray Powder Diffraction pattern for your mineral.

Table 4. X-ray powder diffraction data for your mineral. Tabulate and compare the observed and calculated peaks for your pattern. This will be a merge of your XPOW and observed patterns presented as a single table with the peaks indexed (Miller indices).

V. Occurrences

Give in correct prose a description of the general occurrences of your mineral. You should give the type of mineral environment and/or description of one or two type localities if it is a rare mineral. This should be approximately one page of double-spaced word-processed text (~250 words).

VI. References

Use the reference format of the *American Mineralogist*.

<http://www.minsocam.org/MSA/AmMin/instructions.html>

You MUST follow the format exactly!!!

Each item in tables 1-3 must be referenced (or be your own measurement).