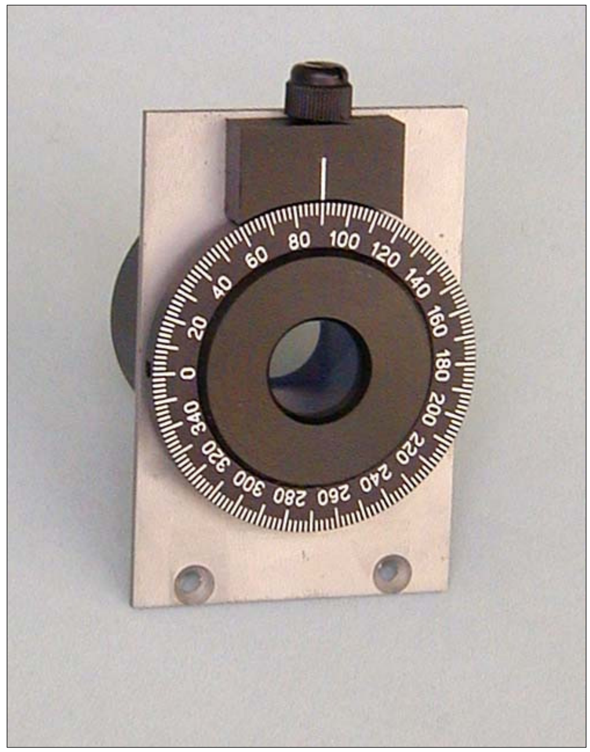
GLAN THOMPSON POLARIZER

Our Glan Thompson Polarizer has a wavelength range from 350 nm to 2300 nm. This Vis-NIR polarizer is recommended for low-to-medium power applications (up to 2W cw) requiring a large field of view and the highest degree of polarization purity. The Glan Thompson Polarizer is made from two calcite elements cemented together to form a prism. This configuration reduces its power-handling capability but results in an increased field of view. The angular field of view of the polarizer is asymmetrical about the mechanical axis and varies as a function of wavelength. The rejected (ordinary) beam is absorbed by the prism housing.

APPLICATIONS

- Ideal for removing interference fringes from transmission spectra recorded at Brewster's angle.
- Excelled for obtaining optimum sensitivity in reflectance measurements.



FEATURES

- Wavelength range: 350 nm to 2300 nm.
- Made from calcite.
- Transmission (Ratio of Total Output to Total Unpolarized Input): $\frac{1}{2}(k_1 + k_2) = 36\%$.
- Extinction Ratio: $<1 \times 10^{-5}$.
- Useful Field Angle (see graph on page 2)
- Maximum Operating Temperature: 60ºC.
- Clear Aperture: 15 mm diameter.
- Slide plate mounted in a fully rotatable holder with an angular scale.
- Length in the beam direction: 1.75"

ORDERING INFORMATION

	CATALOG NO.
Glan Thompson Polarizer	PTH-SMP

Harrick Scientific Products, Inc.
141 Tompkins Ave, 2nd Floor, Pleasantville NY 10570
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The Glan Thompson Polarizer is made of two right-angled prisms of calcite cemented together. Since calcite is a birefringent material, two of the crystalline axes (y- and z-axes) are equivalent in terms of their structure and crystalline forces. The third axis (x-axis) is unique and is called the optical axis. The electric field of light that propagates through the crystal perpendicular to the optical axis generally has the electric field components parallel and perpendicular to the optical axis. The component of the electric field parallel to the optical axis (e-wave) "sees" different crystalline structure than the component perpendicular to the axis (o-wave) and thus 'sees' a different refractive index. For calcite, the refractive indices for o-waves and e-waves are 1.6584 and 1.4864 respectively. This gives total internal reflection critical angles of 37.08° for the o-wave and 42.28° for the e-wave when in contact with air. This means that for any angle between these two values, the o-wave will be totally reflected but the e-wave will be partially transmitted. This gives linear polarization since only the e-ray emerges.

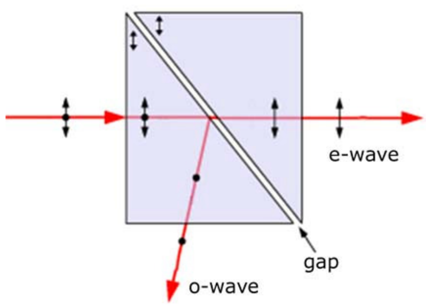

Figure 1. The Glan–Thompson Polarizer reflects s-polarized light at the internal cement 'gap' and transmits only the p-polarized component. The optical axes are vertical in the plane of the diagram.

The Glan Thompson Polarizer is designed so the optical axis of the calcite is aligned perpendicular to the plane of reflection. When collimated light is directed into the polarizer at normal incidence, it transmits through the first prism to the interface. The s-polarized light internally reflects at the interface and is directed to a blackened surface to be absorbed. The p-polarized light is transmitted through the interface and through the second prism. The angle of incidence at the gap is chosen close to Brewster's angle to reduce the reflection of the wanted p-polarization.

Since the Glan Thompson polarizer is made of two prisms, it is not a symmetrical optical system. Its polarized field or acceptance angle, as determined by critical angles of ordinary and extra-ordinary polarizations, is not symmetrical to its optical axis. This asymmetry is shown in Figure 2 and is given as semi-polarized field angles on either side of the optical axis.

The efficiency of Glan Thompson Polarizer is typically measured and reported using collimated light at a single wavelength (633nm). Under these conditions, the efficiency is not a strong function of wavelength provided that the calcite prisms are made from pure and bubble-free material.

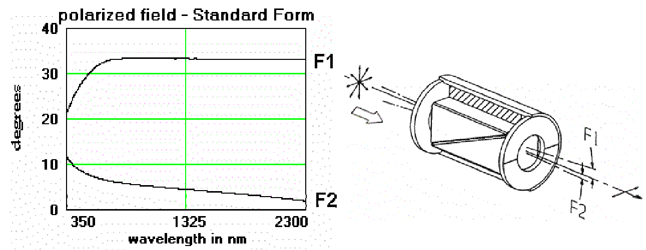

Figure 2. Glan Thompson Polarizer Polarized Field or Acceptance Angle.

In practice, Glan Thompson Polarizers are frequently used with focused beams, as are present in many commercial UV-Vis-NIR spectrometers. The light impinging on the front face of the Glan Thompson Polarizer is not a collimated beam but actually contains a distribution of rays around normal incidence. Any rays of unwanted polarization that are below the critical angle for total internal reflection are transmitted through the interface, thereby degrading efficiency.