

MAGS EXPLORER



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Gemstones



Amethyst crystals, Mexico Photograph courtesy of The Smithsonian Institution, Reprinted for educational purposes under the "fair use" provision of the U.S. Copyright Act.

MIKE BALDWIN--The MiniMAGS program for April is "Gemstones: From Birthstones to State Stones." Perhaps you already know a lot about gemstones. Perhaps these pages will help you learn a little bit more.

WHAT IS A GEMSTONE?

A **natural gemstone** is a mineral, stone, or organic matter that can be cut and polished or otherwise treated for use as jewelry or other ornament. A **precious gemstone** has beauty, durability, and rarity, whereas a **semiprecious gemstone** has only one or two of these qualities. A **gem** is a gemstone that has been cut and polished.

Diamond, corundum (ruby and sapphire), beryl (emerald and aquamarine), topaz, and opal are generally classed as precious stones. All other gemstones are usually classed as semiprecious.

TERMS RELATED TO GEMSTONES

1. **MINERAL:** A mineral is any naturally formed homogeneous inorganic material.

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2. **MINERALOGIST:** A mineralogist is a person who studies the formation, occurrence, properties, composition, and classification of minerals.
3. **GEMOLOGIST:** A gemologist is a person who has successfully completed recognized courses in gemology (the science and study of gemstones) and has proven skills in identifying and evaluating gem materials.
4. **LAPIDARY:** A lapidary is a cutter, polisher, or engraver of precious stones.

WHERE DO WE FIND GEMSTONES?

Gemstones are not plentiful. Gemstones do not form “ore” deposits in the normal sense. Gems, when present at all, tend to be scattered about in a large body of rock or maybe they have crystallized as small aggregates or fill veins and small cavities.

Even stream gravel concentrations of gemstones tend to be small--a few stones in bedrock cracks and potholes, or in the gravels of a stream bed.

Gemstones occur in most major geologic environments. Each environment tends to have its own set of gem materials, but many kinds of gems occur in more than one environment. Most gemstones are found in igneous rocks and alluvial gravels, but sedimentary and metamorphic rocks may also contain gem materials.

Here are some examples of geologic environments in which gemstones are found:

1. Pegmatite: a coarse-grained intrusive igneous rock body, occurring as dikes (a tabular-shaped body), lenses, or veins in the surrounding rock.
2. Stream gravels (placers): deposits of heavier and more



Quartz with phantoms, Brazil Photograph courtesy of The Smithsonian Institution, Reprinted for educational purposes under the “fair use” provision of the U.S. Copyright Act.

durable than average minerals that have been eroded out of the original rock. Often tourmaline, beryl, and many other gem-quality minerals have eroded out of the original rock in which they formed and have moved and been concentrated locally by water in streams. Sapphires in Judith Basin County, Montana, were first found when the gravels were worked for gold from 1895 to 1930.

3. Metamorphic rocks: rocks that have been altered by great heat, pressure, or both. Garnet, for example, is commonly found as crystals in gneiss and mica schist.

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MINERAL GEMSTONES

Hardness and specific gravity are two of the major characteristics of gemstones. Hardness of a gemstone is its ability to resist being scratched. Hardness may be described by using a standard scale of 10 minerals known as the Mohs scale, developed in 1822.

MOHS' SCALE OF HARDNESS	
Talc = 1	Feldspar = 6
Gypsum = 2	Quartz = 7
Calcite = 3	Topaz = 8
Fluorite = 4	Sapphire = 9
Apatite = 5	Diamond = 10

Specific gravity is the number of times heavier a gemstone of any volume is than an equal volume of water; in other words, it is the ratio of the density of the gemstone to the density of water.

Here are a few highly priced gemstones, valued for their beauty, durability, and rarity.

1. Beryl (hardness: 7.5-8 Mohs)

Beryllium aluminum silicate
 Specific gravity: 2.63-2.91
 Emerald [Intense green or bluish green]; Aquamarine [Greenish blue or light blue]; Morganite [Pink, purple pink, or peach]; Heliodore [Golden yellow to golden green]; Red beryl [Raspberry red]; Goshenite [Colorless, greenish yellow, yellow green, brownish]



Beryl Photograph courtesy of The Mineral Information Institute

2. Chrysoberyl (hardness: 8.5Mohs)

Beryllium aluminum oxide

Specific gravity: 3.68-3.78

Chrysoberyl [transparent yellowish green to greenish yellow and pale brown];

Alexandrite [red in incandescent light and green in daylight];

Cat's eye [usually yellowish or greenish]



Chrysoberyl Photograph courtesy of Auburn University

3. Corundum

(hardness: 9 Mohs)

Aluminum oxide

Specific gravity: 3.96-4.05

Ruby [Intense red];

Sapphire [Blue]



Corundum Photograph courtesy of Auburn University

4. Diamond

(hardness: 10 Mohs)

Carbon

Specific gravity: 3.51

Colorless to faint yellowish tinge, also variable



Diamond Photograph courtesy of Probert Encyclopaedia

5. Feldspar

(hardness: 6-6.5 Mohs)

Two distinctly different alkali aluminosilicates: the Plagioclase and the Alkali Feldspar Series

Specific gravity: 2.55-2.76

Plagioclase Series--Labradorite [Colorful, iridescent, also transparent stones in yellow, orange, red, and green];

Sunstone [Gold spangles from inclusions of hematite];

Peristerite: Blue white iridescence

Alkali Feldspar Group--Orthoclase [Pale yellow, flesh red]; Amazonite [Yellow green to greenish blue]; Moon-



Labradorite from Madagascar

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stone [Colorless; also white to yellowish, and reddish to bluish gray]

6. Garnet (hardness: 6.5-7.5 Mohs)

A group of silicate minerals;

Specific gravity: 3.5-4.3

Almandine [Orangy red to purplish red];

Almandine-spessartine [Reddish orange];

Andradite [Yellowish green to orangy yellow to black]; Demantoid [Green to yellow green andradite]; Topazolite [Yellow to orangy yellow]; Grossular [Colorless; also orange, pink, yellow, and brown]; Tsavorite [Green to yellowish green]; Hessonite [Yellow orange to red]; Pyrope [Colorless; also pink to red]; Chrome pyrope [Orange red]; Pyrope-Almandine [Reddish orange to red purple]; Pyrope-Spessartine [Greenish yellow to purple]; Malaia [Yellowish to reddish orange to brown]; Color-change garnet [Blue green in daylight to purple red in incandescent light]; Rhodolite [Purplish red to red purple]; Spessartine [Yellowish orange]; Uvarovite [Emerald green]

7. Jade (hardness: 6 Mohs)

Nephrite

Calcium magnesium silicate

Specific gravity: 2.9-3.1

White, deep green, creamy brown

8. Jadeite

Sodium aluminum silicate

Specific gravity: 3.1-3.5

White, leafy and blue green, emerald green, lavender, dark blue green and greenish black, deep emerald-green



Garnet Photograph courtesy of Paleoart.com



Jadeite Photograph courtesy of University of Delaware



Peridot Photograph courtesy of Paleoart.com



Quartz Photograph courtesy of Paleoart.com

9. Lapis lazuli (hardness: 5-5.5 Mohs)

A rock composed mainly of the mineral lazurite with variable amounts of pyrite (brassy flecks) and white calcite

Specific gravity: 2.7-2.9

Deep blue, azure blue, greenish blue (bluish color with flecks of white and gold)

10. Opal (hardness: 5.5-6.5 Mohs)

Hydrated silica

Specific gravity: 1.98-2.25

White opal [Opaque, porcelain-like white material; colors resemble flashes or speckles]; Black opal [Flashes and speckles appear against black background]; Water opal [A transparent, colorless opal is the background for brilliant flashes of color]; Fire opal: Reddish or orange opal

11. Peridot [Olivine] (hardness: 7 Mohs)

Magnesium iron silicate

Specific gravity: 3.22-3.45

Olive to lime green

12. Quartz (hardness: 7 Mohs)

Silicon dioxide or silica

Specific gravity: 2.65

Coarsely crystalline varieties of silica-

Rock crystal [Colorless]; Amethyst [Purple]; Citrine [Yellow to amber];

Morion [Black]; Smoky quartz or

cairngorm [smoky gray to brown]; Rose quartz [Translucent pink]; Green quartz or praziolite [Green]

Cryptocrystalline varieties of silica- Chalcedony and Jasper [variable]; Agate; Bull's eye agate, Iris or fire agate, Onyx, Sardonyx. Bloodstone or heliotrope.

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Carnelian. Chrysoprase. Moss agate.
Plasma. Prase. Sard. Jasper.

- 13. **Spinel** (hardness: 8 Mohs)
Magnesium aluminum oxide
Specific gravity: 3.58-4.06
Balas ruby [Red]; Almandine spinel [Purple red]; Rubicelle [Orange]; Sapphire spinel and ghanospinel [Blue]; Chlorspinel [Green]
- 14. **Topaz** (hardness: 8 Mohs)
Aluminum silicate fluoride hydroxide
Specific gravity: 3.5-3.6
Wine yellow, pale blue, green, violet, or red
- 15. **Tourmaline** (hardness: 7-7.5 Mohs)
Complex aluminum borosilicate (Elbaite, Dravite, Uvite)
Specific gravity: 3.03-3.25
Achorite [Colorless]; Brazilian emerald [Green]; Dravite [Brown]; Indicolite



Topaz Photograph courtesy of Paleoart.com



Tourmaline Photograph courtesy of Paleoart.com

[Dark blue]; Rubellite [Pink to red];
Siberite [Violet]; Verdilite [Green]

- 16. **Turquoise** (hardness: 5-6 Mohs)
Hydrous copper aluminum phosphate
Specific gravity: 2.6-2.8
Sky blue; greenish blue

- 17. **Zircon** (hardness: 7.5 Mohs)
Zirconium silicate
Specific gravity: 4.6-4.7
Jargon: Variable
Matura diamond [Colorless]; Hyacinth [Yellow, orange, red, brown]

Information for this article gathered from USGS: *Natural Gemstones: Key Terminology*; <http://pubs.usgs.gov/gip/gemstones/terms.html> Maintained by John Watson and Kathie Watson; Last modified 06-18-97 (jmw). Reprinted for educational purposes under the "fair use" provision of the United States Copyright Act of 1976.



Zircon Photograph courtesy of Paleoart.com

SPECIMEN OF THE MONTH

CALCITE

Calcite can be clear to creamy; or pale red, yellow, pink or blue. Turn the page and cut out the Calcite Specimen Card for your collection.



Birthstones

Month of birth	Gemstone	Color
January	Garnet	Dark red
February	Amethyst (Quartz)	Purple
March	Aquamarine (Beryl) or Bloodstone (Quartz)	Pale blue
April	Diamond or Rock Crystal (Quartz)	Colorless
May	Emerald (Beryl) or Chrysoprase (Quartz)	Bright green Pale green
June	Pearl or Moonstone (Feldspar)	Cream
July	Ruby (Corundum) or Carnelian (Quartz)	Red
August	Peridot or Sardonyx (Quartz)	Pale green Brown and white
September	Sapphire (Corundum) or Lapis Lazuli	Pale to dark blue Deep blue
October	Opal or Tourmaline	Variiegated
November	Topaz or Citrine (Quartz)	Yellow
December	Turquoise	Sky blue



Aquamarine, Brazil
 Photograph courtesy of The Smithsonian Institution, Reprinted for educational purposes under the "fair use" provision of the U.S. Copyright Act.

NOTES FROM THE MEETING

Name: Calcite CaCO₂
 Hardness: 3
 Streak: white
 Crystals: faceted
 Color: clear to creamy; or pale red, yellow, pink or blue
 location: Magnet Cove, AR

1. What is the name of the April Specimen-of-the-Month?

2. Cut out the specimen card and put it with your mineral specimen.
3. What is your birthstone? Write down a few things about it.

4. April MAGS Field Trip will be April 12 to Mississippi gravel mines of Memphis Stone & Gravel. Sign up tonight!

This is your newsletter. Put your name on it, and take it home with you.

Your Name _____

