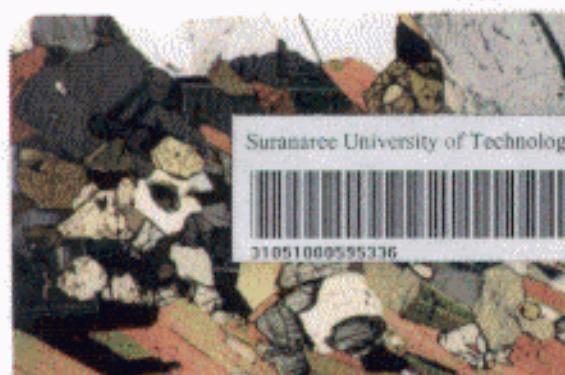
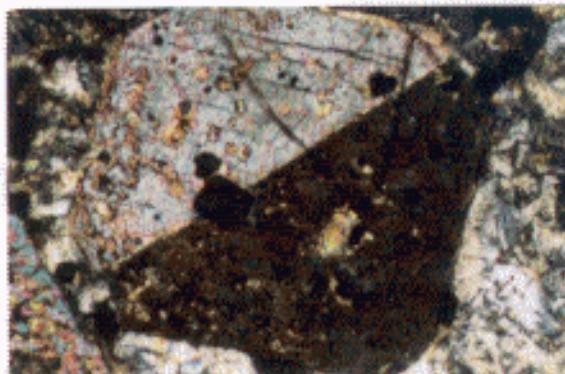
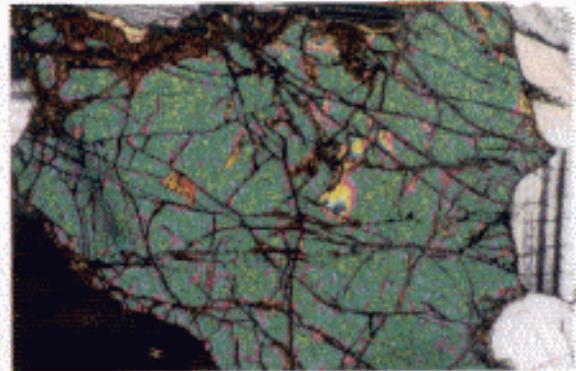
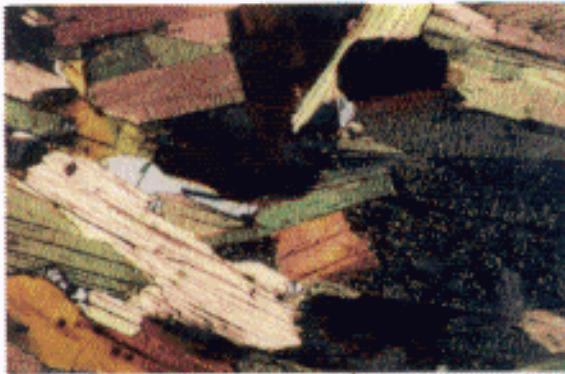


MINERALS IN THIN SECTION



DEXTER PERKINS
KEVIN R. HENKE

Contents

<i>Box 1. Optical Classification of Minerals</i>	<i>Inside front cover</i>	
<i>Box 2. Identifying Minerals and Mineral Properties with a Polarizing Microscope</i>	<i>Inside back cover</i>	
Preface	ix	
About the Authors	xi	
PART I: THEORETICAL CONSIDERATIONS		
What Is Light?	1	
The Properties of Light	3	
Interference	4	
Polarization of Light and the Polarizing Microscope	6	
Polarized Light	6	
Polarizing Microscopes	7	
Colors in Plane Polarized (PP) Light and Crossed Polarized (XP) Light	8	
Velocity of Light in Crystals		
Refractive Index	10	
Snell's Law and Light Refraction	11	
Relief and Becke Lines	12	
Interaction of Light and Crystals	14	
Double Refraction	14	
Crystals Between Crossed Polars	15	
Interference Colors	15	
Uniaxial and Biaxial Minerals	16	
Accessory Plates and the Sign of Elongation	18	
Uniaxial Interference Figures	18	
<i>Box 3. Determining the Extinction Angle and the Sign of Elongation</i>	19	
<i>Box 4. Obtaining an Interference Figure</i>	21	
<i>Box 5. Determining the Optic Sign of a Uniaxial Mineral</i>	22	
Biaxial Interference Figures	22	
<i>Box 6. The Four Kinds of Oriented Biaxial Interference Figures</i>	24	
<i>Box 7. Determining Sign and 2V from a Bxa Figure</i>	26	
<i>Box 8. Determining Sign and 2V from an Optic Axis Figure</i>	27	
Other Mineral Characteristics in Thin Sections	28	
Cleavage	28	
Twinning	28	
Alteration	29	
Zoning	29	
Exsolution	29	
Distinctive Extinction	29	
Inclusions	30	
Opaque Minerals in Thin Sections	30	
References	30	

PART II: IDENTIFYING MINERALS IN THIN SECTION

Systematic Identification

	Tourmaline	68
F.	Garnet, Olivine, and Other Isolated Tetrahedral Silicates	69
	Garnet	69
	Olivine	70
	Kyanite	71
	Andalusite	72
	Sillimanite	73
	Staurolite	74
	Chloritoid	75
	Titanite (sphene)	76
	Zircon	77
G.	Paired Tetrahedral Silicates and Related Minerals	78
	Lawsonite	78
	Vesuvianite (Idocrase)	79
	Epidote and Clinzoisite	80
H.	Native Elements	81
	Graphite	81
I.	Sulfides	82
	Sphalerite	82
	Pyrite	83
	Pyrrhotite	84
	Chalcopyrite	85
J.	Halides	86
	Fluorite	86
K.	Oxides	87
	Rutile	87
	Hematite	88
	Corundum	89
	Spinel	90
	Ilmenite	91
	Magnetite	92
	Chromite	93
L.	Hydroxides	94
	Gibbsite	94
M.	Carbonates	95
	Calcite	95
	Magnesite	96
	Siderite	97
	Dolomite	98
N.	Sulfates	99
	Anhydrite	99
	Barite	100
	Gypsum	101
O.	Phosphates	102
	Apatite	102

Detailed Mineral Description

A.	Quartz, Feldspars and Other Framework Silicates	31
	Quartz and Chalcedony	36
	K-feldspar (orthoclase, sanidine, microcline, perthite, anorthoclase)	37
	Plagioclase	38
	Analcime	39
	Nepheline	40
	Leucite	41
	Zeolites (heulandite, stilbite, natrolite, chabazite, and others)	42
	Sodalite	43
	Scapolite	44
	Beryl	45
	Cordierite	46
B.	Micas and Other Sheet Silicates	47
	Serpentine (chrysotile, lizardite, antigorite)	47
	Clay minerals (includes montmorillonite, illite, kaolinite and others)	48
	Pyrophyllite	49
	Talc	50
	Biotite	51
	Muscovite	52
	Lepidolite	53
	Stilpnomelane	54
	Chlorite	55
	Prehnite	56
C.	Pyroxenes and Pyroxenoids	57
	Orthopyroxene	57
	Diopside	58
	Augite	59
	Pigeonite	60
	Jadeite	61
	Wollastonite	62
D.	Amphiboles	63
	Anthophyllite	63
	Cummingtonite-grunerite	64
	Tremolite-actinolite-ferroactinolite	65
	Hornblende	66
	Na Amphiboles (Glaucophane, Crossite, Riebeckite)	67
E.	Ring Silicates	68

Appendix A: Common Opaque Minerals	103	Appendix E: Minerals Ordered by Interference Colors and Sorted by Optic System and Optic Sign	113
Appendix B: Isotropic Minerals Ordered by Refractive Index	105	Appendix F: Alphabetical List of Minerals and Mineral Properties	117
Appendix C: Uniaxial Minerals Sorted by Optic Sign and Ordered by Refractive Index	107	Color Photographs	121
Appendix D: Biaxial Minerals Sorted by Optic Sign and Ordered by Refractive Index	109	Mineral Index	123