GLY 4200C
Lab Exercise 14

MICAS
BIAXIAL INTERFERENCE FIGURES

Micas

The micas are easily recognized in hand specimen because they form thin "leaves". In thin sections they occur as platy minerals. They are often viewed perpendicular to their cleavage planes and yield good biaxial interference figures.

Assignment: Examine each of the following sections. Sketch any two of the sections (Purple color code)

5. Muscovite - The muscovite is colorless in thin section. Any crystals which show color in plane polarized light are not muscovite.

9. Phlogopite - The phlogopite is light brown in thin section. Numerous rutile needles occur in thin section. Biotite is also present in small, scattered patches.

16. Chlorite - Minute intergrowth of chlorite grains. Some iron oxide patches and films are also present. Good examples of undulatory extinction.

22. Biotite - Clusters of often six-sided crystals. Pleochroitic, from light to dark brown. A few patches are green. Some muscovite grains are present.

Biaxial Interference Figures

Any mineral belonging to the orthorhombic, monoclinic, or triclinic symmetry systems will have two optic axes. Several different figures are possible. The most useful of these is the optic plane figure:

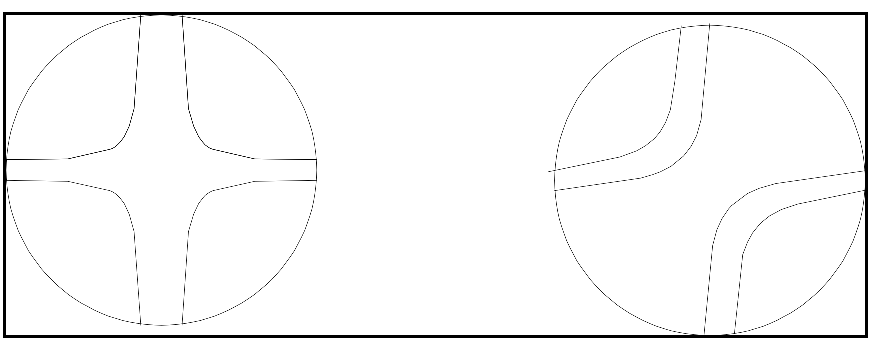

Figure 1 - Acute bisectrix figure of a biaxial mineral. Left: Optic plane parallel to the cross hairs. Right: Optic plane at 45° to the vibration planes of the nicols.

As the stage is rotated on an optic plane figure the "cross" breaks into two isogyres which separate and move toward the edge of the field. The isogyres may remain on the field or leave the field entirely. This depends on the mineral property known as "2V", which is the angle between the two optic axes. If 2V is large enough (more than 40-50°; this depends on the NA value of the objective lens) the isogyres leave the field. If it is less the isogyres remain in the field of view.

The maximum separation of the isogyres (if they remain in the field of view) can be used to estimate 2V. Figure 3 shows a series of optic axis figures with varying 2V. Figure 4 shows a series of acute bisectrix figures.The sign of the mineral may also be determined. The quartz sensitive tint plate would give the following results:

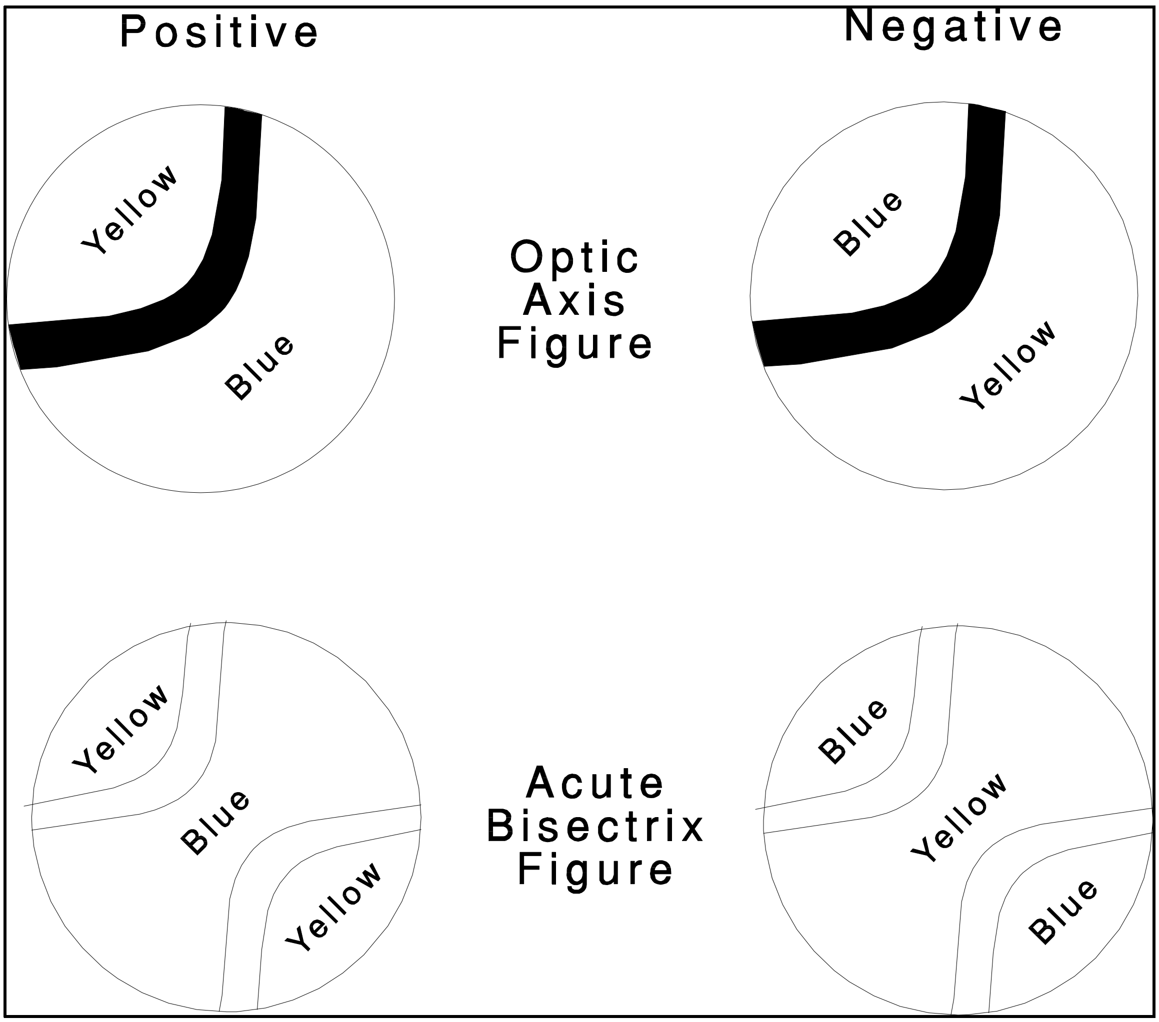

Figure 2

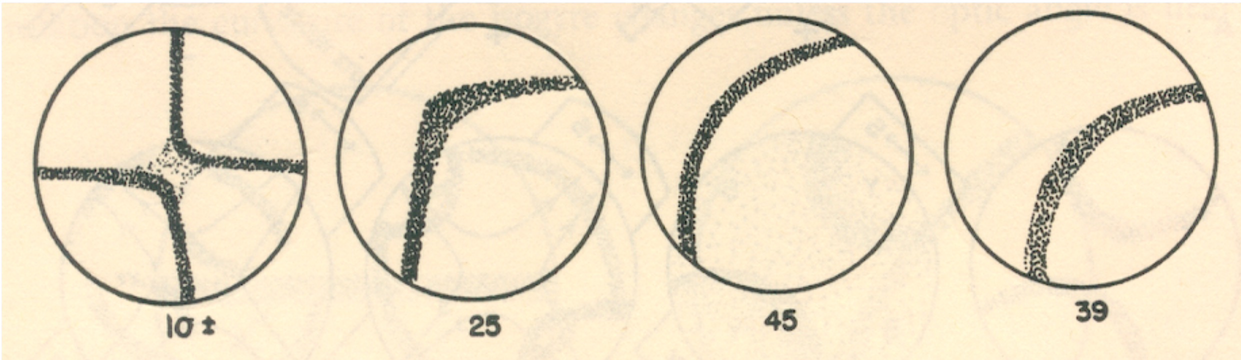

Figure 3 - Estimation of the optic angle (2V) from an optic axis (O.A.) figure.

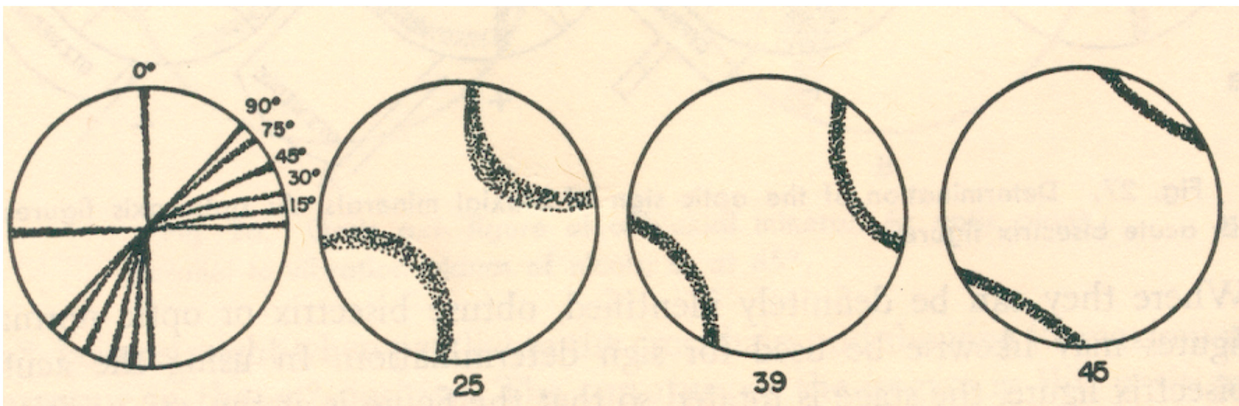

Figure 4 - Estimation of the optic angle (2V) from an acute bisectrix figure.

Depending on the way in which each mineral is cut, figures approaching the two cases shown above may be seen.

The quartz wedge may also be used if colored rings are present. The rings will move outward in quadrants II and IV for a positive mineral; outward in I and III for a negative mineral.

Moorhouse, pp. 31-35, has a discussion of biaxial interference figures.

Assignment:

Examine the 2V slide. Sketch and describe what happens to each interference figure as the stage is rotated.

Examine he 2V = 84° slide (andalusite). Compare the Bx_a and the Bx_o figures.

Examine the topaz slide along Bx_a. Sketch the figure, estimate 2V, and determine the sign.

Examine the Bx_a and OA sections of the augite slide. Sketch the figure, estimate 2V, and determine the sign.

Examine the Bx_a and OA sections of the hornblende slide. This is difficult because of the darkness of the mineral. Determine the sign and estimate 2V.

Examine the epidote section, including OA_1, OA_2, and Bx_a. Is there a difference between OA_1 and OA_2? What is 2V? What is the sign?

Finally, obtain figures for the muscovite (purple 5) and phlogopite (purple 9) sections. What is the sign of each?

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