GLY 4200  HOMEWORK 8
25 points
Properties of Light in Minerals

Show all work. Label answers, including units. Express answers to the correct number of significant figures.

The relationship between the speed of light (c), frequency (f), and wavelength (λ) is:

\[ c = f \lambda \]

\[ c = 2.998 \times 10^8 \text{ m/s.} \]

1. If \( \lambda = 555 \text{ nm} \), what if \( f \)?

2. If \( f = 6.76 \times 10^{14} \text{ Hz} \), what is \( \lambda \) (expressed in nm)?

The index of refraction is defined as:

\[ n = \frac{c_{\text{vacuum}}}{c_{\text{medium}}} \]

3. \( n_{\text{chloroargyrite}} = 2.07 \). What is the speed of light in chloroargyrite?

Snell’s Law is given by the equation:

\[ \frac{\sin \angle i}{\sin \angle r} = \frac{n_r}{n_i} \]
4. If light travels from air into sylvite, and the angle of incidence is 29.6°, what is Δr? 
n for sylvite = 1.490.

Brewster’s Law of maximum polarization is:

\[ \frac{n_r}{n_i} = \tan \angle i \]

5. For sylvite, what is Δi?

The critical angle is given by a variation of Snell’s Law:

\[ \frac{n_i}{n_r} \cdot \sin \angle i = 1.00 \]

6. Suppose light passes from sylvite into air. What is the critical angle? HINT: Remember that light 
is going from sylvite into air. What is the incident medium?

The formula for the Numerical Aperture (N.A.) Is:

\[ N.A. = n \sin \angle \mu, \text{ where} \]

\[ \mu = \frac{\angle \text{angular aperture}}{2} \]

7. If the angular aperture is 35.7°, and n = 1.544, what is N.A.?