



GEMCLOUD



EMERALD —————

EDUCATIONALSERIES

The content of this document is owned by GemCloud. No part of this work may be copied, reproduced, transferred, or transmitted in any form or by any means whatsoever without the written agreement of GemCloud.

INDEX

1	INTRODUCTION	3
2	GEMCLOUD EMERALD CATALOGUE & NOMENCLATURE	7
3	EMERALD ORIGINS IN GEMCLOUD CATALOGUE	13
4	EMERALD TREATMENTS IN GEMCLOUD CATALOGUE	26
5	LIBRARY	31





EMERALD

INTRODUCTION



EMERALD BIOGRAPHY



Photo credit: thejeweleryblog.com

Species: Beryl

Variety: Emerald

Chemical Composition: Beryllium Aluminum Silicate ($\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$)

Trace Element Causing the Color: Chromium

Refractive Index: 1.570 to 1.599

Double Refraction: 0.005 to 0.010

Specific Gravity: 2.72 (\pm 0.05)

Pleochroism: Bluish green to yellowish green

Fluorescence: Sometimes reddish under long wave UV-light

Mohs Hardness: 8.0

Common Inclusion: Multiphase inclusions, crystals, fissures

Most Common Shapes: Octagonal, rectangular, pear, oval



EMERALD VALUE



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

COLOR

This is the most important parameter. The purer the green the higher the value.

CLARITY

The clarity of an emerald is evaluated with the naked eye, emeralds free of inclusions are extremely rare. Visible inclusions (fissures) are very common. Nevertheless, the higher the purity the higher the price.

CUT

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

CARAT

Large stones are much rarer than small stones, therefore their prices are exponentially higher. The per carat difference in price between a 1 carat and a 10 carats emerald can be as big as 50 times.

ORIGIN

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

TREATMENT

Untreated stones are much rarer than treated ones, this factor will have an impact on the price.



EMERALD

INTERESTING FACTS ABOUT



Photo credit: theenchantedmanor.com

Below are some interesting facts about emeralds:

- Its name comes from smaragdus, green gem in ancient Greece which translated to Esmeralda in Latin
- Emerald is regarded as the traditional birthstone for May as well as the traditional gemstone for the astrological sign of cancer
- Cleopatra was known for her passion for emeralds and used it as royal adornments
- Emerald is the stone of the 55th wedding anniversary – also know as the emerald wedding anniversary
- The oldest emeralds are believed to have been formed 2.97 billion years old
- Elizabeth Taylor once owned an emerald necklace that sold in 2011 for \$6.5 million
- According to ancient folklore, putting an emerald under your tongue would help one see into the future



EMERALD

CATALOGUE & NOMENCLATURE



EMERALD

EMERALD PRIMARY AND SECONDARY HUES



Yellowish Green



Green



Bluish Green

Color is a significant factor affecting the value of an emerald.

Color preferences do change with time and from culture to culture – nevertheless today the most sought-after color is a pure green with hints of yellow or blue as secondary colors, and a medium to medium deep tone. As the secondary color becomes more intense, the value of an emerald decreases – the lowest prices being for shades of green that display a strong bluish or yellow overtones.

GEMCLOUD classifies emeralds with 3 different shades of green:

- **Yellowish Green:** Emeralds with a yellow secondary hue.
- **Green:** Emeralds with a pure green primary colour and very weak bluish or yellowish secondary hues. This is considered the finest color for an emerald.
- **Bluish Green:** Emeralds with a bluish secondary hue.



EMERALD

EMERALD COLOR INTENSITIES

GEMCLOUD classifies the different color intensities of emeralds into 5 different grades:



Deep

Moderate to strong saturation with a slightly dark tone



Vivid

saturation of color with medium dark tone



Intense

Moderate saturation of color with a medium light tone



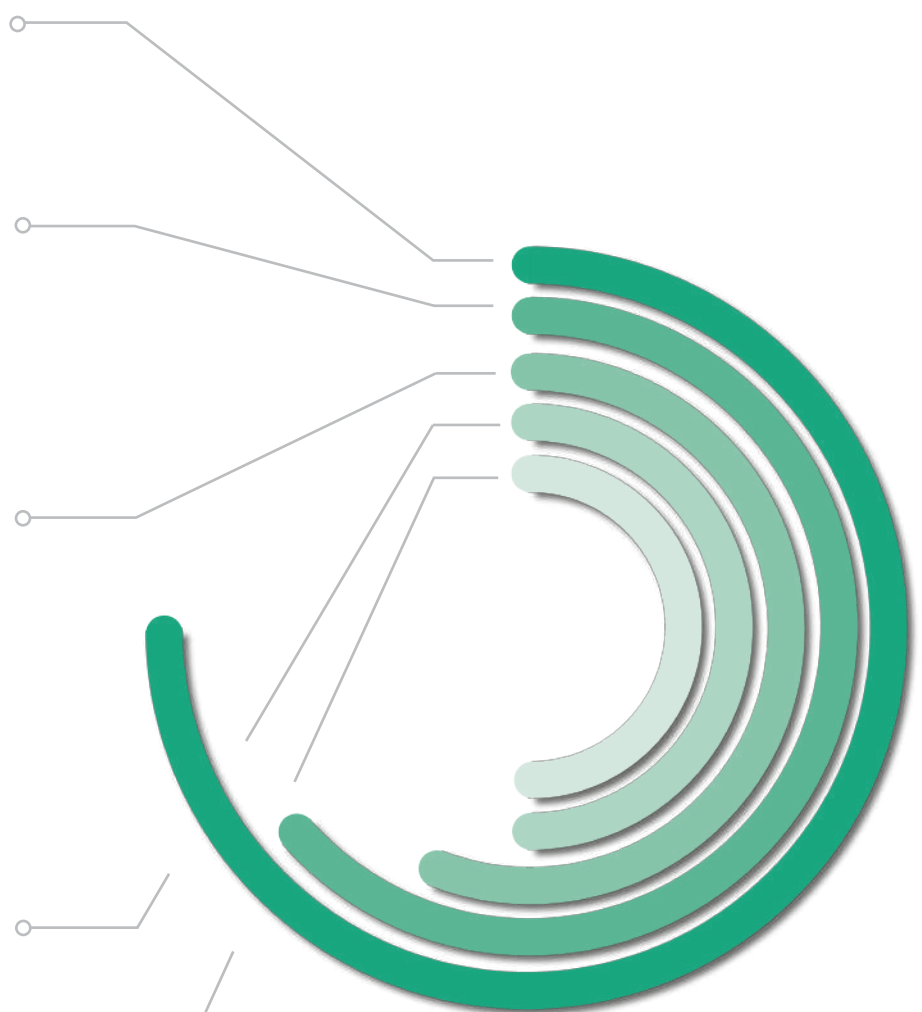
Medium Intense

Moderate saturation of color with a light tone



Light

saturation with a medium to light tone



EMERALD

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.

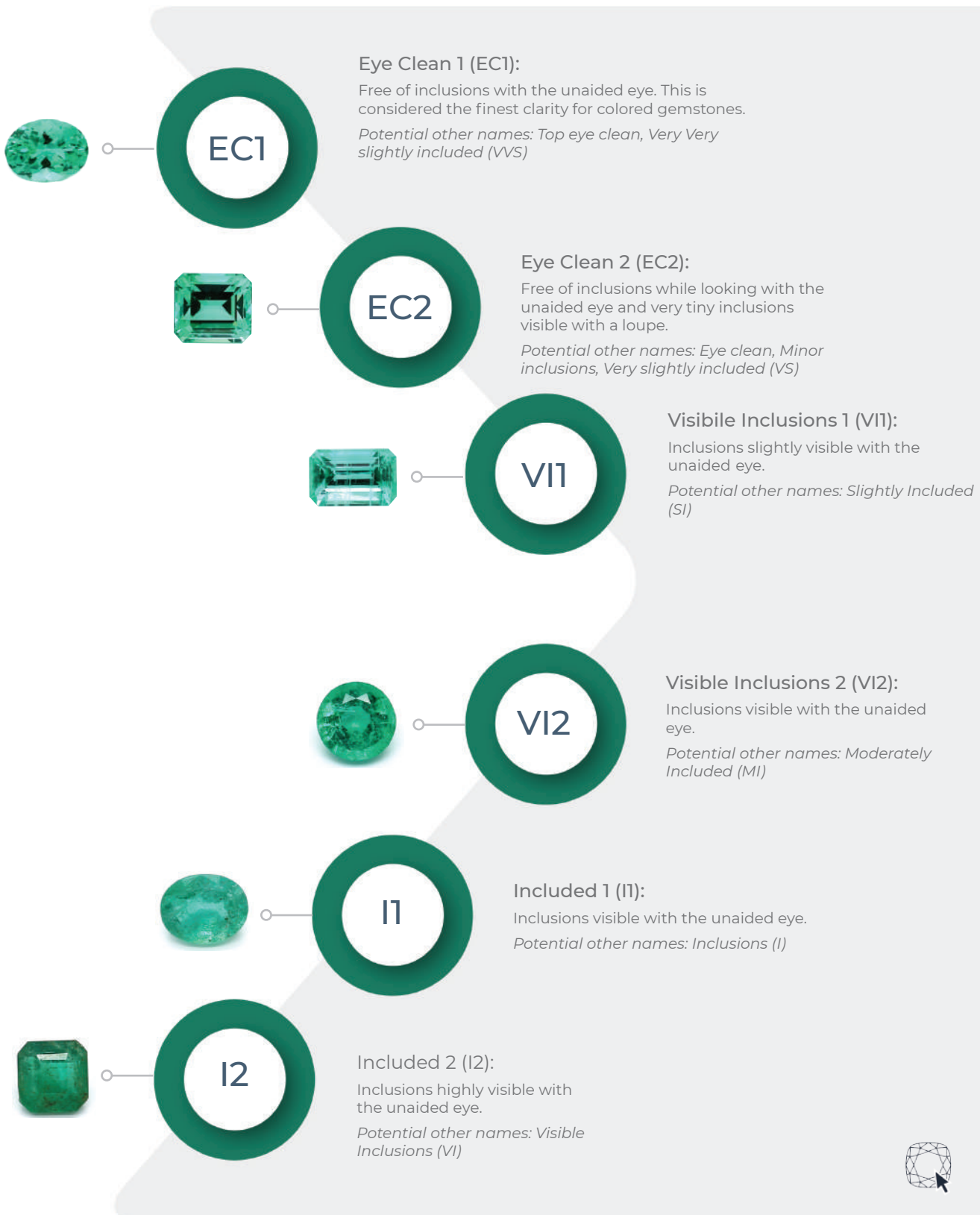
GEMCLOUD grades opaque gemstones with a single grade called 'opaque'.



EMERALD

TRANSPARENT CLARITY GRADES

Clarity of transparent emeralds is assessed by naked eye only and at distance of about 40cm. Transparent emeralds are classified as a 'type 3' stones which means that they almost always have visible inclusions by eye.



EMERALD JARDIN



Photo credit: Sebastian Haensel

“Jardin”, the French word for garden, describes a moss-like pattern of inclusions, typically found in Emeralds. These can be a mixture of solid, liquid and/or gas. They usually appear to be light green or whitish in color.

If an emerald is completely transparent, it is almost immediately assumed that it is unnatural or heavily treated, until tests have been carried out to prove otherwise. Transparent emeralds are extremely rare and are very valuable, especially if untreated. The *jardin* helps gemologists identify whether a stone is natural, synthetic or imitation. The origin of the emerald can also be identified by studying its *Jardin*.



EMERALD

ORIGINS IN GEMCLOUD
CATALOGUE



EMERALD

GEOGRAPHIC ORIGINS



GEMCLOUD catalogue will include emeralds from the most common sources:

- Afghanistan
- Brazil
- Colombia
- Ethiopia
- Madagascar
- Pakistan
- Russia
- Zambia
- Zimbabwe

The emerald catalogue will differ from time to time depending on the inventories of our partner traders.



EMERALD

DETERMINATION OF ORIGIN



Emeralds from different mining areas have different chemical signatures and different types of inclusions. This is due to the fact that they were formed in different geological environments.

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



EMERALD AFGHANISTAN



Typical multiphase inclusions

Photo credit: Sebastian Haensel



Afghanistan's Panjshir Valley mines

Photo credit: asiamining.com



Photo credit: tglprecisioncut.com



Fine emeralds from Panjshir (rough and cut)

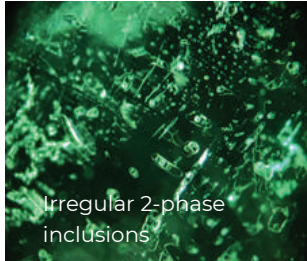
The remote valley of Panjshir, Afghanistan is well known for producing a small amount of high end emeralds which can compete with the finest emeralds, coming from Colombia. Emeralds have here been mined for thousands of year, bigger mining operations started around 2001.

The mines are located between 3,000m and 4,000m in elevation and mining conditions are harsh. Similarly to Colombia, miners are following hydrothermal veins, using jackhammers and explosives to create shafts up to 1000m inside the mountain. Currently there are more than 100 active mines, production is mainly commercial material.

Recently pockets with astonishing clean emeralds were found, some stones were sold for up to 200,000 USD per carat. These stones are very similar to Colombian stones and can be challenging for every gemological laboratory to detect the origin.



EMERALD BRAZIL



Irregular 2-phase inclusions

Photo credit: Sebastian Haensel



Belmont emerald mine, Brazil

Photo credit: Andrew Lucas / GIA



Photo credit: mineralauctions.com



Rough and cut emerald from Brazil

Since the late 1970's, Brazil has had constant production of commercial grade emeralds which currently represents up to 50% of emeralds on the north American market.

Brazilian mining companies use highly evolved technology and production has been consistent year after year.

High-end emeralds from Brazil are very rare but their soft green color and highly competitive pricing has created a large demand for the product.

High-end emeralds might be rarer from Brazil, but some people prefer the softer green tone of the Brazilian stones. The prices and supply are also very steady.



EMERALD COLOMBIA



Photo credit: Sebastian Haensel



The Rockefeller Emerald @ Christie's



Photo credit: londonde.com



Photo credit: kloiberjewelers.com



Rough and cut Colombian emeralds

Colombian emeralds have been mined for centuries and considered to be the world finest.

Amongst all the mines, one of the most famous mine is the Muzo mine which is said to produce the highest amount of top grade emeralds.

After a lot of problems with violence and dubious working conditions, also known as the reign of the 'green wars' from 1980 to 2009, the mining conditions are currently sustainable and up to western standards.

One of the most famous and expensive emeralds is the Rockefeller Emerald, a Colombian emerald with impressive 18.04ct. It was sold for 5,511,500 \$ or \$305,500 per carat in a Christie's auction in 2017.



EMERALD ETHIOPIA



Typical 2-phase inclusions

Photo credit: Sebastian Haensel



Emerald mine in Shakiso area, Ethiopia

Photo credit: ICA / Incolor magazine



Photo credit: spec4gem.info



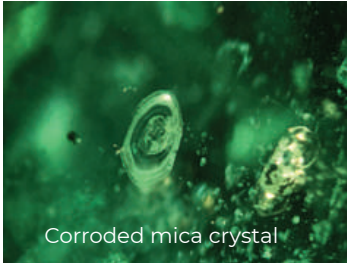
Rough and high-quality cut Ethiopian emerald

Ethiopia is the most recent source of emeralds. A source of astonishingly high-quality material was discovered in 2015 in an area already known for gold mining and coffee production.

At the beginning of the discovery, around 2,000 miners worked the area with hand tools and later on upgraded the operation with excavators and jack hammers. Production is small scale and not consistent.



EMERALD MADAGASCAR



Corroded mica crystal

Photo credit: Sebastian Haensel



Photo credit: <http://mes.chez-alice.fr/>



Photo credit: schmuck-boerse.com



Rough and cut emerald
from Madagascar

Emeralds were found in Madagascar in the 1970's. Hard rock mining, weather conditions and changing political situations always made it difficult to work the deposit.

Production is steady for small and commercial stones and from time to time the deposit also produces some high-end stones.

From a gemologist point of view, Madagascar emeralds are chemically similar to the one from Zambia, but have very different internal features.



EMERALD PAKISTAN



Dolomite crystals

Photo credit: Sebastian Haensel



Swat Valley, Emerald mining area, Pakistan

Photo credit: flickr.com



Photo credit: catawiki.com



Rough and high-quality
cut emerald from Pakistan

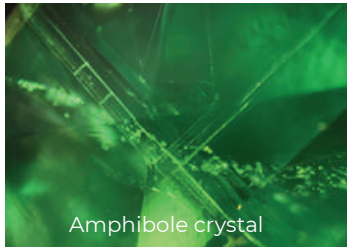
Emerald deposits in the Swat valley, Pakistan were discovered in the late 1950's. For the first 20 years it was more or less worked by local people for the local market, later on bigger companies took over and began producing for the international market.

Nowadays there are several hard rock deposits that produce mainly commercial emerald. Now the mining shafts reveal high quality emeralds.

Chemically these emeralds are quite similar to Afghanistan stones but mostly more included. Some of the inclusions can be very typical for Pakistan emeralds.



EMERALD RUSSIA



Amphibole crystal

Photo credit: Sebastian Haensel

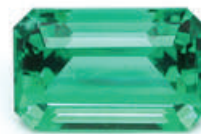


Malysheva mine in the Ural mountains, Russia

Photo credit: askural.com



Photo credit: RubyRose (pinterest)



Rough and cut emerald
from Russia

Back in the 1830's the first Russian emeralds were found in the Ural mountains close to Yekaterinburg together with the famous alexandrite. The largest emerald deposit, the Mariinsky field has been in operation for more than 185 years.

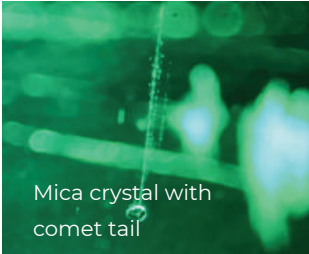
After investments and restoration, a modern operation started in 2005 and have since then produced some high-quality emeralds. The attractive bluish green colour with very high purity of Russian emeralds is well known by connoisseurs.

From a gemmological point of view, Russian emeralds are easily recognizable both by their unique chemistry and internal features.

Beside the bluish green color, inclusions from Russian emeralds are quite recognizable and can be diagnosed for an experienced gemologist.



EMERALD ZAMBIA



Mica crystal with
comet tail

Photo credit: Sebastian Haensel



Kagem Mine in Zambia, the World's largest
colored gemstone mine

Photo credit: nationaljeweler.com



Photo credit: Gemfields



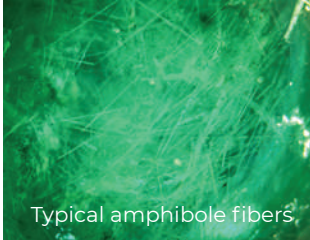
Rough and cut emerald
from Zambia

Zambia is now one of the top 3 largest producer of beautiful deep green emeralds along with Columbia and Brazil. Zambian emeralds were discovered in the 1920's but commercial mining only started in 1976. The main Zambian mine is named the Kagem mine, it is today the world's largest colored gemstone mine with an estimated 25% of worldwide emerald production.

Zambian emeralds have a typical bluish overtone which is due to the presence of iron and commonly have a very high level of purity.

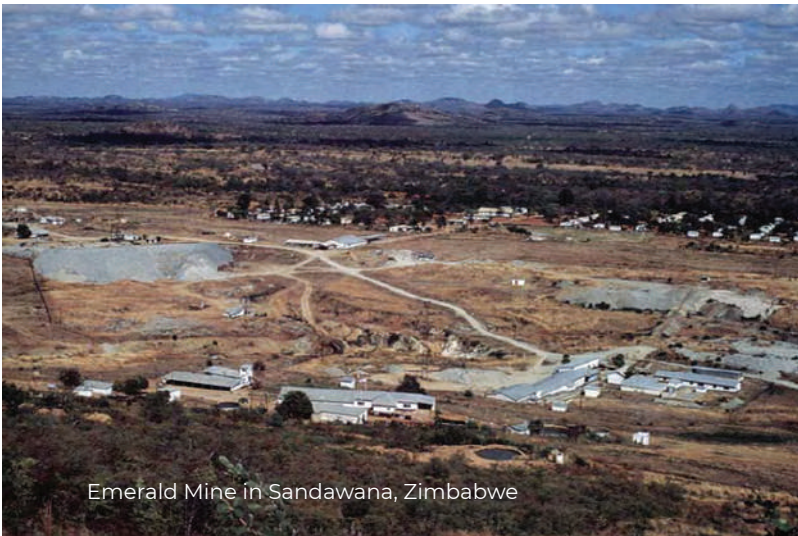


EMERALD ZIMBABWE



Typical amphibole fibers

Photo credit: Sebastian Haensel



Emerald Mine in Sandawana, Zimbabwe

Photo credit: GIA



Photo credit: GIA



Rough and cut emerald
from Zimbabwe

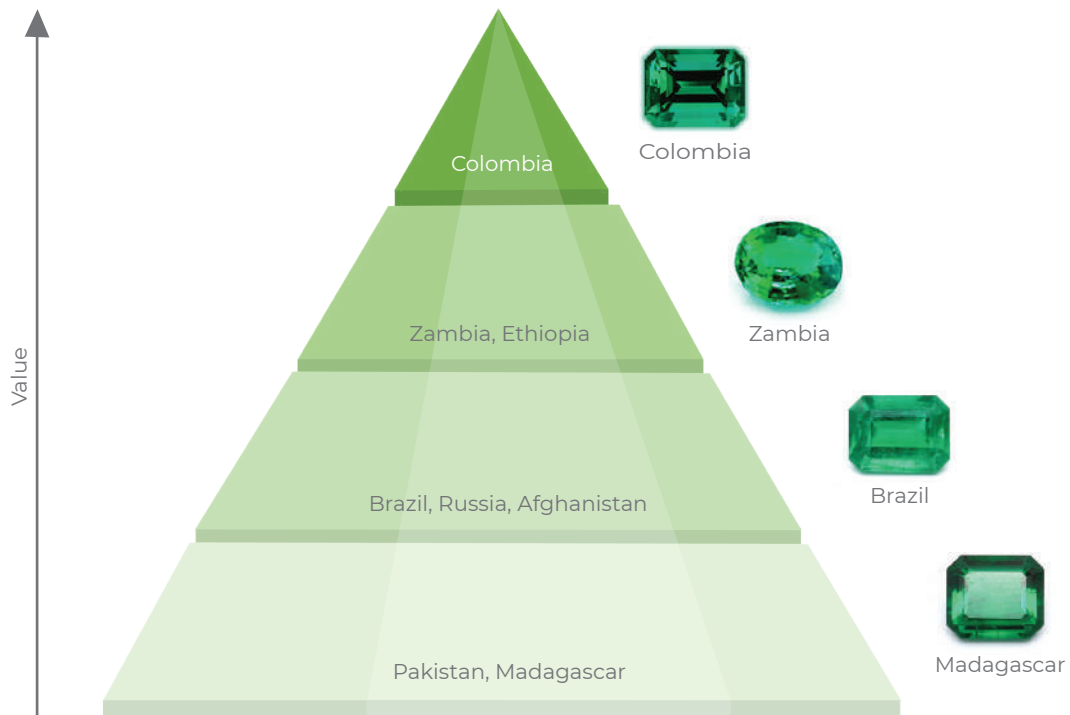
The deposit in Sandawana, Zimbabwe was discovered in 1956 although emeralds from Zimbabwe were already recognized since the 19th century by German geologists. In the beginning it was an open pit mine but after it reached a certain depth it was changed to shaft mining.

Back in the 1970's, some shafts were so rich in emeralds that the area was called the Bank of England. Nowadays there is only a small sporadic production with high quality stones produced occasionally.

Sandawana emeralds are every gemologist's darling as they are very easy to recognize from their typical internal features called 'hair like amphibole fibers inclusions' which are unique for emeralds.



EMERALD HIERARCHICAL OVERVIEW



We tend to associate a product quality with its geographic origin. This is true for most products, including watches and wines, as well as gemstones.

In the case of emeralds, different origins will have different prices even for similar looking emeralds.

Colombian emeralds command premium prices over other origins, which will be priced on a lower price range – even with the quality being similar.



EMERALD

TREATMENTS IN GEMCLOUD
CATALOGUE



EMERALD TREATMENTS



Before treatment



After treatment

Photo credit: edelsteine.at

The treatment of emerald has been known for several hundred years and most of the emeralds in the market are clarity enhanced with oil.

Clarity enhancement is the major treatment process for emerald, and it can be divided into:

- **Oiling:** Most of the emeralds have fissures which can be filled with oil (in a vacuum) to improve the clarity and overall appearance of the stone. This treatment is accepted by the trade and emeralds with oil treatment will still command high prices due to the lack of stones without fissures. This treatment is temporary stable (for several years) and can be repeated after cleaning. The amount of oil can range from insignificant to significant.
- **Artificial Resin:** This treatment is used for emeralds with a lot of cracks and high amount of fissures, not only to enhance the clarity but also to stabilize the gemstone and make it more durable. This treatment is stable and does not require any special care. The amount of resin range from minor to significant.



EMERALD TREATMENTS - IDENTIFICATION

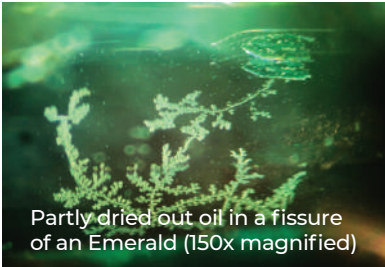


Photo credit: Sebastian Haensel

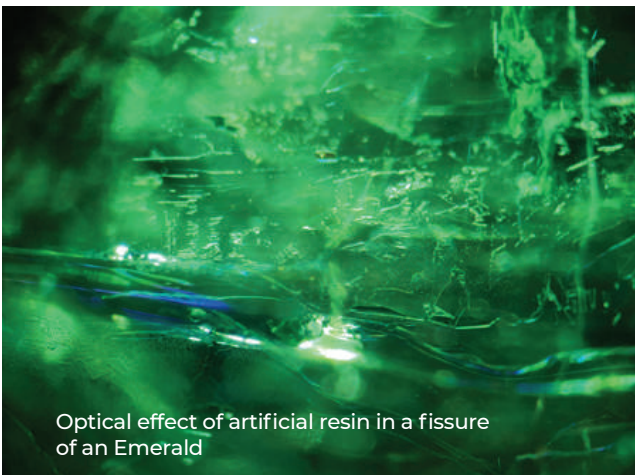


Photo credit: Sebastian Haensel

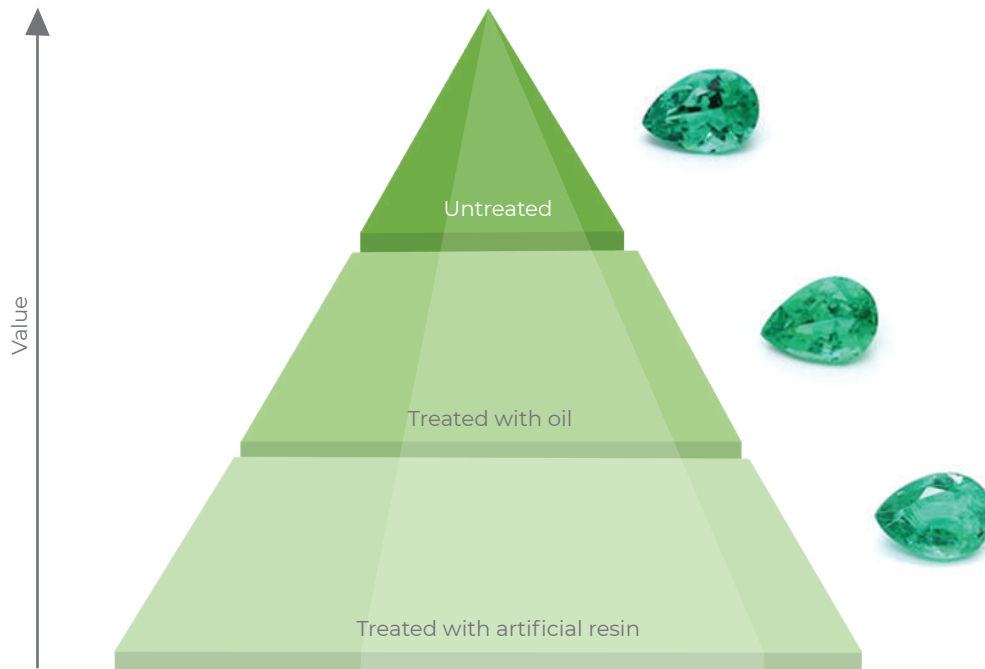
Gemologists identify treatments in emeralds by studying both their internal features and some of their internal characters with advanced machinery (UV-Lamp, FTIR).

Because the material that is filled into the fissures of an emerald has different chemical and physical properties it can be detected by Microscopy and FTIR-Analysis.



EMERALD

ECONOMICAL OVERVIEW



Because an untreated emerald is much rarer than an oiled emerald which is itself rarer than an emerald with artificial resin, 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 emerald the higher will be the price. Below is an example of price comparisons between 3 different emeralds:

- No enhancement emerald of 1 ct: 3,000 USD
- Moderate oil emerald of 1ct: 400 USD
- Significant resin emerald of 1 ct: 200 USD

This price difference between treatments then grow exponentially with the size of the emerald. Note: this is just a basic example shown for guidelines and prices may vary from stone to stone and time to time.



EMERALD COMMUNICATING ABOUT TREATMENTS



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

- Oiling of emeralds is traditional and has been carried out for millennia.
- Oiling of emeralds is very common and well accepted.
- Most emeralds on the market are clarity enhanced.
- This Oil treatment is temporary stable (for several years) and can be repeated after cleaning.
- The term 'enhancement' is usually preferred to 'treatment' as it sounds less negative.
- All of GEMCLOUD emeralds are accompanied with a gemological report.
- All treatments on the portfolio are fully disclosed.

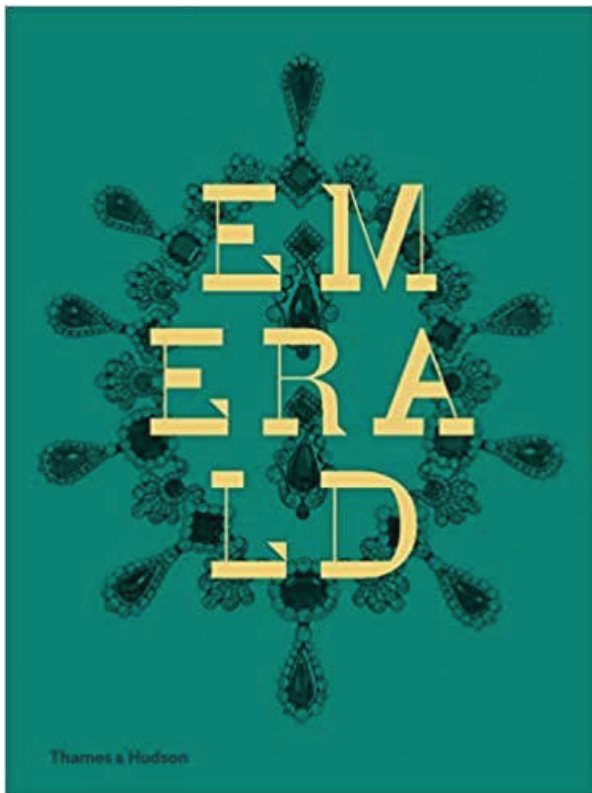


EMERALD LIBRARY



EMERALD

BOOKS ABOUT EMERALDS



Below is some books we advises you to buy if you want to know more about emeralds:

- Emerald by Joanna Hardy – interesting book compiling historical jewelry pieces with emeralds.
- 'Emeralds, A Passionate Guide: The Emeralds, the People, their Secrets' by Ronald Ringsrud.
- Magnificent Green – On the trail of the legendary Colombian emerald by A. Peretti.



EMERALD

ARTICLES – GENERAL INFORMATION

Below is a list of interesting articles with verified information:

General information about emeralds

- <https://www.gia.edu/emerald>
- <https://www.gia.edu/emerald-quality-factor>
- <https://www.gia.edu/gia-faq-grade-emerald>
- <https://www.gia.edu/emerald/buyers-guide>
- <https://www.gia.edu/emerald-description>
- <https://www.gia.edu/gems-gemology/winter-2019-emerald-geographic-origin-determination>
- <https://www.gia.edu/seeing-green>
- <https://gemfields.com/our-mines-assets/kagem/>
- <https://www.gemstone.org/incolor/40/>
- <https://www.gubelin.com/cms/en/gemmology/gemstones/emerald/>



EMERALD

ARTICLES - TREATMENTS

Emerald treatments

- <https://www.gia.edu/gem-treatment>
- <https://www.gia.edu/doc/The-Oil-Treatment-of-Emeralds-in-Bogota-Colombia.pdf>
- https://www.ssef.ch/wp-content/uploads/2018/03/1999_Filler_Identification_Emerald__J_Gemmo_ruduce_file.pdf
- <https://www.emerald-gemstone.com/emerald-treatments/>
- <https://www.gemsociety.org/article/just-ask-jeff-are-all-emeralds-treated-and-what-is-your-opinion/>
- <https://www.jewelers.org/education/gemstone-guide/gemstone-treatments>
- <https://emerald.org.in/emerald/emerald-treatments/>
- <http://www.gahk.org/journal/2019/a11.pdf>



EMERALD

TREATMENT NOMENCLATURE

Emerald treatments – Main laboratories Nomenclatures

- https://www.lmhc-gemmology.org/s/LMHC-Information-Sheet_5_V5_2014.pdf
- <https://www.ssef.ch/emerald/>
- <http://gemresearch.ch/enhancement-disclosure/>
- <https://www.gia.edu/gem-treatment>
- <https://www.gubelingemlab.com/en/news/detail/guebelin-gem-lab-starts-offering-identification-of-filler-type-in-emeralds-127>

