\[ v = \lambda f \]
\[(\text{ms}^{-1}) = (\text{m}) (\text{s}^{-1})\]
\[ c = \lambda f \]

\[ (\text{ms}^{-1}) = (\text{m}) (\text{s}^{-1}) \]

\[ 3 \times 10^8 = \]
\( c = \lambda f \)

\[(\text{ms}^{-1}) = (\text{m}) (\text{s}^{-1})\]

\(3 \times 10^8 = (500 \times 10^{-9})\)
\[ c = \lambda f \]

\[(\text{ms}^{-1}) = (\text{m}) (\text{s}^{-1})\]

\[3 \times 10^8 = (500 \times 10^{-9})(6 \times 10^{14})\]
E = hf = hc/\lambda
\[ E = hf = \hbar c/\lambda \]

\[ (J) = (J s)(s^{-1}) \]
\[ E = h f = h \cdot c/\lambda \]

\[ (J) = (J \cdot s)(s^{-1}) \]

\[ (h = 6.626 \times 10^{-34} \text{ J s}) \]

\[ (f = 6 \times 10^{14} \text{ s}^{-1}) \]

\[ (E = 4 \times 10^{-19} \text{ J} = 2.5 \text{ eV}) \]
\( n_1 < n_2 \)
\[ n_1 < n_2 \]
Snell's Law

\[
\frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1}
\]
Snell's Law

\[ \frac{\sin \theta_1}{\sin \theta_2} = \frac{n_2}{n_1} \]

\[ n_1 \sin \theta_1 = n_2 \sin \theta_2 \]
$\sin \theta_1 = \sin \theta_2 \frac{n_2}{n_1}$

$1 = \sin \theta_2 \frac{n_2}{n_1}$

$\theta_2 = \sin^{-1} \left( \frac{n_1}{n_2} \right)$
$n_{\text{oil}} > n_{\text{mineral}}$

$n_{\text{mineral}} > n_{\text{oil}}$
Focal Plane

\[ n_{\text{oil}} > n_{\text{mineral}} \]

\[ n_{\text{mineral}} > n_{\text{oil}} \]
Focal Plane

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Focal Plane

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\[ n_{\text{mineral}} > n_{\text{oil}} \]
## Prominent Fraunhofer Lines

<table>
<thead>
<tr>
<th>Lines</th>
<th>Due To</th>
<th>Wavelengths (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - (band)</td>
<td>O2</td>
<td>7594 - 7621</td>
</tr>
<tr>
<td>B - (band)</td>
<td>O2</td>
<td>6867 - 6884</td>
</tr>
<tr>
<td>C</td>
<td>H</td>
<td>6563</td>
</tr>
<tr>
<td>a - (band)</td>
<td>O2</td>
<td>6276 - 6287</td>
</tr>
<tr>
<td>D - 1, 2</td>
<td>Na</td>
<td>5896 &amp; 5890</td>
</tr>
<tr>
<td>E</td>
<td>Fe</td>
<td>5270</td>
</tr>
<tr>
<td>b - 1, 2</td>
<td>Mg</td>
<td>5184 &amp; 5173</td>
</tr>
<tr>
<td>c</td>
<td>Fe</td>
<td>4958</td>
</tr>
<tr>
<td>F</td>
<td>H</td>
<td>4861</td>
</tr>
<tr>
<td>d</td>
<td>Fe</td>
<td>4668</td>
</tr>
<tr>
<td>e</td>
<td>Fe</td>
<td>4384</td>
</tr>
<tr>
<td>f</td>
<td>H</td>
<td>4340</td>
</tr>
<tr>
<td>G</td>
<td>Fe &amp; Ca</td>
<td>4308</td>
</tr>
<tr>
<td>g</td>
<td>Ca</td>
<td>4227</td>
</tr>
<tr>
<td>h</td>
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<tr>
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</tr>
<tr>
<td>K</td>
<td>Ca</td>
<td>3934</td>
</tr>
</tbody>
</table>
Solar Spectrum - NOAO/ARIA/NSF
Dispersion

Graph showing the relationship between refractive index and wavelength. The x-axis represents wavelength (nm) on a log scale, ranging from 400 to 700 nm. The y-axis represents refractive index, ranging from 1.56 to 1.63. Two lines are plotted: one for immersion oil and one for mineral. The graph illustrates how the refractive index decreases as the wavelength increases for both materials.
Dispersion

Dispersion graph showing the relationship between refractive index and wavelength (λ) for different substances:

- **Mineral**
- **Immersion oil**

The graph is on a log scale for wavelength (λ) ranging from 400 to 700 nm.
Dispersion

Dispersion diagram showing the variation of refractive index with wavelength for different immersion oils and a mineral. The x-axis represents the wavelength (nm) on a log scale, while the y-axis represents the refractive index. The graph illustrates the dispersion properties of the materials at different wavelengths.
Dispersion

Refractive Index

Wavelength $\lambda$ (nm)

(log scale)

Dispersion of a mineral and immersion oil.