



GEMCLOUD



BLUE SAPPHIRE EDUCATIONALSERIES

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BLUE SAPPHIRE

INTRODUCTION



BLUE SAPPHIRE BIOGRAPHY

Photo credit: Bill Larson



Species: Corundum

Variety: Fancy Sapphire

Chemical Composition: Aluminum Oxide (Al₂O₃)

Trace Element Causing the Color: Titanium and Iron

Color: Dominant color is blue however can be pure blue to slightly greenish blue, from light to dark

Refractive Index: 1.762 - 1.770

Double Refraction: 0.009 (± 0.01)

Specific Gravity: 4.00 (± 0.05)

Pleochroism: Medium to strong violetish blue and greenish blue

Fluorescence: Longwave orange to reddish, mostly inert

Mohs Hardness: 9.0

Common Inclusion: Needles, fingerprint, straight, hexagonal growth, banding, twinning lines, crystals

Most Common Shapes: Cushion, oval, round, pear



BLUE SAPPHIRE VALUE



The value of sapphires is based on the combination of 6 different parameters:

COLOR

This is the most important parameter. The purer the shade of blue the higher the value.

CLARITY

The clarity of a sapphire is evaluated with the naked eye – Sapphires free of inclusions are very rare and visible inclusions are quite common. Nevertheless, the higher the purity the higher the price.

CUT

Sapphires which are cut with a good level of symmetry, proportion and polishing are commanding the highest prices.

CARAT

Because large stones are rarer than small stones, their prices are exponentially higher. The per carat price between a 1 carat and a 10 carats can be as big as 20 times.

ORIGIN

Some origins will command premium prices, even for stones which are visually the same.

TREATMENT

Because unheated stones are rarer than heated, this factor will have an impact on the price.



BLUE SAPPHIRE PRICING HISTORY

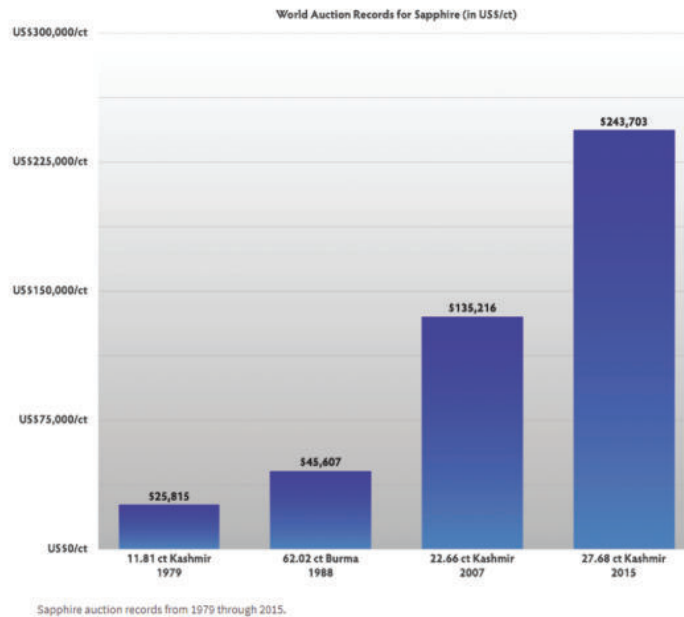


Photo credit: Richard Hughes

As witnessed during international auctions, sapphire prices have steadily increased ten-fold during the last 40 years, which makes them an attractive long-term investment.

Sapphires have the highest volume of sales against rubies and emeralds – it is also one of the most chosen alternatives for engagement rings after diamonds (mainly due to the engagement ring of Lady Diana).

The record prices mentioned on this slide are for similar quality gemstones of Kashmir origin and sold at international auctions such as Sotheby's and Christies (<https://www.lotusgemology.com/index.php/library/articles/160-under-the-hammer-ruby-sapphire-auction-records>) – note that this is also reflecting the market for gemstones of other origins, especially Sri Lankan and Madagascar sapphires.

This is due to a combination of very high rarity and a demand for the product constantly increasing.



BLUE SAPPHIRE

INTERESTING FACTS ABOUT



Photo credit: J.Lewis Jewellery (pinterest)

Below are some interesting facts about sapphires:

- The word sapphire comes from the Greek word "sappheiros", meaning blue stone
- Sapphire belongs to the same mineral variety as rubies: corundum
- Sapphires come in most of the rainbow colors; colors other than blue are called 'fancy sapphires'
- They are known to represent royalty, a symbol of nobility, trust and sincerity
- They have produced the biggest sales from the main precious stones worldwide (in term of volume)
- Among the big 3, Ruby, emerald and blue sapphire, sapphire is usually the most affordable
- September's birthstone
- Wedding Anniversary stone for 5th and 45th



BLUE SAPPHIRE

CATALOGUE & NOMENCLATURE



BLUE SAPPHIRE

SAPPHIRE PRIMARY AND SECONDARY HUES



Violetish
Blue



Blue



Greenish
Blue

Color is the most significant factor affecting the value of a sapphire.

Color preferences do change in time and from culture to culture – nevertheless today the most sought-after color is a pure blue hue with a slight hint of purplish or greenish overtone and a medium to medium dark tone.

As the secondary color becomes more intense, the value of a sapphire decreases – the lowest prices being for shades of blue that display a strong violetish or greenish overtone.

GEMCLOUD classifies sapphires in 3 different shades of blue:

- **Violetish blue:** Blue sapphire with a violetish secondary hue.
- **Blue:** Blue sapphire with a pure shade of blue to very slight secondary hue of violet or green. This is considered the finest hue for blue sapphire.
- **Greenish blue:** Blue sapphire with a greenish secondary hue.



BLUE SAPPHIRE COLOR GRADES

GEMCLOUD classifies the different color intensities of sapphires into 7 different grades:



Dark

Moderate to strong saturation of color with a very dark tone

Trade name: Midnight blue



Deep

Moderate to strong saturation of color with a medium dark to dark tone

Trade name: Twilight blue



Vivid

Vivid saturation of color with medium to medium dark tone. This is considered the finest intensity of color for blue sapphire.

Trade name: Royal blue



Intense

Moderate saturation of color with a medium light tone

Trade name: Intense cornflower blue



Medium Intense

Moderate saturation of color with a light tone

Trade name: Cornflower blue



Light

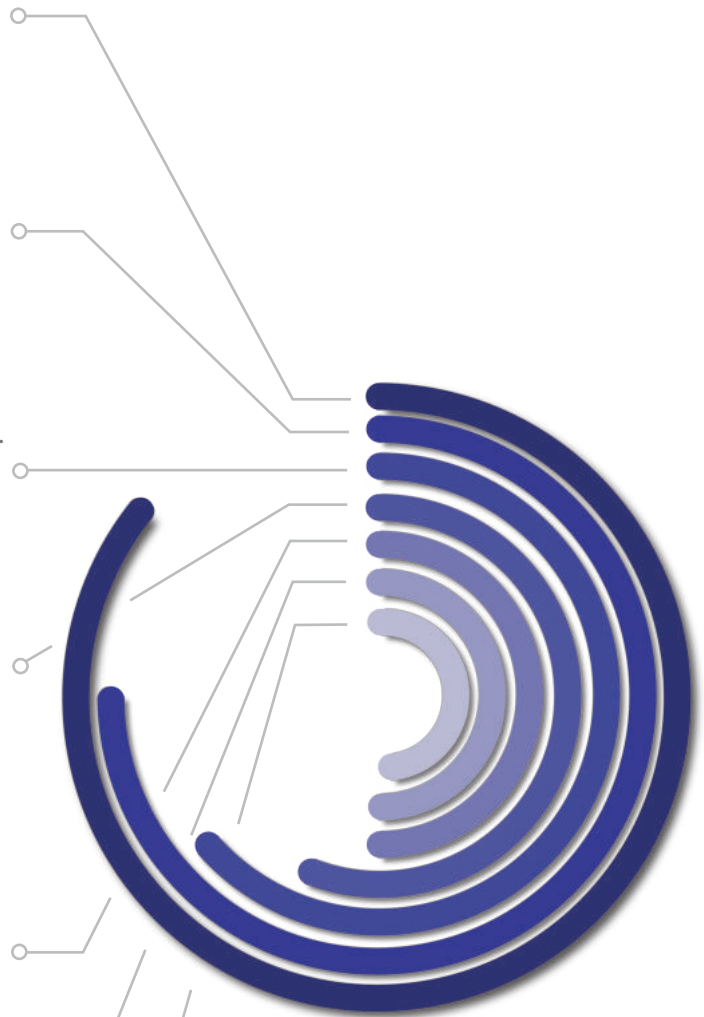
Slightly grayish or brownish saturation of color with a light tone

Trade name: Pastel blue



Very light

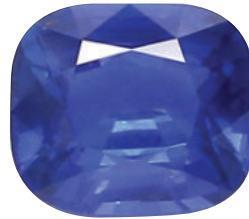
Grayish color with a very light tone, near colorless



BLUE SAPPHIRE ROYAL BLUE AND CORNFLOWER



Cornflower



Royal blue

Cornflower and royal blue are trade names used for describing specific shades of blue sapphires.

Cornflower

Cornflower is a flower commonly found in Sri Lanka displaying an intense blue color – it is sometimes associated with blue sapphire with a light to medium saturation and light to medium tone.

Royal blue

Royal blue is an old term used to describe a vivid blue color with a medium to medium dark tone, often being borderline with dark tone.

As is the case for terms like pigeon blood rubies, most gemological laboratories use these two terms to describe some shades of sapphires. However, many laboratories use their own standards with different ranges of color, and in different cases, each of the above terms can refer to a very wide and arbitrary range of blue.

GEMCLOUD uses the term “vivid blue” which can be compared to royal blue as well as the terms “medium intense / intense blue” for the color range usually described as cornflower.



BLUE SAPPHIRE

GEMCLOUD CLARITY GRADES



Transparent



Translucent



Opaque

GEMCLOUD grades all its gemstones through a universal clarity standard composed of 8 different grades (6 transparent grades, 1 translucent grade & 1 opaque grade) divided into the below:

TRANSPARENT

Transparent gemstones are the ones which have the property of transmitting light without serious diffusion.

GEMCLOUD grades transparent gemstones between 6 different grades: EC1, EC2, VI1, VI2, I1 and I2 (see next page).

TRANSLUCENT

Translucent gemstones are the ones which only have partial light going through due to their numerous inclusions.

GEMCLOUD grades translucent gemstones type with a single grade called 'translucent'.

OPAQUE

Opaque gemstones are so included that there is no light passing through the gemstones.

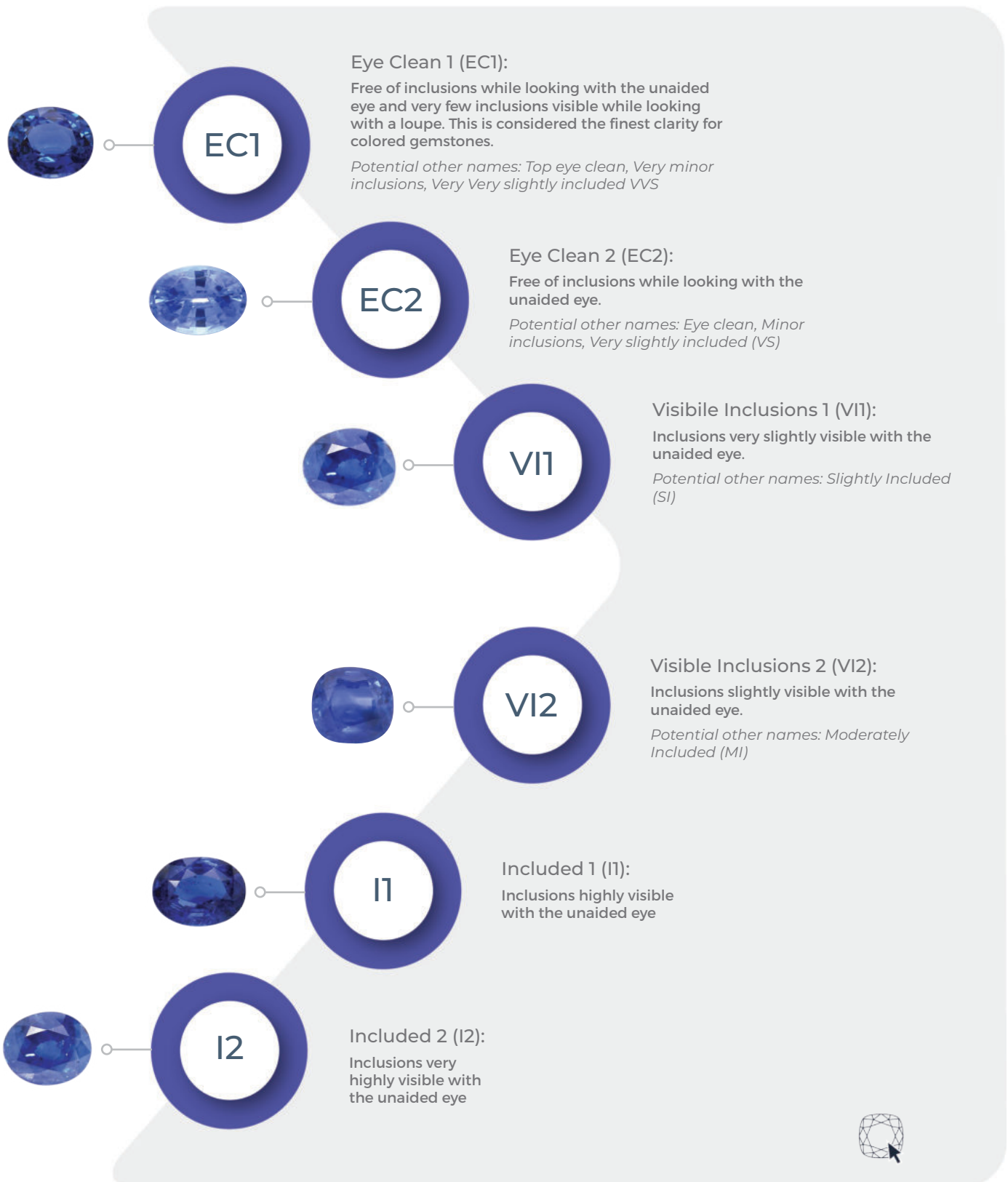
GEMCLOUD grades opaque gemstones with a single grade called 'opaque'.



BLUE SAPPHIRE

TRANSPARENT CLARITY GRADES

Clarity in transparent sapphires is assessed by naked eye only and at distance of about 40cm. Transparent sapphires that are free of inclusions are very rare and visible inclusions are common and accepted.



BLUE SAPPHIRE

ORIGINS IN GEMCLOUD
CATALOGUE



BLUE SAPPHIRE GEOGRAPHIC ORIGINS



GEMCLOUD catalogue will includes sapphires from the most common geographic origins:

- Australia
- Burma (Myanmar)
- Ethiopia
- Kashmir
- Nigeria
- Madagascar
- Sri Lanka
- Thailand / Cambodia



BLUE SAPPHIRE

DETERMINATION OF ORIGIN



Sapphires coming from different mining areas have different chemical signatures and different type of inclusions. This is due to the fact that they were formed in different geological environments (with different host rocks etc...).

These chemical signatures and the different type of inclusions are like fingerprints of humans and they help gemologists to distinguish the different origins.



BLUE SAPPHIRE BURMA, MYANMAR



Photo credit: dianavincet.com

Burma (today named Myanmar) is one of the most historical and oldest mined sapphire sources: here sapphires have been mined for centuries.

Burmese sapphires are mined, along with rubies, through a difficult, hard rock mining process that makes it difficult to recover high quality gems.

Fine quality Burmese sapphires are very rare, and display a typical vivid to deep blue, sometimes referred in the market as 'royal blue'.

Most Burmese sapphires do not need any enhancement for improving their quality.

Because of marketing and since Burmese sapphires have been associated with royalty for centuries, Burma is considered one of the finest origins for sapphires and achieve premium prices on the international market.

Burma is also well known to produce very fine 6 rays star sapphires.



BLUE SAPPHIRE KASHMIR



Photo credit: polyauction

Nowadays, sapphires from Kashmir are among the most expensive and sought-after gems on the market – regularly achieving world record prices amongst coloured gemstones, right after Burmese rubies.

Amongst sapphires of different origins, Kashmir is considered the most premium source and the one that achieves the highest prices, all other factors being equal.

This is because Kashmir sapphires have been adorned by kings and queens through history, but also due to a combination of incomparable beauty and extreme rarity.

They were discovered by the beginning of 1880's following a landslide, somewhere on the Indian side of the Kashmir. Since then, the production has been extremely sporadic and nearly non-existent.

Kashmir sapphires have a typical intense blue color with a unique velvety appearance, sometimes referred as 'cornflower' by the trade – they are well known to retain their lustre under any lighting conditions.

This typical color is sometimes used as a benchmark with sapphire of other origins and referred as 'Kashmir like' color.



BLUE SAPPHIRE SRI LANKA



Photo credit: Christie's

Sri Lanka, formerly known as 'Ceylon', have been producing sapphires for thousands of years and is probably the oldest source known of blue sapphires.

Historical blue sapphires from Sri Lanka frequently reach very high prices through international auctions and are considered one of the top 3 premium sources for sapphires.

Sri Lankan sapphires are typically mined in old riverbeds and the rough have an easily recognizable rounded, pebble like shape.

They have a typical violetish blue color with a soft intense saturation and medium light tone commonly referred as 'Cornflower' by the trade - nevertheless, Sri Lanka also produces some fine gems with a vivid saturation, commonly referred as royal blue.

It has been well known for producing large exceptional sapphires, such as 'The Blue Belle of Asia' featuring a 392.52-carat untreated cushion-cut sapphire from Sri Lanka (visual on the top).



BLUE SAPPHIRE MADAGASCAR



Madagascar is nowadays probably the most resourceful source of gemstones and home to the largest deposit of sapphires worldwide (Ilakaka). It is currently the most prolific source of sapphires and represents about 60% of the sapphires on the market.

They are visually indistinguishable from Sri Lankan sapphires as they geologically come from the same place – few billion years ago, these two countries were one in a continent which was called Gondwana.

These sapphires are mostly mined into very deep, old riverbeds, sometimes as deep as 60 meters underground, as well as difficult hard rock mining in some parts of the country.

Their color goes from pastel blue to highly saturated vivid blue color, commonly referred to as 'royal blue' by the trade.

Madagascar is the most diverse amongst all the sources of sapphires – This also reflects in their chemistry and gemological laboratories sometimes mistake them with other origins such as Burma, Kashmir and Sri Lanka.



BLUE SAPPHIRE BASALTIC DEPOSITS



Photo credit: Vincent Pardieu

Australia, Cambodia, Ethiopia, Nigeria and Thailand sapphires are all described as coming from a 'Basaltic' origin - meaning that they were all created in the earth crust and brought to the surface by volcanic activity.

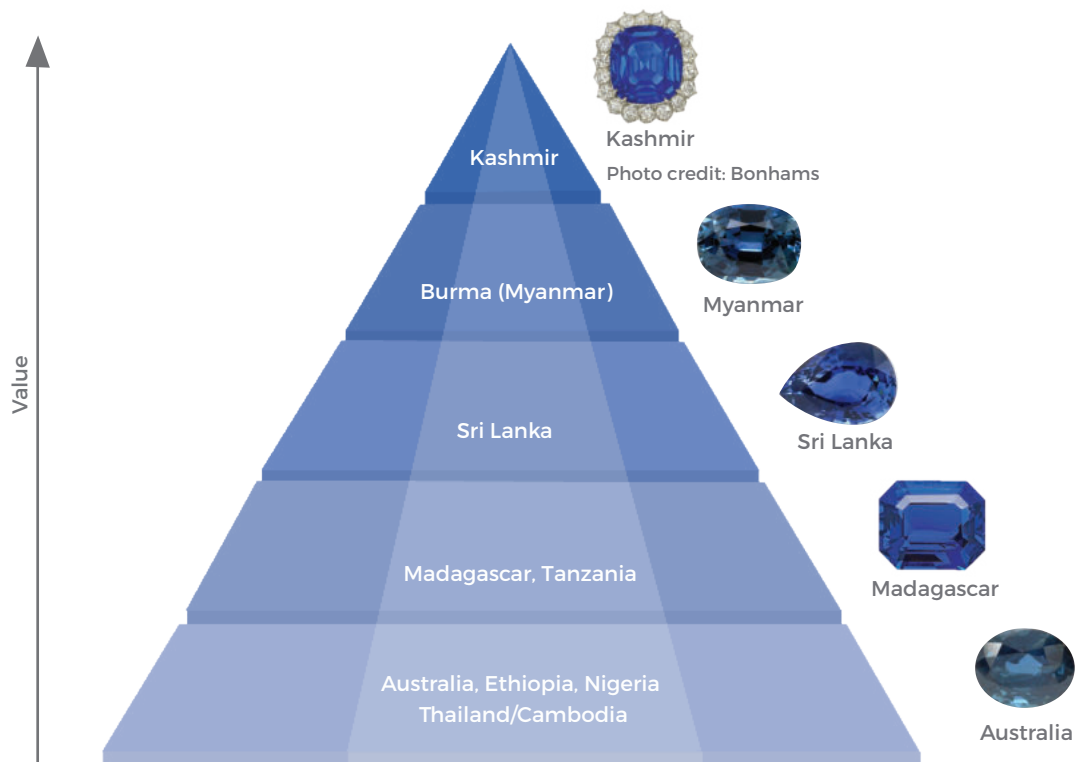
This process typically produces sapphires which go from greenish blue to blue with a deep saturation and a medium dark to dark tone - sometimes referred as 'navy blue' by the trade.

Most of the sapphires coming from basaltic origins are commonly heat-treated in order to improve their colors - either to remove the greenish tint or lighten their color tone.

Basaltic sapphires are on the bottom of the value scale of sapphires and there is no premium price for different origins amongst themselves - parcels of various origins are often mixed with similar quality factors.



BLUE SAPPHIRE HIERARCHICAL OVERVIEW



Because we tend to associate a product quality with its origin, different origins will have different prices for similar looking gemstones. From a quality point of view, sapphires with different origins will have similar fine quality stones and the exact same colours.

In the case of sapphires, we divided origins into different pricing groups (from most to least expensive):

- Kashmir: This is considered the highest premium origin for sapphire.
- Myanmar: This is considered the second finest origin.
- Sri Lanka: This is considered the third finest origin.
- Madagascar / Tanzania: These are considered equally as the fourth finest origin.
- Basaltic Deposits: Namely Australia, Ethiopia, Nigeria, Vietnam, Thailand and Cambodia. These origins are considered equally as the lowest rank for origin premium.



BLUE SAPPHIRE

TREATMENTS IN GEMCLOUD
CATALOGUE



BLUE SAPPHIRE TREATMENTS



Before
Heating



After
Heating

Photo credit: lotusgemology.com

Heat - treatment of blue sapphires appeared on the market in the 1970's - The legend says that after a fire in the gemstone market in Thailand, some traders realized that they could change the color of sapphires by heating them.

There are currently 4 major sapphire treatments, but because not all are considered stable, GEMCLOUD will only be working with the one below (on top of unheated):

Heated: Sapphires which have been heated with high temperature in order to improve their color and clarity. These are considered less valuable than unheated sapphires.

This treatment is permanent, stable and does not require any special care.

These are usually referred to as 'Heated', 'H' or 'Indication of thermal enhancement' by gemological laboratories.

In rare cases, residue of flux is encountered in heated sapphires and these will be referred to as 'Heated (Minor residue)', Heated (Moderate residue) and Heated (Significant residue) on gemological reports.



BLUE SAPPHIRE TREATMENTS

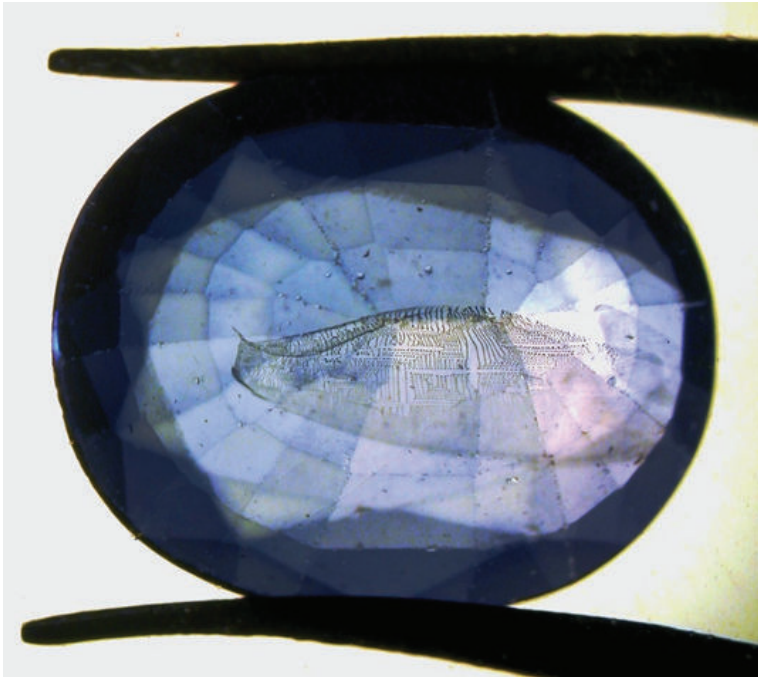


Photo credit: Chaman Golecha

Below are the three-remaining treatments, which will not be present in the GEMCLOUD feed:

Diffusion with Beryllium – to improve color

This treatment is usually referred as 'Diffused', H(Be) or 'Beryllium diffused' on gemological reports.

It is considered stable and does not need any special care, except for stones that need to be recut – the cutter would have to pay attention as the treatment is often located just below the surface (and so color can then be removed during the cutting process).

Diffusion with Titanium – to improve color

This treatment is usually referred as 'Diffused', H(Ti) or 'Titanium diffused' on gemological reports.

It is considered stable and does not need any special care, except for stones that need to be recut – the cutter would have to pay attention as the treatment is often located just below the surface (and so color can then be removed during the cutting process).



BLUE SAPPHIRE TREATMENTS

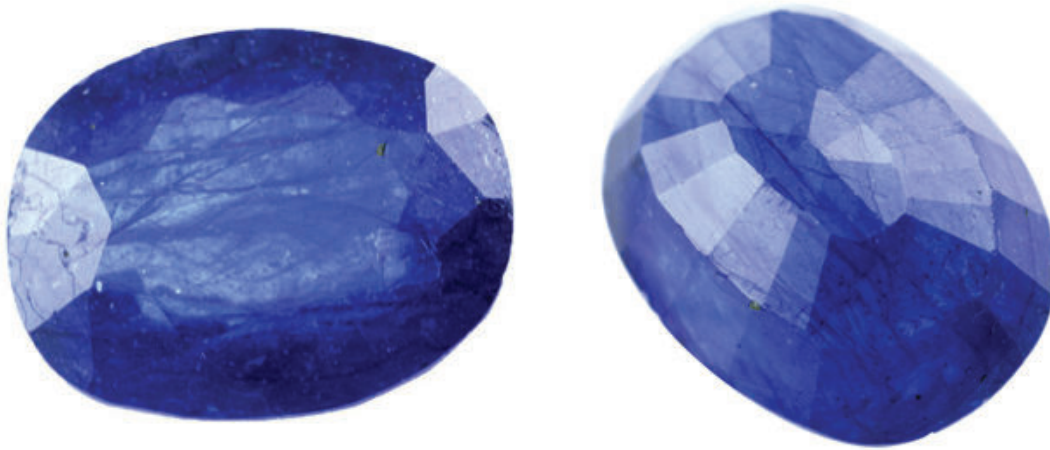


Photo credit: indiamart.com

Heated with lead-glass to improve color & clarity

These are usually referred as 'lead-glass' or 'composite sapphire' on gemological reports.
This treatment is not considered stable and needs special care.



BLUE SAPPHIRE TREATMENTS - IDENTIFICATION

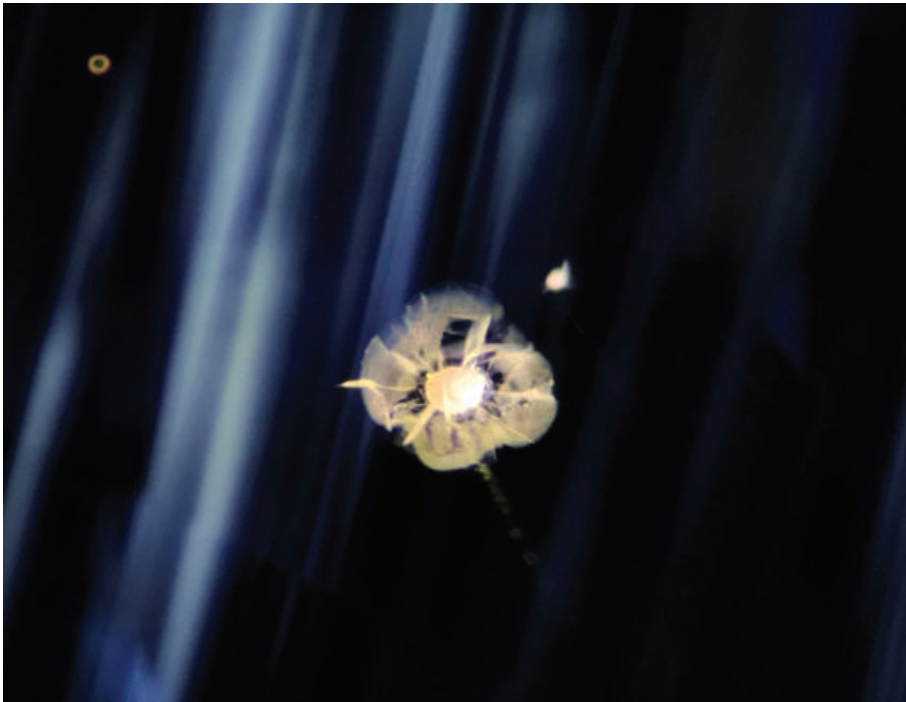


Photo credit: Sebastian Haensel

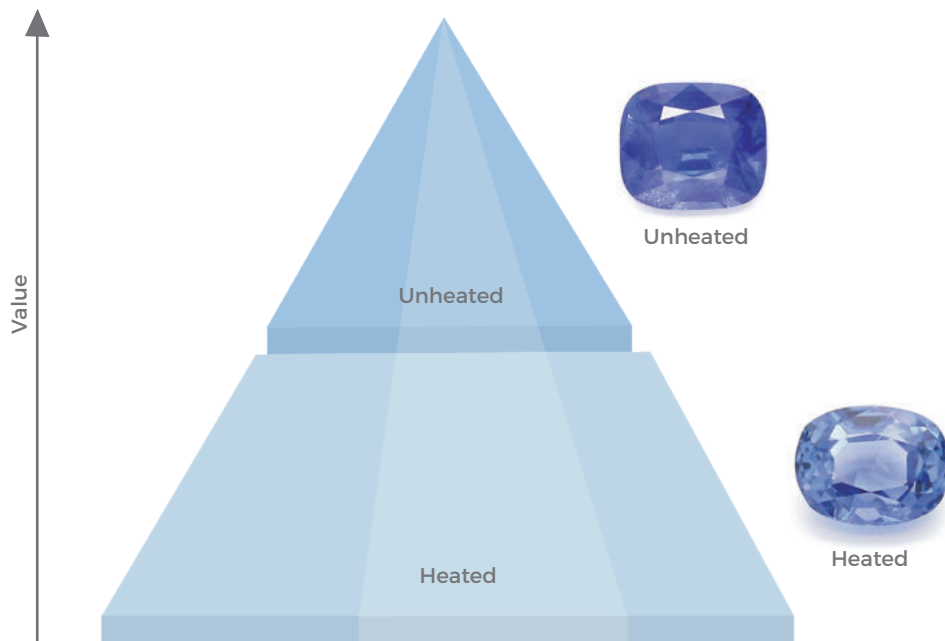
Gemologists identify treatments in sapphires by studying both their internal features and their chemistry with advanced machinery.

Because heat-treatment involves high-temperature that creates thermic shocks and modifies the aspects of internal features, gemologists are often able to find clues of treatment while looking with strong magnification.

Photo: Due to heat treatment expanded crystal with atoll-like structure (magnification about 120x).



BLUE SAPPHIRE ECONOMICAL OVERVIEW



Because an unheated sapphire is much rarer than a heated sapphire, these will command different prices – even between stones that are impossible to differentiate with the naked eye.

Indeed, the value follows the scarcity and so the rarer the sapphire, the higher will be the price.

Below is an example of price comparisons between 2 different sapphires that visually look exactly the same:

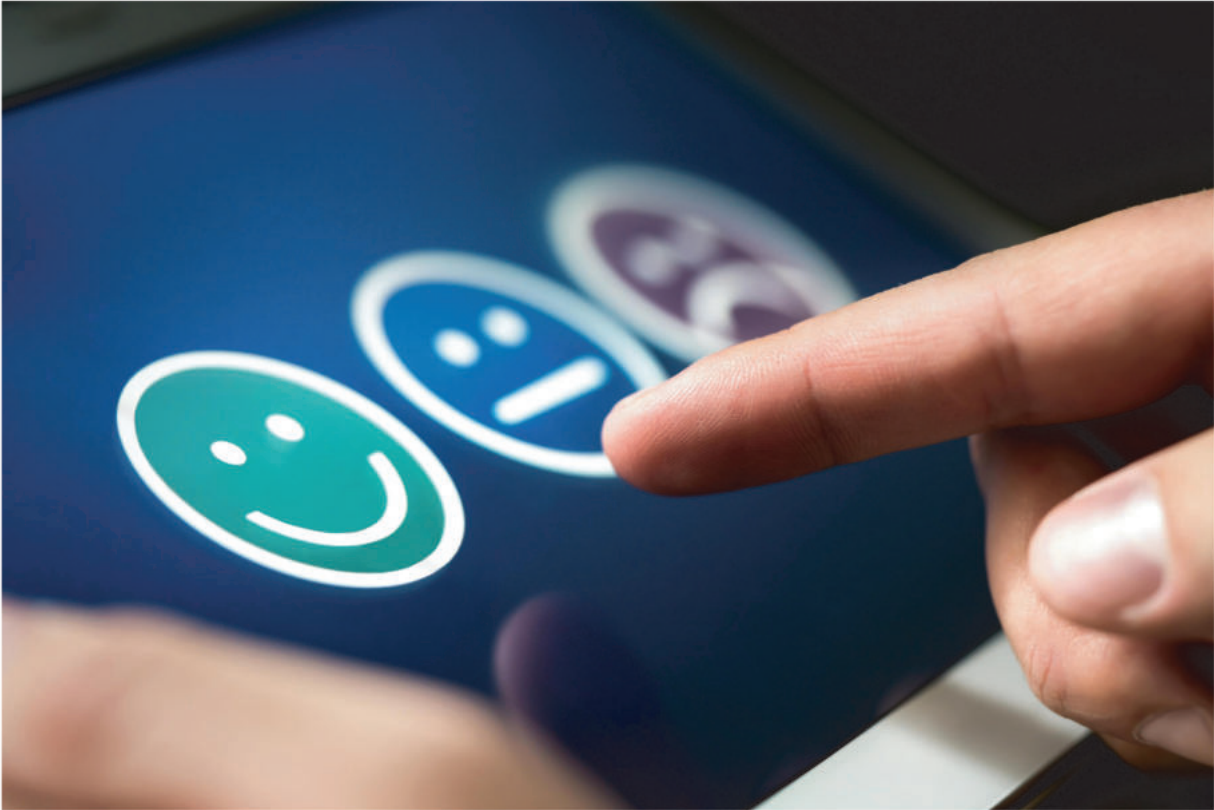
- ↗ Unheated vivid sapphire of 1 ct: 2,500 USD / total
- ↗ Heated vivid sapphire of 1 ct: 1,000 USD / total

This price difference between unheated and heated then grows exponentially as the sapphires grow in size.

Note: this is just a basic example shown as a guideline and prices may vary from stone to stone and time to time.



BLUE SAPPHIRE COMMUNICATING ABOUT TREATMENTS



Below is a list of arguments to emphasize while communicating treatments to end consumers:

- Heat-treatment of sapphires is very common and well accepted.
- Most of the sapphires in the market are heat - treated.
- All treatments in our catalogue are permanent, stable and do not need any special care.
- Heat - treatment finalizes the unfinished work of mother nature.
- The term 'enhancement' is usually preferred to 'treatment' as it sounds less negative.
- All of GEMCLOUD sapphires are accompanied with a gemological report.
- All treatments on the portfolio are fully disclosed.



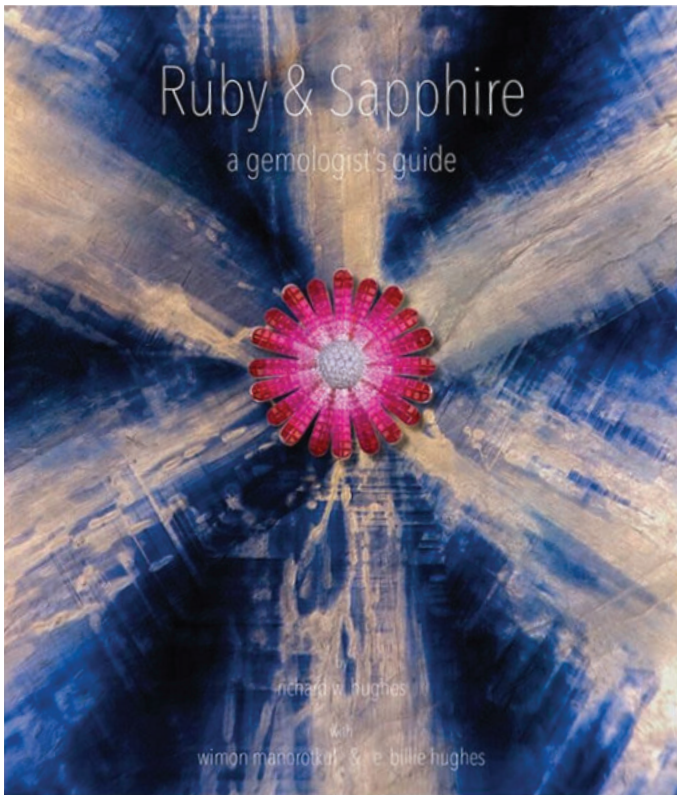
BLUE SAPPHIRE

LIBRARY



BLUE SAPPHIRE

BOOKS ABOUT SAPPHIRES



Below are some books we advise you to read if you want to know more about sapphires:

- **'Ruby & Sapphire, A Gemologist's Guide'** by Richard Hughes – this is a must, as this book is considered the bible for information about rubies and sapphires.
- **'Ruby & Sapphire, A Collector's Guide'** by Richard Hughes.
- **'The Book of Ruby and Sapphire'** by Richard Hughes – interesting old narratives about Mogok and from the eyes of an English man. Very good for extracting marketing ideas.
- **'Secrets of the Gem Trade: The connoisseur's Guide to Precious Gemstones'** by Richard Wise – Interesting book about colored gemstones in general.



BLUE SAPPHIRE

ARTICLES – GENERAL INFORMATION

Below is a list of interesting articles with verified information:

General information about Sapphires

- <https://www.gia.edu/sapphire>
- <https://www.gia.edu/sapphire-quality-factor>
- http://www.ruby-sapphire.com/sapphire_connoisseurship.htm

Sapphire treatments - General

- <https://www.gia.edu/gems-gemology/summer-2019-madagascar-sapphire-heat-treatment-experiments>
- <https://www.gia.edu/gia-faq-heat-treatment-affect-sapphire-value>
- <http://www.ruby-sapphire.com/brief-history-heat.htm>
- <https://www.youtube.com/watch?v=U564LcIC6Hs>
- http://www.ruby-sapphire.com/heat_seeker_uv_fluorescence.htm



BLUE SAPPHIRE

ARTICLES – TREATMENTS & ORIGINS

Beryllium treatment

- <http://www.ruby-sapphire.com/beryllium-treated-blue-sapphire.htm>
- <http://www.ruby-sapphire.com/pdf/Emmett-2011-Beryllium-and-Beefsteak.pdf>

Lead-glass and cobalt treatment

- <http://www.ruby-sapphire.com/glass-filled-sapphire.htm>

Sapphire treatments –Main laboratories Nomenclatures

- <http://gemresearch.ch/enhancement-disclosure/>
- <https://www.lmhc-gemmology.org/gemstones>

Burmese Sapphire

- <https://www.lotusgemology.com/index.php/library/articles/287-burmese-sapphire-giants>
- <https://www.gia.edu/ongoing-research/characterization-blue-sapphires-from-mogok-stone-tract-mandalay-region-burma-myanmar>
- https://www.git.or.th/eng/testing_center_en/lab_notes_en/glab_en/2016/11/B36-1.pdf
- <http://www.ruby-sapphire.com/burmese-sapphire-giants.htm>




BLUE SAPPHIRE

ARTICLES - ORIGINS

Kashmir Sapphire

 <http://www.palagems.com/kashmir-sapphire>

 <https://www.sothebys.com/en/articles/the-brightest-sapphires-from-kashmir-burma-and-ceylon>

 <https://www.ssef.ch/wp-content/uploads/2018/01/2013-Krzemnicki-Kashmir-sapphire-Facette.pdf>

 <http://www.ruby-sapphire.com/r-s-bk-india.htm>

 <https://www.christies.com/features/The-Peacock-Necklace-9517-3.aspx>

Madagascar sapphire

 <https://www.youtube.com/watch?v=nOIWjPDRcJO>

 https://www.youtube.com/watch?v=X9KsIZenr_I

 <https://www.youtube.com/watch?v=vfzq72NlfCg>

 <https://www.ssef.ch/trade-alert-kashmir-like-sapphires-from-madagascar/>



BLUE SAPPHIRE

ARTICLES - ORIGINS


Tanzania sapphire

 <https://www.youtube.com/watch?v=7wqfoMAYBaI>

Thailand / Cambodia

 <https://www.youtube.com/watch?v=O7OrNmJapGA&t=34s>

Sri Lanka

 https://www.gubelingemlab.com/tl_files/content/03%20Gemmology/Gem%20Lab/Documents/GemmologicalProfile_SriLankanSapphire_Specimen.pdf

Economical

 <https://www.lotusgemology.com/index.php/library/articles/160-under-the-hammer-ruby-sapphire-auction-records>

