

9-2003

# GEOL 580.01: X-Ray Diffraction Techniques in Mineral and Rock Analysis

Graham R. Thompson  
*University of Montana - Missoula*

Let us know how access to this document benefits you.

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi>

---

## Recommended Citation

Thompson, Graham R., "GEOL 580.01: X-Ray Diffraction Techniques in Mineral and Rock Analysis" (2003). *Syllabi*. 3562.  
<https://scholarworks.umt.edu/syllabi/3562>

This Syllabus is brought to you for free and open access by the Course Syllabi at ScholarWorks at University of Montana. It has been accepted for inclusion in Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

# G580 - X-ray Diffraction Techniques in Mineral and Rock Analysis

## Fall, 2003 - Gray Thompson

**Office: SC 359; Phone #'s 243-4953, 549-3636 (home)**  
**Email: gl\_grt@selway.umt.edu**

We will work with analytical methods for identifying and characterizing minerals and mineral groups listed in the syllabus, determining compositional and/or structural properties using techniques appropriate to each group. Class members may work independently or as a team. The assignment for each project is:

1. Conduct a literature review of techniques that have been developed for the mineral (group) using the references provided as a **starting** point.
2. Using all references, select appropriate methods of sample preparation and analysis and perform the necessary XRD analyses to identify the composition and/or structure of the mineral.
3. Present the data, interpretations, and conclusions orally during scheduled class meetings.
4. Submit a brief written report at the end of each project consisting of
  - A. An annotated bibliography of the references used ( and those not used as well).
  - B. The XRD data.
  - C. A summary of the interpretations of the data
  - D. An assessment of the procedures.

Week	Topic	Readings/References
1, 2, & 3	Principles and practice of X-ray diffraction	Moore & Reynolds, 1997. X-ray diffraction ... of Clay Minerals 2 <sup>nd</sup> Ed. Reynolds, 1989. Principles of Powder Diffraction, MSA Reviews in Mineralogy V. 20, pp 1 – 17
	X-ray diffraction analysis and identification of a single mineral: sample preparation methods for analysis of a random powder sample. Use of internal standards to calibrate XRD data.	Moore & Reynolds, 1997. X-ray diffraction ... of Clay Minerals 2 <sup>nd</sup> Ed. Bish & Reynolds, 1989. Sample Preparation for X-ray diffraction. MSA Reviews in Mineralogy V. 20, pp 73 - 97
	Indexing and interpreting	Fink Index & Search

4, 5, & 6	<p>X-ray diffraction data for a single mineral</p> <p>X-ray diffraction analysis and identification of a mixture of two or more minerals. Quantitative analysis</p>	<p>Manual</p> <p>Fink Index &amp; Search Manual Snyder &amp; Bish, 1989, Quantitative Analysis. MSA Reviews in Mineralogy V 20, pp 101 - 142</p>
7, 8 & 9	<p>X-ray diffraction as a tool for compositional analysis of carbonate minerals</p>	<p>Chave, K.E., 1952. A solid solution between calcite and dolomite, J. Geol. V. 60, pp 190-192.</p> <p>Pilkey, O. H. 1959. The effect of environment on the concentration of Mg and Sr in certain recent echinoid tests. MS Thesis, The University of Montana.</p> <p>Reeder, R.J. &amp; Shepard, C.E., 1983, Variation of lattice parameters in some sedimentary dolomites. Am Min.</p>
10 & 11.	<p>X-ray diffraction as a tool for compositional analysis of the olivine group minerals.</p>	<p>Yoder, H.S. &amp; Sahama, Th.G., 1957, Olivine X-ray determinative curve. Am. Min V. 42, p. 475</p>
12 & 13	<p>X-ray diffraction as a tool for compositional analysis of a mineral: Pyroxene group minerals</p>	<p>Zwaan, On the determination of pyroxene by powder XRD, Leidse Geol. Mededelingen v19, p 167 (in Deer, Howie, &amp; Zussman, Rock Forming Minerals v2, p12ff and pp 110-112</p> <p>Kuno, 1954, Opx in volc. rocks, Am. Min. v39 p30</p> <p>Hess, 1952, Opx...unit cell dimensions, Am. Jour. Sci.</p>

14 & 15	X-ray diffraction analyses for structural details of the sheet silicates: polytype determinations for micas, kaolin group minerals, and chlorites	<p>Bowen vol p 173.</p> <p>Moore &amp; Reynolds, 1997. X-ray diffraction ... of Clay Minerals 2<sup>nd</sup> Ed., pp 112 – 116, 246 – 247</p> <p>Bailey, S.W, 1984. Classification and structures of the micas. MSA Reviews in Mineralogy V.13, pp 1 – 12</p> <p>Srodon, J. and Eberl, D.D., 1984. Illite. MSA Reviews in Mineralogy V.13, pp 506 -510</p>
---------	---	--