

## VERNOIL

Vernoil sapphire, also known as Verneuil sapphire, is a synthetic version of sapphire created using the Verneuil process, which is the first commercially successful method for manufacturing synthetic gemstones. Here are the key properties of Verneuil sapphire:

### 1. Chemical Composition

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- Formula:  $\text{Al}_2\text{O}_3$  (Aluminum oxide)
- It is chemically identical to natural sapphire, consisting mainly of aluminum oxide with trace elements that can give it various colors.

### 2. Physical Properties

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- Hardness: 9 on the Mohs scale, making it one of the hardest substances, only second to diamond.
- Density: Approximately 3.98 to 4.06 g/cm<sup>3</sup>.
- Refractive Index: 1.762 - 1.770 (birefringence of 0.008).
- Luster: Vitreous, giving it a bright, glass-like shine.
- Color: Can be colorless or various colors (blue, pink, yellow, green, etc.) depending on the trace elements added during synthesis.
- Pleochroism: Weak to moderate, meaning it can show different colors when viewed from different angles.

### 3. Optical Properties

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- Clarity: Often has fewer inclusions compared to natural sapphire, but can have curved striae (growth lines) that are characteristic of the Verneuil process.
- Transparency: Ranges from transparent to translucent.
- Fluorescence: May fluoresce under ultraviolet light, depending on the impurities.

### 4. Thermal Properties

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- Melting Point: Around 2,050°C.
- Thermal Conductivity: High, which makes it useful in some industrial applications.

## 5. Growth Characteristics

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- Curved Growth Lines: Characteristic of the Verneuil process, these curved lines can often be seen under magnification and are a key feature in distinguishing synthetic from natural sapphires.

## 6. Usage

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- Jewelry: Often used as a gemstone in rings, necklaces, and other jewelry due to its durability and variety of colors.
- Industrial Applications: Used in various industrial applications, including watch faces, scientific instruments, and semiconductors, due to its hardness and thermal stability.

## 7. Identification

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- While visually similar to natural sapphire, Verneuil sapphires can be identified by their curved striae and lack of natural inclusions. Advanced gemological tools may also detect differences in trace elements and crystal structure.