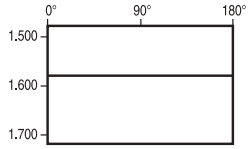
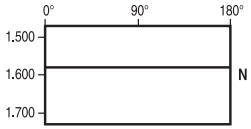
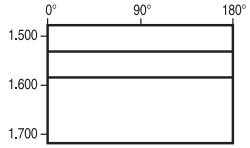
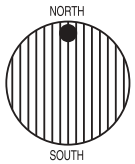
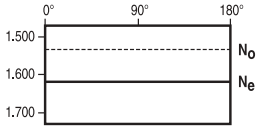
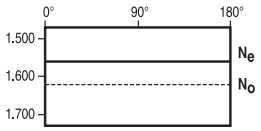
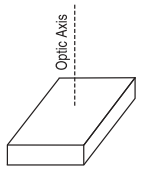
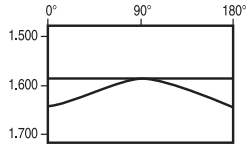
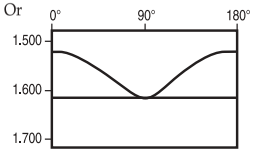
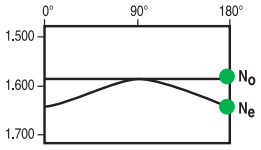
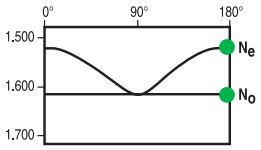
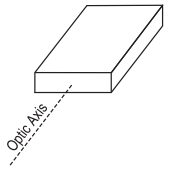
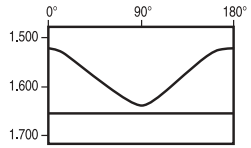
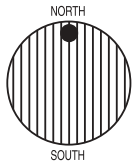
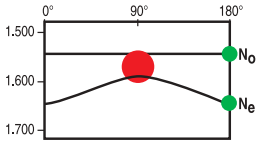
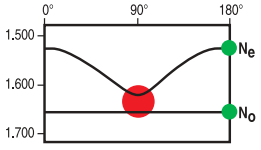
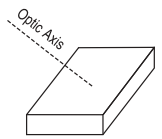
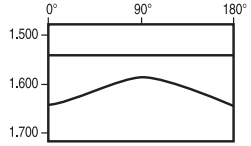
The use of the polarizing filter on the refractometer

PATTERN NUMBER	INITIAL OBSERVATION	POLARIZING FILTER	DETAILED OBSERVATION For observation with the POLARIZING FILTER rotate the gemstone in the position indicated by the RED dot. For determination of the REFRACTIVE INDEX rotate the gemstone in the position indicated by the GREEN dot.	ORIENTATION AND OPTICAL PROPERTIES	RESULTS
I	 Single CONSTANT shadow edge	Not used	**Detailed Observation not needed.** Make sure that the **SINGLE** Shadow edge stays **CONSTANT** during the rotation of the gemstone. 	**Isotropic**	Record **N**
II	 Two CONSTANT and PARALLEL shadow edges	Set in the North – South position 	1. Observation can be made in any position during the rotation of a gemstone. 2. Insert the polarizing filter. (Shadow edge of the ordinary ray (N_o) disappears.) 3. Read N_e on the shadow edge that stays visible. 4. Remove the polarizing filter. Read N_o on the shadow edge that is now visible.  	**Uniaxial** Optic axis is perpendicular to the gem table 	Record N_e, N_o Determine the **optic sign** Calculate the **maximum birefringence**
III	 Or  One CONSTANT and one VARIABLE shadow edge **TOUCHING**	Not used	**Detailed Observation not needed.** 1. Read **N_o** on the constant shadow edge. 2. Read **N_e** on the variable shadow edge **when two shadow edges are separated the most.** (as shown by the green dots).  	**Uniaxial** Optic axis is parallel to the gem table 	
IV	 Or	Set in the North – South position 	1. Rotate gemstone in the position indicated by the red dot (where shadow edges are the closest). 2. Insert the polarizing filter **Observe which shadow edge disappears.** CONSTANT shadow edge **DISAPPEARS**  	**Uniaxial** Random orienation 	



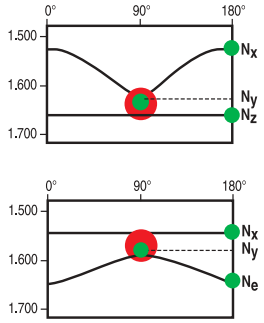
One CONSTANT and one VARIABLE shadow edge **NOT TOUCHING**

Observe which shadow edge disappears.

Identify gemstone as uniaxial or biaxial.

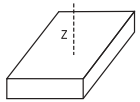
3. Remove the polarizing filter. Read principal refractive indices in positions shown by green dots.

VARIABLE shadow edge **DISAPPEARS**

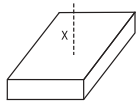


Biaxial

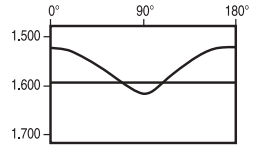
Z perpendicular to the gem table



X perpendicular to the gem table



V

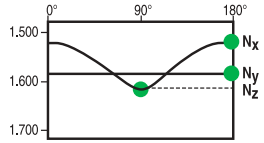


One CONSTANT and one VARIABLE shadow edge **INTERSECTING**

Not used

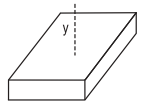
Detailed Observation not needed.

Read N_Z, N_Y and N_X as indicated by green dots

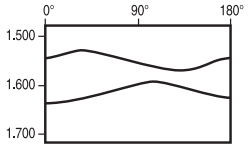


Biaxial

Y perpendicular to the gem table



VI

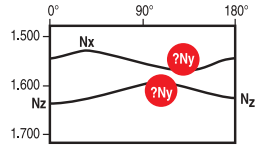


Two VARIABLE shadow edges **NOT TOUCHING**

Set in the East – West position

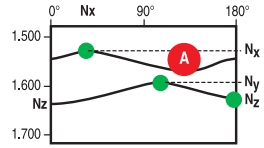
N_Z AND N_X ARE DETERMINED AS THE LARGEST AND THE SMALLEST REFRACTIVE INDEX OBSERVED DURING THE ROTATION.

N_Y CAN BE READ EITHER ON THE UPPER OR ON THE LOWER SHADOW EDGE



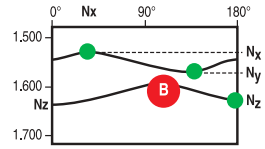
Each shadow edge must be observed separately to determine N_y

Rotate gemstone in the position A indicated by the red dot. Insert the polarizing filter in the East-West position. If the shadow edge containing N_X disappears - read N_Y and N_Z on the other shadow edge.



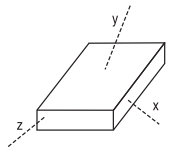
If the shadow edge containing N_X does not disappear, test the other shadow edge.

Rotate gemstone in the position B indicated by the red dot. Insert the polarizing filter in the East-West position. If the shadow edge containing N_Z disappears - read N_Y and N_X on the other shadow edge.



Biaxial

Random Orientation



Record N_Z, N_Y and N_X

Calculate the **maximum birefringence**

Use 2V diagram to determine the
1. **optic sign**
2. **optic angle (2V)**