

July 16, 1995

FRANK NELSON BLANCHARD

RÉSUMÉ

EDUCATION

University of Michigan (major in geology, minor in mineralogy)
A.B. 1953
M.S. 1954
Ph.D. 1960

Indiana University (summer field geology, 1952)
University of Florida (part time, 1962-63 and 1978-79)

Academic honors and distinctions

Freshman Honors (1950), Phi Eta Sigma (1952), Junior Honors (1953), Magnolia Petroleum Company Scholar (1953), Sigma Gamma Epsilon (1953), Phi Kappa Phi (1953), A.B. with distinction (1953), University Fellowships (1953-54, 1954-55, 1955-56), Sigma Xi

ACADEMIC EXPERIENCE

Professor of Geology, University of Florida, 1976 - present
Affiliate Professor, Department of Materials Science and Engineering, University of Florida, 1987
Visiting Professor, VPI and State University, spring, 1981
Associate Professor, University of Florida, 1969 - 1976
Assistant Professor, University of Florida, 1961 - 1969
Tenure awarded, 1963
Interim Assistant Professor, University of Florida, 1958 - 1961
Appointed to Graduate Faculty, 1959
Teaching Fellow, University of Michigan, 1956-57, 1957-58

Courses taught at the University of Florida (since 1959) -

Exploring the Geologic Sciences, Physical Geology, Engineering Geology, Structural Geology, Interpretation of Geologic Maps, Crystallography, Mineralogy, Economic Geology, Rocks and Minerals for Teachers, Petrology, Mineralogical Analysis by X-ray Methods, Optical Crystallography, Ground-Water Geology, Optical Mineralogy, Petrography, X-ray Fluorescence Analysis, Advanced Topics in X-ray Analysis, Individual Work, and Seminars

Current regular teaching assignments - General Mineralogy, Optical Mineralogy, Optical Crystallography, and Mineralogical

Analysis by X-ray Methods

Short Courses (offered at University of Florida)

EPA Air Pollution Microscopy (Course 420) - Principal instructor (January and October, 1984, December, 1985, 1986, 1987, 1988, 1989)

MAIC X-ray Diffraction and Fluorescence - course director and sole instructor (May 1986)

MAIC Optical Microscopy - sole instructor for section on polarized light microscopy (May, 1984)

PROFESSIONAL LICENCE

Professional Geologist in the State of Florida (PG0000364)

OTHER PROFESSIONAL EXPERIENCE

Consulting and/or analytical services provided for Du Pont (Laporte Plant, Texas), WESTVACO, Stauffer Chemical Company, Micro-Analytical Laboratories, Anglo-American Clays Corporation, Jim Walter Research Corporation, Product Liabilities Incorporated, Law Engineering Testing, Florida Department of Transportation, Materials Consultants Incorporated, Materials Science Incorporated, Williams and Associates Incorporated, Florida Crushed Stone, Environmental Science and Engineering Incorporated, Florida Testing Laboratories, Shands and Baker, AGRICO, Attorneys Reynolds, Smith, Hills, and Mateer, Colling, and Young

Geologist-Party Chief - U. S. Steel (Oliver Iron Mining Division) summer, 1958, 1957, 1956, and Geologist - summer 1955

Geologist - Magnolia Petroleum Company - summer 1953

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Mineralogical Society of America, Mineralogical Association of Canada, Florida Academy of Sciences, Southeastern Geological Society

AWARDS AND HONORS

Recognized with four others for Superlative Teaching (1977),

Nominated for Outstanding Teacher of the Year Award (1973, 1974, and 1975)

Listed in American Men and Women of Science and in other bibliographies

SUMMER COURSES AND CONFERENCES ATTENDED (5 TO 10 WEEKS EACH)

NSF Summer Institute in Modern Techniques of Microscopy (1973)

NSF Summer Field Course in Structures and Origin of Volcanic Rocks (1973)

Philips X-ray Analytical School (1971) (one week)

NSF Short Course in Experimental Petrology, Geochemistry, Rock Magnetism (1967)

NSF Summer Conference in Structure and Stratigraphy of the

Appalachians (1965)
NSF Summer Conference in History of Geology (1964)
NSF Summer Institute in Ground Water Geology (1963)

RESEARCH AWARDS FROM THE UNIVERSITY OF FLORIDA

AS PRINCIPAL INVESTIGATOR

DSR - Graduate Research Assistant (1984) (\$2338)
Graduate School and DSR - Graduate Research Assistant (1981-82)
(\$2,423)
Graduate School - Accessories for X-ray diffraction equipment
(1969-?) (\$3,400)
Graduate School - X-ray diffraction equipment (1967) (\$5,400)
Graduate School - Equipment for TL and DTA equipment (1965?)
Graduate School - Summer research appointment (1964)
Graduate School - Summer research appointment (1961)
Graduate School - Thermoluminescence equipment (1959)

AS CO-PRINCIPAL INVESTIGATOR

DSR - Thermoluminescence dating laboratory (1979) (with B. A.
Purdy, \$7,250)

GRANTS

AS PRINCIPAL INVESTIGATOR

JCPDS - International Centre for Diffraction Data - 1990-91
(\$7,000)
JCPDS - International Centre for Diffraction Data - 1989-90
(\$7,500)
JCPDS - International Centre for Diffraction Data - Data
collection for phosphate minerals tetracyclines, and other
natural and synthetic phases, and 1988-89 (\$7,000)
Hooker Chemical Company (1987-88) Distribution of palygorskite
and related mineral phases and MgO in a north Florida
phosphorite (\$7,500)
JCPDS - International Centre for Diffraction Data - Data
collection for phosphate and arsenate minerals, evaluation of
PDF patterns, testing of computer aided identification of
minerals
1987-88 (\$6,834)
1985-86 (\$3,936)
1984-85 (\$3,815)
1983-84 (\$2,400)
1982-83 (\$3,673)
1979-80 (\$1,700)
1978-79 (\$1,200)
Soft Phosphate Research Institute (1971) Firing of phosphorite
(\$3,000)
Soft Phosphate Research Institute (1969) Mineralogical, chemical,
and crystallographic characterization of phosphate samples
(\$2,000)
Soft Phosphate Research Institute (1969) Mineralogical analysis of
phosphate samples (\$500)
General Electric Company (1968) X-ray Diffraction Equipment
(\$16,912)
USAF and NATO (1966) Funds to attend the Advanced Research

Institute on the Application of Thermoluminescence to Geological Problems, Spoleto, Italy (approximate value \$1,500)
Semi-Elements, Inc (1965) Thermoluminescence of synthetic fluorite (approximate value \$500)
American Philosophical Society (1961) Thermoluminescence of fluorite (\$1,000)

AS CO-PRINCIPAL INVESTIGATOR

Florida Institute of Phosphate Research (1982,4.5.6) Separation of dolomite from the South Florida Phosphate Rock
1986 (\$172,000)
1985 (\$116,000)
1984 (\$106,000)
1982 (\$178,000)

ABSTRACTS AND BRIEF NOTES

Blanchard, F. N. (1961) Thermoluminescent properties of the mineral fluorite. Yearbook of the American Philosophical Society, 1961, 271-275.

Blanchard, F. N. (1971) Letter to the editor concerning J. R. Craig's paper, "A slide rule method for rapid indexing of cubic X-ray powder diffraction patterns." Journal of Geological Education.

Davis, M. P., F. N. Blanchard, P. A. Mueller, and D. L. Smith (1977) Geochemistry of uranium and thorium in intrusive rocks of the southeastern piedmont. Florida Academy of Sciences.

Gunning, S. P., F. N. Blanchard, P. A. Mueller, D. L. Smith (1977) An evaluation of the chemical and radioactive properties in the phosphate districts of Florida. Florida Academy of Sciences.

Sinks, D. J., F. N. Blanchard, P. A. Mueller (1977) Chemical and petrographic analyses of some metamorphic rocks, Beartooth Mountains, Montana. Florida Academy of Sciences.

White, G. N., C. T. Hallmark, V. E. Burkheiser, and F. N. Blanchard (1980) Separation and characterization of a soil-derived 14A intergrade. ASA-CSSA-SSSA 1980 Annual Meeting, Detroit, Michigan.

White, G. N., V. E. Burkheiser, F. N. Blanchard, and C. T. Hallmark (1980) Selected area chemical analysis of single clay particles by energy dispersive X-ray analysis under electron microscope. The Clay Minerals Society, October, 1980 meeting, Waco, Texas.

Blanchard, F. N. (1982) Evaluation of X-ray data for phosphate minerals in terms of computerized phase identification. Florida Academy of Sciences, Forty-sixth Annual Meeting, April, 1982, Stetson University, Deland, Florida.

Blanchard, F. N. (1983) Evaluation of existing powder diffraction standards for phosphate minerals. The 32nd Annual Denver X-ray Conference and the summer meeting of the American Crystallographic Association, August, 1983, Snowmass, Colorado.

Blanchard, F. N. (1984) The quality of powder diffraction standards for phosphate minerals and the level of success in computer identification using the X-ray Powder Diffraction File. The 33rd Annual Meeting of the Southeastern Section of the G.S.A., April 6, 1984, Lexington, Kentucky.

Blanchard, F. N. and R. E. Goddard (1984) The mineralogical residence of magnesium in phosphorite samples from the southern extension of the Central Florida phosphate district. The 33rd Annual Meeting of the Southeastern Section of G.S.A., April 6, 1984, Lexington, Kentucky.

Blanchard, F. N. (1984) The quality of X-ray diffraction standards for phosphate minerals and the degree of success in computer identification. The 33rd Annual Denver X-ray Conference, August 2, 1984, Denver, Colorado.

Blanchard, F. N., R. E. Goddard, and B. Saffer (1985) Application of quantitative X-ray analysis combined with other analytical methods to the study of high-magnesium phosphorites. The 34th Annual Denver X-ray Conference, August 7, 1985, Snowmass Colorado.

Blanchard, F. N. (1985) The use of calculated patterns as an aid in preparation of powder diffraction standards: minyulite, $KAl_2(PO_4)_2(OH,F)4H_2O$, as an example. The 34rd Annual Denver X-ray Conference, August 7, 1985, Snowmass, Colorado.

Moudgil, B. and F. N. Blanchard (1987) Application of polarized light microscopy SEM and X-ray diffraction analysis to the study of high magnesium phosphorites. The Society of Mining Engineers, February, 1987, Denver, Colorado.

Dufresne, D. P. and F. N. Blanchard (1988) Distribution of palygorskite, MgO, and other major minerals in a Florida phosphorite. The 52nd Annual Meeting of the Florida Academy of Sciences, May 13, 1988, Tampa, Florida.

PUBLICATIONS

Blanchard, F. N. (1964) An electric analog model demonstrates ground water flow. **Journal of Geological Education**, 12, 104-105.

Blanchard, F. N. (1966) Thermoluminescence of fluorite and age of deposition. **American Mineralogist**, 51, 371-379.

Blanchard, F. N. (1967) Thermoluminescence of synthetic fluorite. **American Mineralogist**, 52, 371-379.

Blanchard, F. N. and S. A. Denahan (1967) Variscite from the Hawthorne formation. **Quarterly Journal of the Florida Academy of Sciences**, 19, 163-170.

Blanchard, F. N. and S. A. Denahan (1968) Wavellite-cemented sandstones from northern Florida. **Quarterly Journal of the Florida Academy of Sciences**, 19, 248-256.

Blanchard, F. N. (1968) Differential thermal analysis of wavellite. **Quarterly Journal of the Florida Academy of Sciences**, 30, 161-167.

Blanchard, F. N. and S. A. Denahan (1968) Cacoxenite and beraunite from Florida. **American Mineralogist**, 53, 2096-2101.

Blanchard, F. N. (1969) Rockbridgeite in iron phosphate nodules from Polk County, Florida. **Southeastern Geology**, 10, 31-34.

Blanchard, F. N. (1971) Thermal analysis of crandallite. **Quarterly Journal of the Florida Academy of Sciences**.

Blanchard, F. N. (1971) Physical and chemical data for crandallite from Alachua County, Florida. **American Mineralogist**, 57, 473-484.

Purdy, B. A. and F. N. Blanchard (1973) Petrography as a means of tracing stone tools from Florida. **Florida Anthropologist**, 26, 121-125.

Blanchard, F. N. (1974) X-ray powder diffraction data for wavellite. **Florida Scientist**, 37, 1-4.

Blanchard, F. N. (1975) Firing of soft phosphate yields a bloated product. **Florida Scientist**, 38, 82-84.

Blanchard, F. N. (1977) Calculated X-ray powder diffraction patterns for barite, celestite, and anglesite. **Florida Scientist**, 40, 61-64.

Blanchard, F. N. (1977) Calculated and observed X-ray powder diffraction patterns for paravauxite. **Florida Scientist**, 40, 199-202.

Blanchard, F. N. (1978) Calculated X-ray powder diffraction data for the crandallite-goyazite series. **Florida Scientist**, 41, 15-20.

Blanchard, F. N. and B. R. Alford (1978) Heterosite X-ray powder diffraction data. **Florida Scientist**, 41, 233-237.

Blanchard, F. N. (1980) A computer program for calculation of calibration curves for quantitative X-ray diffraction analysis. **Journal of Geological Education**, 28, 190-192,

Blanchard, F. N. (1980) A FORTRAN IV program for use with data from a Debye-Scherrer photograph. **Journal of Geological Education**, 28, 190-192.

Blanchard, F. N. (1980) A FORTRAN program to aid in mineral identification using optical properties. **Journal of Geological Education**, 28, 231-232.

Blanchard, F. N. and S. A. Abernathy (1980) X-ray powder diffraction data for the phosphate minerals vauxite, metavauxite, vivianite, Mn-heterosite, scorzalite, and lazulite. **Florida Scientist**, 43, 257-265.

Blanchard, F. N. (1981) X-ray powder diffraction data for lithiophilite. **Florida Scientist**, 44, 53-56.

Mueller, P. A., M. P. Davis, and F. N. Blanchard (1982) Uranium and thorium variations in plutonic rocks of the Georgia Piedmont.

Southeastern Geology, 23, 41-49.

Abernathy, S. A. and F. N. Blanchard (1982) Variations in unit cell parameters and in the X-ray diffraction intensity ratio $I(200)/I(100)$ in the lazulite-scorzalite series. **American Mineralogist**, 67, 610-614.

White, G. N., V. E. Berkheiser, F. N. Blanchard, and C. T. Hallmark (1982) Standardless thin film analysis of clay particles using energy dispersive X-ray analysis. **Clays and Clay Minerals**, 30, 375-382.

Blanchard, F. N. (1984) Evaluation of existing X-ray powder diffraction standards for phosphate minerals. **Advances in X-ray Analysis**, 27, 61-66.

Blanchard, F. N. (1984) A FORTRAN program to compute the refractive index of a crystal fragment from data of the double variation method. **Journal of Geological Education**, 32, 17-19.

Blanchard, F. N. (1985) The quality of X-ray diffraction standards for phosphate minerals and the degree of success in computer identification. **Advances in X-ray Analysis**, 28, 305-308.

Blanchard, F. N., R. E. Goddard, and B. Saffer (1986) Application of quantitative X-ray diffraction combined with other analytical methods to the study of high-magnesium phosphorites. **Advances in X-ray Analysis**, 29, 235-242.

Blanchard, F. N. (1986) The use of calculated patterns as an aid in preparation of powder diffraction standards: minyulite, $KAl_2(PO_4)_2(OH,F)4H_2O$, as an example. **Advances in X-ray Analysis**, 29, 225-233.

Blanchard, F. N. and G. Palenik (1989) X-ray powder data for two tetracyclines: 6-methylene-5-hydroxytetracycline hydrochloride (methacycline hydrochloride), $C_{22}H_{23}N_2O_8Cl$, and 6-demethyl-7-chlorotetracycline hydrochloride trihydrate (declomycin hydrochloride), $C_{21}H_{28}O_{11}N_2Cl_2$. **Powder Diffraction**, 4, 21-23).

Blanchard, F. N. and P. P. Saligan (1989) High quality powder diffraction data from an impure sample, triphylite, $Li(Fe,Mn)PO_4$. **Powder Diffraction**, 4, 26-28.

Blanchard, F. N. (1989) Calculated X-ray data aid in collecting high quality X-ray powder data -- oxytetracycline dihydrate, $C_{22}H_{24}N_2O_9 \cdot 2H_2O$ as an example. **Florida Scientist**, 52, 94-99.

Blanchard, F. N. (1989) The space group and reference powder diffraction data for tetracycline hydrochloride, $C_{22}H_{24}N_2O_8HCl$. **Powder Diffraction**, 4, 103-105.

Blanchard, F. N. and G. Palenik (1989) X-ray powder data for tetracycline-urea tetrahydrate, $C_{23}H_{36}N_4O_{13}$ and tetracycline hexahydrate, $C_{22}H_{24}N_2O_8 \cdot 6H_2O$. **Powder Diffraction**, 4, 168-171.

Blanchard, F. N. (1989) X-ray powder data for mellite. **Powder Diffraction**, 4, 172-173.

Blanchard, F. N. (1989) X-ray powder data for CaWO₄, synthetic scheelite. *Powder Diffraction*, 4, 172-173.

Blanchard, F. N. (1989) New X-ray powder data for gorceixite [BaAl₂(PO₄)₂(OH)5H₂O], an evaluation of *d*-spacings and intensities, pseudosymmetry and its influence on the figure of merit *Powder Diffraction*, 4, 227-230.

PUBLISHED IN THE X-RAY POWDER DIFFRACTION FILE (REVIEWED)

The International Center for Diffraction Data - Complete powder diffraction data and related crystallographic data for each of the following (1979 through 1994):

1) Iron Aluminum Phosphate Hydroxide Hydrate/Paravauxite	Fe Al ₂	29-1424i	A
2) Aluminum Phosphate Hydrate/Metavariscite	Al P O ₄ !2 H ₂ O	33-0032i	M
3) Aluminum Phosphate Hydrate/Variscite-10	Al P O ₄ !2 H ₂ O	33-0033*	O
4) Calcium Aluminum Phosphate Hydroxide/Crandallite-A	Ca Al ₃ (P	33-0257i	R
5) Iron Aluminum Phosphate Hydroxide Hydrate/Metavauxite	Fe Al ₂	33-0639i	M
6) Iron Aluminum Phosphate Hydroxide Hydrate/Vauxite	Fe Al ₂ (P	33-0640i	A
7) Iron Phosphate Hydrate/Phosphosiderite	Fe P O ₄ !2 H ₂ O	33-0666*	M
8) Iron Phosphate Hydrate/Strengite	Fe P O ₄ !2 H ₂ O	33-0667i	O
9) Lithium Manganese Iron Phosphate/Sicklerite, ferroan	Li (Mn	33-0802*	O
10) Lithium Manganese Phosphate/Lithiophilite	Li Mn P O ₄	33-0803i	O
11) Sodium Aluminum Phosphate Hydroxide Hydrate/Wardite	Na Al ₃ (	33-1202*	T
12) Iron Manganese Phosphate/Heterosite	(Fe , Mn) P O ₄	34-0134i	O
13) Magnesium Aluminum Phosphate Hydroxide/Lazulite	Mg Al ₂ (P O ₄	34-0136i	M
14) Manganese Phosphate Hydroxide Hydrate/Hureaulite	Mn ₅ (P O ₄)	34-0146*	M
15) Beryllium Calcium Phosphate Hydroxide/Hydroxylherderite	Ca Be	34-0147i	M
16) Calcium Iron Phosphate Hydrate/Anapaite	Ca ₂ Fe (P O ₄) ₂ !4 H	34-0148i	A
17) Potassium Sodium Calcium Iron Manganese Aluminum Fluoride Phosp		34-0149*	M
18) Iron Phosphate Hydroxide/Rockbridgeite	Fe ₅ (P O ₄) ₃ (O H) ₅	34-0150i	O
19) Aluminum Phosphate Hydroxide/Augelite	Al ₂ (P O ₄) (O H) ₃	34-0151i	M
20) Strontium Aluminum Phosphate Hydroxide/Goyazite	Sr Al ₃ (P O ₄	34-0152*	R
21) Barium Iron Arsenate Hydroxide/Dussertite	Ba Fe ₃ (As O ₄ ) (	35-0621*	R
22) Iron Phosphate Hydroxide/Satterlyite	Fe ₂ (P O ₄) (O H)	35-0622*	H
23) Lead Aluminum Phosphate Hydroxide/Plumbogummite	Pb Al ₃ (P O ₄	35-0623*	R
24) Calcium Magnesium Aluminum Phosphate Hydroxide Hydrate/Montgome		35-0624*	M
25) Manganese Iron Phosphate Hydroxide/Frondelite	Mn Fe ₄ (P O ₄)	35-0625*	O
26) Calcium Boron Silicate Hydroxide/Howlite	Ca ₂ B ₅ Si O ₉ (O H)	35-0630*	M
27) Zinc Phosphate Hydroxide Hydrate/Spencerite	Zn ₄ (P O ₄) ₂ (O	35-0631*	M
28) Iron Magnesium Aluminum Phosphate Hydroxide/Scorzalite	(Fe ,	35-0632*	M
29) Potassium Iron Niobium Tantalum Oxide Phosphate Hydrate/Olmstea		35-0633i	O
30) Iron Magnesium Manganese Phosphate Hydrate/Ludlamite	(Fe , M	35-0634i	M
31) Calcium Iron Magnesium Phosphate Hydrate/Collinsite, ferroan		35-0635*	A
32) Barium Aluminum Phosphate Hydroxide/Jagowerite	Ba Al ₂ (P O ₄	35-0636i	A
33) Copper Iron Arsenate Hydroxide Hydrate/Arthurite	Cu Fe ₂ (As	36-0400*	M
34) Iron Manganese Phosphate/Beusite	(Mn , Fe) ₃ (P O ₄) ₂	36-0401*	M
35) Manganese Aluminum Phosphate Hydroxide Hydrate/Eosphorite	Mn	36-0402*	O
36) Iron Aluminum Phosphate Hydroxide Hydrate/Gormanite	Fe ₃ Al ₄ (	36-0403i	A
37) Copper Phosphate Hydroxide/Libethenite	Cu ₂ (P O ₄) (O H)	36-0404*	O
38) Copper Molybdenum Oxide Hydroxide/Lindgrenite	Cu ₃ (Mo O ₄) ₂	36-0405i	M
39) Copper Uranyl Phosphate Hydrate/Metatorbernite	Cu (U O ₂) ₂ (	36-0406*	T
40) Barium Uranyl Phosphate Hydrate/Metauranocircite-18A	Ba (U O	36-0407*	T
41) Copper Phosphate Hydroxide/Pseudomalachite	Cu ₅ (P O ₄) ₂ (O	36-0408*	M
42) Aluminum Phosphate Hydroxide Hydrate/Senegalite	Al ₂ (P O ₄)	36-0409*	O
43) Zinc Phosphate Hydroxide/Tarbuttite	Zn ₂ P O ₄ (O H)	36-0410*	A
44) Barium Titanium Manganese Phosphate Silicate Chloride Sulfate/Y		36-0411*	A
45) Calcium Zinc Arsenate Hydroxide/Austinite	Ca Zn As O ₄ (O H)	37-0445*	O

46)	Copper Iron Phosphate Hydroxide Hydrate/Chalcosiderite	Cu Fe6	37-0446*	A
47)	Copper Arsenate Hydroxide/Clinoclase	Cu3 (As O4) (O H) 3	37-0447*	M
48)	Calcium Copper Arsenate Hydroxide/Conichalcite	Ca Cu As O4 (	37-0448i	O
49)	Copper Phosphate Hydroxide/Cornetite	Cu3 (P O4) (O H) 3	37-0449*	O
50)	Aluminum Fluoride Phosphate Hydroxide Hydrate/Fluellite	Al2 (	37-0450*	O
51)	Zinc Phosphate Hydrate/Hopeite	Zn3 (P O4) 2 ! 4 H2 O	37-0465*	O
52)	Potassium Iron Phosphate Hydroxide Hydrate/Leucophosphite	K F	37-0466i	M
53)	Potassium Aluminum Phosphate Hydroxide Hydrate/Minyulite	K Al	37-0467*	O
54)	Iron Arsenate Hydrate/Scorodite	Fe As O4 ! 2 H2 O	37-0468*	O
55)	Calcium Aluminum Phosphate Sulfate Hydroxide/Woodhouseite	Ca	37-0469*	R
56)	Lead Uranyl Phosphate Hydroxide Hydrate/Dewindtite	Pb3 [(U	39-1350*	O
57)	Calcium Uranyl Phosphate Hydrate/Metaautunite-9A	Ca (U O2) 2	39-1351*	T
58)	Zinc Phosphate Hydrate/Parahopeite	Zn3 (P O4) 2 ! 4 H2 O	39-1352*	A
59)	Lead Iron Sulfate Hydroxide/Plumbojarosite	Pb Fe6 (S O4) 4 (	39-1353*	R
60)	Zinc Arsenate Hydroxide/Adamite	Zn2 (As O4) (O H)	39-1354*	O
61)	Lead Iron Arsenate Hydroxide/Carminite	Pb Fe2 (As O4) 2 (O	39-1355*	O
62)	Copper Aluminum Arsenate Sulfate Hydroxide Hydrate/Chalcophylli		39-1356*	R
63)	Copper Arsenate Hydroxide/Cornwallite	Cu5 (As O4) 2 (O H) 4	39-1357*	M
64)	Copper Arsenate Hydroxide Hydrate/Euchroite	Cu2 (As O4) (O	39-1358*	O
65)	Lead Aluminum Arsenate Sulfate Hydroxide/Hidalgoite	Pb Al3 (	39-1359*	R
66)	Calcium Uranyl Silicate Hydroxide Hydrate/Uranophane	Ca (U O	39-1360*	M
67)	Strontium Aluminum Phosphate Sulfate Hydroxide/Svanbergite	Sr	39-1361*	R
68)	Tetracycline Hexahydrate	C22 H24 N2 O8 ! 6 H2 O	39-1985*	O
69)	Tetracycline Urea Tetrahydrate	C22 H24 N2 O8 ! C H4 N2 O ! 4 H	39-1986i	O
70)	Tetracycline Hydrochloride	C22 H24 N2 O8 ! H Cl	39-1987*	O
71)	Demeclocycline Hydrochloride Trihydrate	C21 H21 Cl N2 O8 ! H	39-1993*	M
72)	Methacycline Hydrochloride	C22 H22 N2 O8 ! H Cl	39-1994*	O
73)	Lithium Iron Phosphate/Triphylite	Li Fe P O4	40-1499*	O
74)	Tetracycline Methyl Betaine Pentahydrate	C23 H26 N2 O8 ! 5 H2	40-1651*	O
75)	Calcium Uranyl Phosphate Hydrate/Autunite	Ca (U O2) 2 (P O4	41-1353*	T
76)	Calcium Tungsten Oxide/Scheelite, syn	Ca W O4	41-1431*	T
77)	Barium Aluminum Phosphate Hydroxide/Gorceixite	Ba Al3 (P O4	41-1459*	M
78)	Minocycline Hydrochloride	C23 H28 Cl N3 O7	41-1627*	O
79)	Doxycycline Hyclate	C24 H32 Cl N2 O10	41-1628i	M
80)	Bis(Diphenylphosphino)Methane	C25 H22 P2	41-1629i	O
81)	8-Hydroxyamoxapine	C17 H17 Cl N3 O2	41-1630i	O
82)	8-Hydroxyloxapine	C18 H19 Cl N3 O2	41-1631*	M
83)	Trifluoroacetatotriphenylphosphinegold	C20 Au F3 O2 P	41-1632*	O
84)	Zinc Bis(Acetylacetonate) trimer	C30 H42 O12 Zn3	41-1633C	M
85)	Zinc Bis Acetylacetonate Hydrate	C10 H14 O4 Zn ! H2 O	41-1634C	M
86)	1,3-Bis(Diphenylphosphino)Propane	C27 H26 P2	41-1655i	A
87)	Terfenadine	C32 H41 N O2	41-1943i	M
88)	Amoxapine	C17 H16 Cl N3 O	41-1944*	O
89)	Loxapine	C18 H18 Cl N3 O	41-1945*	M
90)	Pseudoephedrine Hydrochloride	C10 H16 Cl N O	41-1946*	O
91)	Clemastine Fumarate	C25 H30 Cl N O5	41-1947*	O
92)	Ammonium Sulfamate	N2 H6 S O3	42-0659C	O
93)	Calcium Manganese Aluminum Iron Fluoride Phosphate/Griphite	M	42-1351C	C
94)	Aluminum Phosphate Hydroxide/Trolleite	Al4 (P O4) 3 (O H) 3	42-1352C	M
95)	Copper Arsenate Hydroxide/Olivenite	Cu2 (As O4) (O H)	42-1353*	M
96)	Sodium Aluminum Phosphate Hydroxide/Brazilianite	Na Al3 (P O	42-1354*	M
97)	Lead Antimony Oxide/Bindheimite	Pb2 Sb2 O7	42-1355*	C
98)	Zinc Arsenate Hydroxide Hydrate/Legrandite	Zn2 (As O4) (O	42-1356*	M
99)	Iron Phosphate Sulfate Hydroxide Hydrate/Diadochite	Fe2 (P O	42-1364*	A
00)	Tellurium Oxide/Paratellurite, syn	Te O2	42-1365*	T
01)	Aluminum mellitate hydrate	C12 Al2 O12 ! 16 H2 O	42-1501*	T
02)	Diclofop-methyl	C16 H14 Cl2 O4	42-1602C	M
03)	Maleic hydrazide	C4 H4 N2 O2	42-1603C	A

104) Di-trichloroacetimide	C4 H C16 N O2	42-1604C A
105) Trichloroacetic acid	C2 H C13 O2	42-1605C M
106) 2,4,5-Trichlorophenoxyacetic acid	C8 H5 C13 O3	42-1606C A
107) Glyphosate	C3 H8 N O5 P	42-1607C M
108) Bentazon	C10 H12 N2 O3 S	42-1608C M
109) Bromacil	C9 H Br N2 O2	42-1609C M
110) Diphenylpyraline hydrochloride	C19 H23 N O ! H Cl	42-1789i T
111) Tripelennamine hydrochloride	C16 H21 N3 ! H Cl	42-1790O
112) 2-Chloro-2',6'-diethyl-N-(methoxymethyl)acetanilide	C14 H20 C	42-1791C M
113) (+)-Chlorpheniramine maleate	C20 H23 Cl N2 O4	42-1792C M
114) Cyproheptadine hydrochloride sesquihydrate	C21 H21 N ! H Cl !	42-1793C O
115) Calcium Magnesium Carbonate/Calcite, magnesian	(Ca , Mg) C	43-0697* R
116) Diuron	C9 H10 Cl2 N2 O	43-1590* M
117) Cyclizine hydrochloride	C18 H22 N2 ! H Cl	43-1591* O
118) 2-[(2)-Dimethylaminoethyl-2-thenylamino]pyridine hydrochloride		43-1592* M
119) Cinnarizine	C26 H28 N2	43-1593* M
120) Triprolidine hydrochloride hydrate	C19 H22 N2 ! H Cl ! H2 O	43-1594* M
121) Bromoxynil	C7 H3 Br2 N O	43-1595* A
122) Fenac	C8 H5 C13 O2	43-1596* A
123) Tin dichloro[2,6-diacetylpyridinebis(semicarbazone)] dichloride		43-1868* M

COMPUTER PROGRAMS FOR TEACHING AND RESEARCH

Generalized Optic Orientation Diagrams (Copyright, 1987)
Search and Compare Optical Properties (Copyright, 1987)
Debye (referenced in **Powder Diffraction**)
R-Cell (authored by Trueblood, revised for PC by F.N.B, referenced
in **Powder Diffraction**)
MAC, 2VANGLE, and QNTXRD (used in teaching)

TEACHING AIDS USED AT NUMEROUS OTHER UNIVERSITIES

Photomicrographs for Classic North American Thin Sections (Ward's
Natural Science Establishment)

Optical Crystallography (150 color slides with descriptions)

Thin-section Mineralogy (260 color slides with descriptions)

MISCELLANEOUS

Numerous reports to granting agencies, technical and
semi-technical lectures to local and regional groups, mineral and
rock identifications for individuals (hundreds), seminars, analytical
and mineralogical assistance and to many other members of the
University faculty, and so forth

University and Departmental Committees: University Senate,
Graduate Adviser, Departmental Computer Representative, Graduate
Admissions, Graduate Fellowships, Graduate Assistantships,
Supervision of X-ray Laboratory and Scanning Electron Microscope,
Search and Screen Committees (chairman of one), College of Liberal
Arts and Sciences Curriculum Committee