

Magnesium Fluoride

MgF₂

◆ Key Properties of Magnesium Fluoride (MgF₂)

🌈 Ultra-Broad Transmission: Excellent from ~0.12 μm to 7 μm — ideal for VUV, UV, visible, and IR systems.

🔍 Low Refractive Index: ~1.38 at 1 μm , enabling efficient optical coupling and broad system compatibility.

💧 Non-Hygroscopic: Fully moisture-resistant and far more durable than hygroscopic salts like NaCl and KBr.


☁️ Highly Durable: Hard, chemically stable, and excellent for harsh-environment or field-deployed optics.

📈 Low Dispersion: Smooth refractive index behaviour supports high-precision imaging and instrumentation.


⚡ Laser-Compatible: Suitable for high-power UV and VUV laser systems thanks to high damage threshold.


🛸 Radiation Resistant: Excellent material for space optics, detectors, sensors, and vacuum UV systems.


Applications of Magnesium Fluoride (MgF_2)


 VUV & UV Spectroscopy: Outstanding transparency makes MgF_2 ideal for deep-UV and vacuum-UV instruments.

 Excimer & UV Laser Optics: Commonly used in F_2 , ArF, KrF and other UV laser platforms.

 Space & Aerospace Optics: High radiation resistance enables long-term orbital and high-energy use.

 Imaging & Analytical Systems: Low dispersion and high durability support precision UV–IR imaging.

 UV–IR Windows & Lenses: Used for rugged windows, lenses, prisms, and protective covers.

 Industrial & Scientific Instruments: Ideal for harsh-environment sensors, detectors, and inspection systems.

Technical Parameters of Magnesium Fluoride (MgF₂)

Property	Typical Value
Transmission Range	0.12 μm – 7.0 μm
Refractive Index	1.38 @ 1 μm
Density	3.18 g/cm ³
Melting Point	1261 °C
Hardness (Knoop)	~415 kg/mm ² (hard)
Thermal Expansion	13.7×10^{-6} /°C
Crystal Type	Tetragonal (single crystal)
Hygroscopic	No
Chemical Formula	MgF ₂
Applications	UV/VUV spectroscopy, excimer lasers, aerospace optics, IR

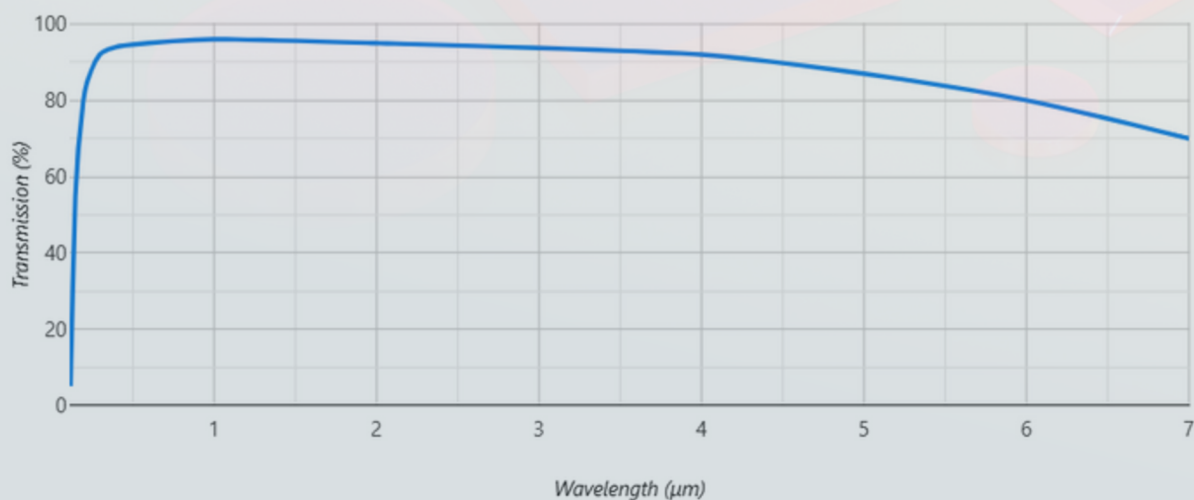
Magnesium Fluoride (MgF₂) is a durable, wide-band optical material with excellent transmission from 0.12–7.0 μm , making it ideal for VUV/UV spectroscopy, excimer laser systems, thermal imaging, and aerospace optics.

It has a low refractive index (~1.38), very low dispersion, and is non-hygroscopic, offering strong environmental stability and far better durability than salts like NaCl or KBr. As a hard, chemically robust crystal, MgF₂ can be fabricated into windows, lenses, prisms, and polarisation optics for UV–IR applications while maintaining excellent long-term performance.

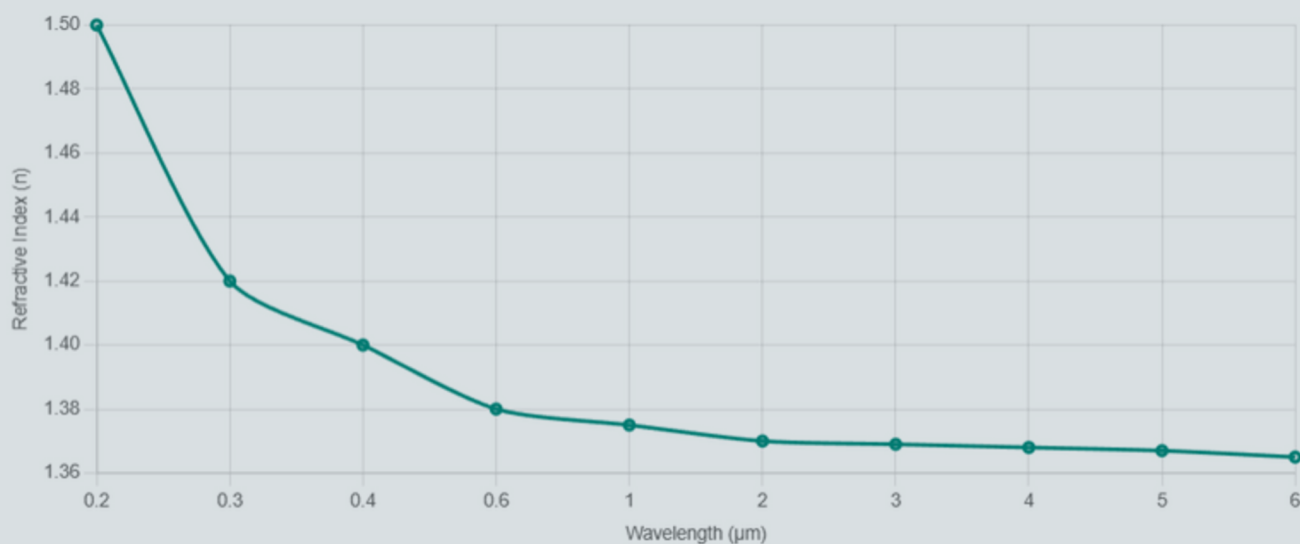


Magnesium Fluoride (MgF_2) – Optical & Thermal Graphs

MgF_2 Transmission (0.12–7.0 μm)



MgF_2 Refractive Index

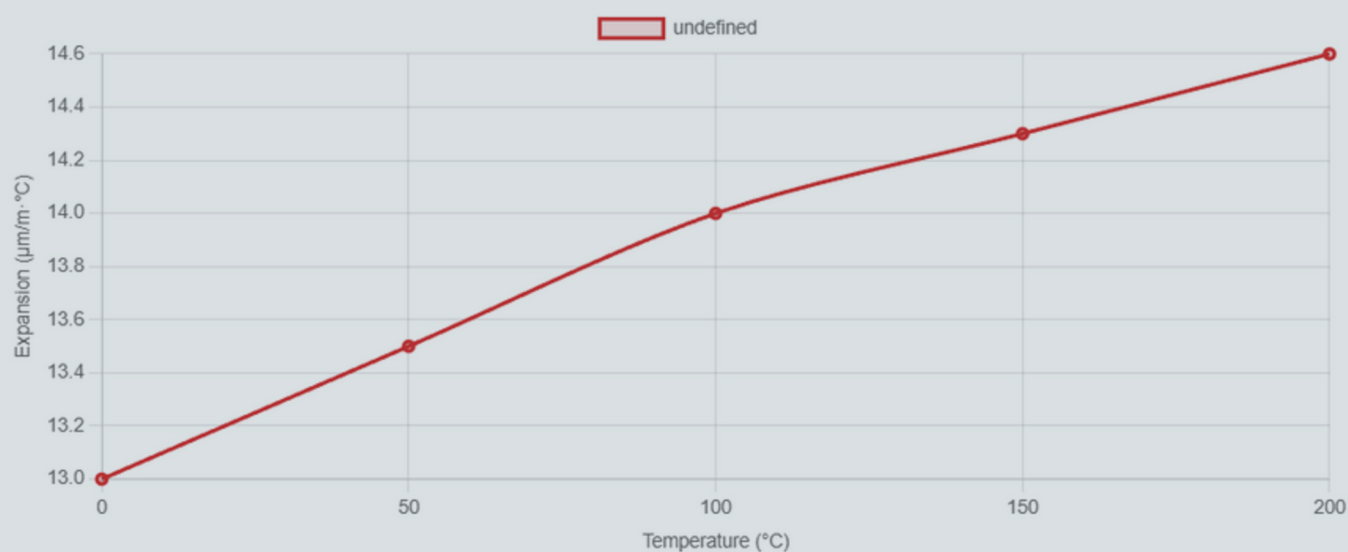


Magnesium Fluoride (MgF_2) provides excellent broadband transmission from $0.12\text{ }\mu\text{m}$ to $7.0\text{ }\mu\text{m}$, spanning the deep-UV through to the infrared. With its low refractive index (~ 1.38) and very low dispersion, MgF_2 is well suited for VUV/UV optics, excimer laser systems, spectroscopy, and broadband UV-IR windows and lenses.

MgF_2 offers strong thermal stability and maintains reliable optical performance under laboratory and field conditions. As a hard and durable material, it can be fabricated to high precision for windows, prisms, polarisation optics, and UV-IR components.

Being non-hygroscopic and chemically stable, MgF_2 is easy to handle and remains a dependable choice for UV, VUV, aerospace, and broadband optical applications.

MgF_2 Thermal Expansion



FAQ

Q: What is Magnesium Fluoride (MgF_2) used for?

A: Magnesium Fluoride is widely used in VUV/UV spectroscopy, excimer laser systems, aerospace and satellite optics, thermal imaging, and broadband UV-IR windows, prisms, and lenses thanks to its excellent 0.12–7.0 μm transmission.

Q: What makes MgF_2 different from other fluoride materials?

A: MgF_2 is extremely hard and durable, offers excellent UV and VUV transmission, has a low refractive index (~ 1.38), and is non-hygroscopic, making it more robust than salts such as NaCl and KBr. It also has very good radiation and environmental resistance.

Q: Is Magnesium Fluoride hygroscopic?

A: No. MgF_2 is fully non-hygroscopic, meaning it does not absorb moisture and remains stable even in humid or outdoor environments.

Q: Is MgF_2 suitable for high-power UV and excimer lasers?

A: Yes. MgF_2 is commonly used in F_2 , ArF, KrF, and other excimer laser systems due to its high damage threshold and deep-UV transparency.

Q: What types of optical components can be made from MgF_2 ?

A: Common components include windows, lenses, prisms, wedges, polarisation optics, and broadband UV-IR elements. MgF_2 can also be birefringence-cut for polarising applications.

Q: How durable is Magnesium Fluoride?

A: MgF_2 is one of the hardest UV-transmitting optical materials, offering strong resistance to scratching, chemical exposure, and environmental wear, making it ideal for rugged field applications.

Q: Can MgF_2 optics be anti-reflection coated?

A: Yes. MgF_2 optics can be supplied uncoated or with UV/IR AR coatings, depending on the wavelength range and application requirements.

Q: Is MgF_2 safe to handle?

A: Yes. MgF_2 is chemically stable and non-toxic. Standard optical-handling precautions (gloves, lint-free wipes) are recommended to protect the surface.