

# Thallium Bromoiodide

## KRS-5

### ◆ Key Properties of KRS-5 (Thallium Bromoiodide)

🌈 Wide Infrared Transmission: Excellent performance from 0.6  $\mu\text{m}$  to 40  $\mu\text{m}$  — ideal for mid-IR and far-IR spectroscopy.

🔍 High Refractive Index:  $\sim 2.37$  @ 10  $\mu\text{m}$  — suitable for ATR crystals and IR beam manipulation.

🧪 Chemically Stable: More resistant to moisture than alkali halides, with good long-term stability.


🔧 Low Dispersion: Beneficial for broadband IR optical systems requiring minimal chromatic variation.

⚙️ Soft & Easily Machined: Polishes to a smooth optical finish; suitable for windows, ATR prisms, and lenses.


🌡️ Good Thermal Properties: Stable from cryogenic temperatures up to  $\sim 200^\circ\text{C}$  under controlled conditions.


🔬 Ideal for FTIR: Widely used in spectroscopy, gas analysis cells, and long-wave IR applications.


## Applications of KRS-5 (Thallium Bromoiodide)


 FTIR Spectroscopy: Widely used for ATR crystals, windows, and prisms due to its broad infrared transmission from 0.6–40  $\mu\text{m}$ .

 Thermal & Long-Wave IR Imaging: Ideal for mid-IR and far-IR detectors, gas analysis cells, and thermal emission measurement systems.

 ATR (Attenuated Total Reflection) Elements: High refractive index ( $\sim 2.37$ ) makes KRS-5 a preferred ATR material for chemical and biological analysis.

 Gas & Liquid Flow Cells: Used in IR transmission cells for environmental monitoring, industrial process control, and laboratory spectroscopy.

 Broadband IR Windows & Optics: Performs exceptionally across the MWIR–LWIR range, supporting interferometers, monochromators, and IR beam paths.

 Custom Infrared Components: KRS-5 is soft and easy to fabricate, making it suitable for bespoke prisms, flowcell windows, and precision IR optical parts.



## Technical Parameters of KRS-5 (Thallium Bromoiodide)

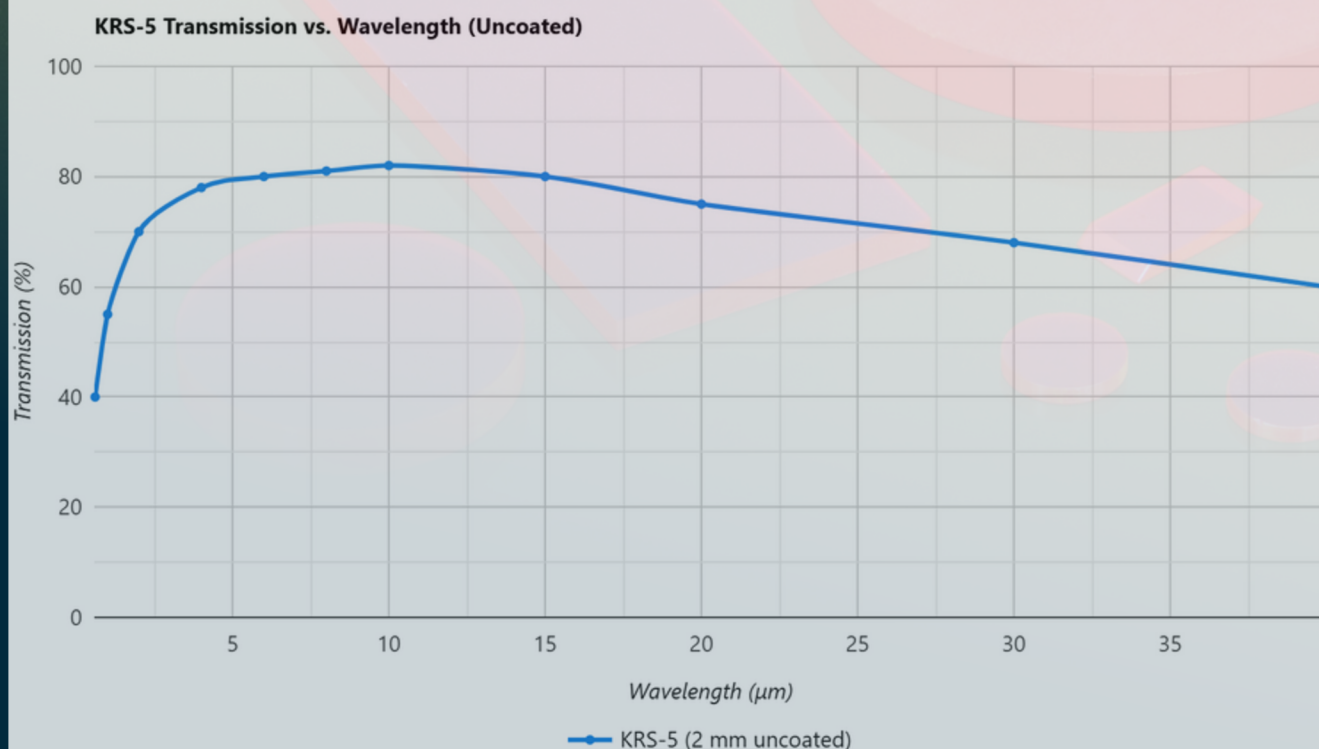
KRS-5 (Thallium Bromoiodide) is a versatile infrared optical material with exceptionally broad transmission from 0.6  $\mu\text{m}$  to 40  $\mu\text{m}$ , making it ideal for FTIR spectroscopy, gas analysis, and long-wave IR imaging.

With a high refractive index ( $\sim 2.37$  @ 10  $\mu\text{m}$ ) and excellent uniformity across the IR spectrum, KRS-5 provides strong performance in analytical systems that require deep IR coverage. The material is soft and flexible, allowing it to be pressed, shaped, or drawn into windows, prisms, flow-cell plates, and ATR components.

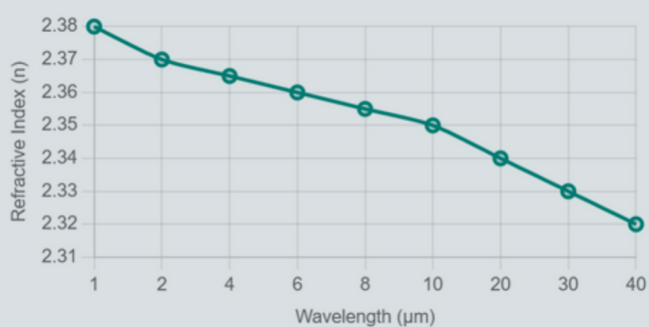
Because KRS-5 contains thallium, it must be handled carefully, but remains stable in most laboratory environments and offers reliable performance in mid- and far-IR applications.

Property	Typical Value
Chemical Formula	TlBr <sub>0.4</sub> I <sub>0.6</sub>
Transmission Range	0.6 $\mu\text{m}$ – 40 $\mu\text{m}$
Refractive Index	$\sim 2.37$ @ 10 $\mu\text{m}$
Density	$\sim 7.5 \text{ g/cm}^3$
Hardness	Very soft (Mohs $\sim 1$ ) – easily scratched
Thermal Expansion	$\sim 49 \times 10^{-6} / ^\circ\text{C}$
Melting Point	$\sim 414 ^\circ\text{C}$
Solubility	Slightly soluble in water; more stable than NaCl/KBr
Toxicity Consideration	Contains Thallium – handle with care
Typical Applications	ATR crystals, FTIR windows, flow cells, IR prisms, broadband IR optics

## KRS-5 (TlBr/TlI) Transmission Graph



## Refractive Index of KRS-5 vs. Wavelength

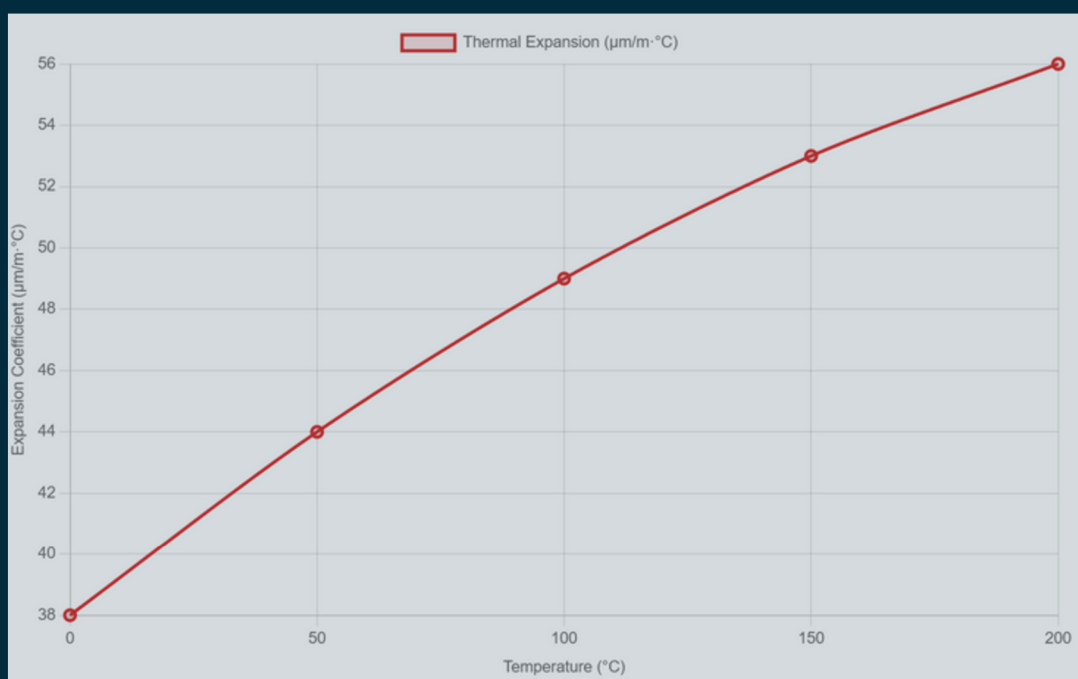


Wavelength (μm)	Refractive Index (n)
1	2.38
2	2.37
4	2.365
6	2.36
8	2.355
10	2.35
20	2.34
30	2.33
40	2.32



KRS-5 provides exceptionally broad infrared transmission from  $\sim 0.6 \mu\text{m}$  to  $40 \mu\text{m}$ , covering the full mid-IR and far-IR spectrum with minimal absorption. Its high refractive index of  $\sim 2.37$  @  $10 \mu\text{m}$  makes it particularly effective for ATR crystals, IR flow cells, and long-wave optical components where deep IR performance is required.

Thermally, KRS-5 exhibits a moderate expansion coefficient of  $\sim 49 \times 10^{-6} / ^\circ\text{C}$ , and remains dimensionally stable under typical laboratory and spectroscopy conditions. Despite being a relatively soft material, it offers excellent IR uniformity and can be pressed or shaped for a wide range of optical geometries. Due to its thallium content, KRS-5 should be handled carefully, but it remains chemically stable in dry environments. These combined optical and physical characteristics make KRS-5 a reliable choice for FTIR spectroscopy, ATR accessories, gas-analysis optics, and broadband IR windows operating across the extended infrared range.



# FAQ

## **Q: What is KRS-5 used for?**

A: KRS-5 is commonly used in FTIR spectroscopy, ATR (attenuated total reflection) crystals, long-wave infrared optics, gas analysis windows, prisms, and broadband IR beam paths. Its extremely wide transmission range (0.6–40  $\mu\text{m}$ ) makes it suitable for both mid-IR and far-IR systems.

## **Q: Why is KRS-5 popular for ATR applications?**

A: KRS-5 has a high refractive index ( $\sim 2.37$ ), which produces a strong evanescent field and increases interaction with samples. This makes it highly effective for chemical, biological, and industrial ATR measurements.

## **Q: Is KRS-5 moisture resistant?**

A: Yes. KRS-5 is only slightly hygroscopic and is far more moisture-resistant than materials such as KBr or NaCl. It performs well under normal laboratory conditions.

## **Q: Is KRS-5 toxic?**

A: KRS-5 contains thallium compounds, which are toxic. Finished components are safe to handle when clean and mounted, but the material must not be touched with bare hands or exposed to acids. Gloves should always be worn during cleaning or assembly.

## **Q: How mechanically durable is KRS-5?**

A: KRS-5 is very soft (Mohs  $\sim 1$ ) and scratches easily. It should not be cleaned with abrasives or wiped aggressively. Protective mounting is strongly recommended.

## **Q: Can KRS-5 withstand high temperatures?**

A: KRS-5 is stable up to around 200  $^{\circ}\text{C}$  in dry, controlled environments. However, due to its high thermal expansion and softness, it is sensitive to thermal shock and rapid temperature changes.

## **Q: What is the transmission range of KRS-5?**

A: KRS-5 transmits from approximately 0.6  $\mu\text{m}$  to 40  $\mu\text{m}$ , making it one of the broadest infrared window materials available for FTIR, LWIR, and far-IR applications.