Learning Series: Birthstones – September

Sapphire – The September Birthstone

Background

Sapphire is a variety of the mineral species corundum. When one thinks “sapphire”, the color blue readily comes to mind—in fact, some experts contend the word comes from the Greek “sappheiros” meaning “blue stone”—but sapphires actually occur in all colors of the rainbow, with the exception of red which is technically referred to as ruby. Colors other than blue are referred to as “fancy” colors.

Typically mined from alluvial deposits or from primary underground workings, sapphires can also be found naturally by searching through certain sediments since their level of hardness make them resistant to being eroded like softer stones. Sapphires are common in metamorphic rocks, such as crystalline limestone, mica-schist, gneiss, etc., and can also be found as an original constituent of certain igneous rocks, usually those deficient in silica. In the field, associated minerals are commonly chlorite micas, chrysolite, serpentine, magnetite, spinel, cyanite, and diaspore.

Because of the remarkable hardness of sapphires—and of aluminum oxide in general—sapphires are used in many non-ornamental applications, including infrared optical components such as those in scientific instruments, high-durability windows, wristwatch crystals and movement bearings, and very thin electronic wafers which are used as the insulating substrates of very special-purpose, solid-state electronics, most of which are integrated circuits.

Sapphires exist in various mixtures of primary and secondary hues, tonal levels and saturation, and are evaluated based upon the purity of their primary hue. Trace amounts of elements such as iron, titanium, chromium or vanadium are what give the stones such a wide variety of colors, e.g., iron and titanium result in blue, chromium will produce pinks, iron will create yellow to green, vanadium gives you the rare violet stones and the combination of iron and vanadium will produce orange tones. Further, rutile needle inclusions will result in a silky shine to the stone. If these needles are aligned in the same direction it will cause the six-rayed star sapphire affect.

Composition, Chemical Formula, Colors, and Sources

Composition – Aluminum oxide

Chemical Formula – Al_2O_3

Colors – Blue is by far the most popular color for sapphires, but they can be almost any color, including yellow, green, white, colorless, pink, orange, brown, and purple. The most valuable blue sapphires can be described as vivid, medium-dark violet to purplish-blue where the primary hue is at least 85% blue and the secondary hue no more than 15% of the total. Importantly, any hint of black, gray, or green overtones in the secondary hue will reduce a stone's value. In general, a more pastel blue would be less preferred to a vivid blue, but it would be priced higher than an overly dark blackish-blue color. Padparadscha is the name for a rare orange-pink variety of sapphire which actually has a higher value than even the best blue sapphires. A second rare variety exhibits different colors in different light. A color-change sapphire is usually blue in natural light and violet in artificial light.

Sources – Sapphires were first discovered in Sri Lanka (known then as Ceylon) in the 7th century. As of 2007, Madagascar is the current world leader in fine sapphire production, however, most stones used in ordinary jewelry come from Australia or Thailand because they have the most productive mines and create the most affordable stones. The highly prized stones usually come from Kashmir. Other producers include Afghanistan, Brazil, Cambodia, China, India, Kenya, Myanmar, Nigeria, Pakistan, Tanzania, Vietnam, and the United States (specifically from deposits around Helena, Montana, with a few gem-grade sapphires also coming from Franklin, NC).

Note: It is common practice to heat natural sapphires to enhance color or reduce cloudiness that is caused by rutile inclusions so about 90 percent of all sapphires on the market have been heat-treated. Other methods, such as diffusion treatment, are used as well, but are somewhat more controversial because they add elements to the sapphire for the purpose of improving colors in an attempt to garner higher prices.

Identification

Streak – white
Hardness – 9
Crystal system – hexagonal
Transparency – transparent to translucent
Specific gravity – 3.9 – 4.1
Luster – vitreous, adamantine
Cleavage – none; often conspicuous parting in three directions
Fracture – conchoidal, uneven, brittle
Refractive index – 1.762 - 1.788 +0.08 -0.04
Pleochroism – strongly
Birefringence – 0.008

Folklore, Legend and Healing Properties

Sapphires have long been a favorite among priests and kings, who considered them symbolic of wisdom and purity. However, the stones were also thought to be protective against envy, and even against poisoning. A common belief was that a venomous snake placed in a sapphire vessel would rapidly die!

Ancient civilizations believed that the world was set upon an enormous sapphire which painted the sky blue with its reflection. This legend, as well as the belief that the Ten Commandments were inscribed upon tablets made of sapphire, gives September's birthstone a royal place among gemstones.

Ground to a powder, the blue stone was believed to cure colic, rheumatism and mental illness, and to strengthen eyesight. It opens and heals the thyroid and the throat chakra and has a calming and balancing effect on the nervous system.

Trivia

Sapphire is the gem designated for the 5th, 23rd and 45th wedding anniversary; a star sapphire is typically given on the 65th wedding anniversary.

At 733 carats, the priceless Black Star of Queensland is believed to be the largest star sapphire ever mined. Once thought to be worthless, it was used as a door stop for over a decade.

The Star of India (weighing 563.4 carats) is thought to be the second-largest star sapphire, and it is currently on display at the American Museum of Natural History in New York City, from where it was once stolen by the infamous burglar Jack Murphy, aka Murph the Surf.

The 423-carat Logan Sapphire, an egg-sized, cushion cut stone is displayed in the Smithsonian Museum of Natural History and is the largest faceted sapphire on public display; perhaps the largest blue sapphire known.

Other famous sapphires include the intensely blue 330-carat Star of Asia, the 182-carat Star of Bombay, the 116-carat Midnight Star, and two 104-carat stones—the St. Edward's and the Stuart—both listed among the English Crown Jewels.

Any freshly exposed surface of aluminum is quickly oxidized to corundum, so it can be said that your lawn chair or screen door—or any other aluminum object—is coated with sapphire.

Sources:
http://www.bernardine.com/birthstone/sapphire.htm
http://www.about-birthstones.com/septemberbirthstone.html
http://www.gemsbrokers.org/gemstone/gems_and_gemology/sapphire_myths.htm
http://www.bernardine.com/gemstones/sapphire.htm
http://www.birthstoneofthemonth.com/September-birthstone-Sapphire
http://www.gemaffair.com/content/Sapphire_Jewelry.htm
http://www.gemselect.com/gem-info/sapphire/sapphire-info.php
http://nevada-outback-gems.com/mineral_information/Corrundum_sapphire_mineral_info.htm
http://en.wikipedia.org/wiki/Sapphire
http://www.galleries.com/minerals/gemstone/sapphire/sapphire.htm
http://jewelry-blog.internetstones.com/famous-gemstones/the-black-star-of-queensland-famous-black-sapphire-gemstone