The American University of Beirut
Final Examination

Optical Mineralogy (212)
Department of Geology
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Feb. 5, 1996
Time: 2 hours
Exam rules apply

Part I

Answer all questions of Part I

(MARKS)

(15) 1. Concisely define or describe the following terms:

a) Retardation
b) Melatope
c) BXA
d) Numerical aperture
e) Apparent optic angle

(15) 2. a) Why do minerals with high birefrengence exhibit high interference colours?

b) How is the Biot-Fresnel construction used to locate vibration directions of a centered BXA interference figure (at the 45 degree position) for a mineral of 2V of about 40 degrees.

c) What does the term length slow mean? How do you determine this?.

(15) 3. a) Explain what is meant by the pleochroic formula X = yellow, Y = pale green, Z = dark green

b) Neatly sketch a fully labelled ZX plane (or principal section) of a biaxial, negative indicatrix.

c) Explain the origin of the phenomenon of optical relief (not the Becke line). What does the term negative relief mean?

(15) 4. a) Describe one common method to determine plagioclase composition.

b) What is the shape of the indicatrix for the non crystalline but transparent substance glass?.

c) Explain how the refractive indices of a mineral contained in a standard rock thin section could be approximately determined.

Part II

Answer only one of the following two questions.

(15) 5. List the methods of determining the optic angle (2V) of a mineral. Describe in detail the fundamental operations for three of these methods (use diagrams, equations and text to illustrate your answer).

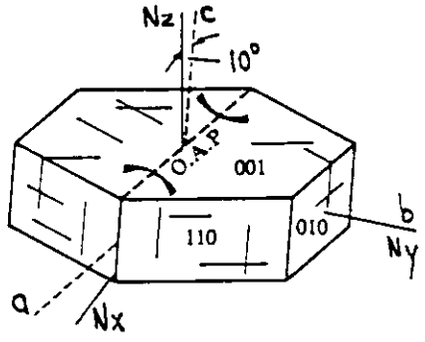
(15) 6. Answer question #6 on the space provided on the next page.

Question #6

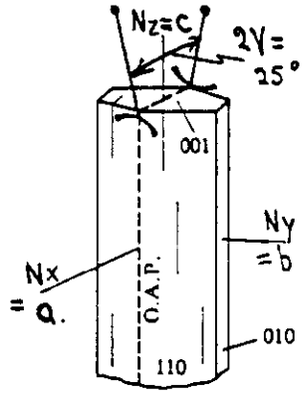
Four orientation diagrams are given below, and questions about the minerals represented by these diagrams are asked in the table given. Provide answers for all spaces in this table which are not crossed out. All answers are to be placed in the table.

	Mineral A	Mineral B	Mineral C	Mineral D
a) What is the crystal system?				
b) State the angle $N_Z \wedge C$				
c) Give the optic sign				
d) Underline the correct designation of the Optic Plane?	(001), (010) (100)			(100), (hok) ⊥ [100]
e) In order to measure $N_Z \wedge C$, would you wish to view the crystal along the BxA, BxO, or optic normal?				
f) In which crystallographic direction does the BxO lie?				
g) The birefrengence equals to;				

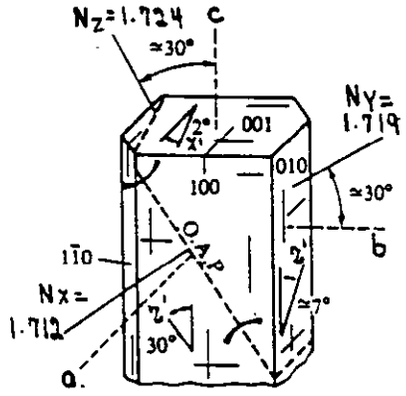
Mineral A.



Mineral B



Mineral C



Mineral D