# Earth & Space Science
# Geology Kit Information Sheet

| Mineral | *Source Location* | *Chemical Formula* | *Hardness* | *Color* | *Streak* | *Cleavage / Fracture* | *Uses* |
|---|---|---|---|---|---|---|---|
| ***A.*** **Calcite** | Chihuahua, Mexico | $CaCO_3$ | 3 | Commonly white, many other colors | White | Good in 3 directions; forms rhomboids | Cement; acid neutralizer; abrasives |
| ***B.*** **Biotite mica** | Ontario, Canada | $K(Mg,Fe)_{2-3}Al_{1-2}Si_{2-3}O_{10}(OH,F)_2$ | 2-2.5 | Black, brown; transparent in thin sheets | Brown | Perfect in 1 direction | Filler in paints; drilling mud |
| ***C.*** **Quartz** | Brazil | $SiO_2$ | 7 | Clear, white or a range of colors (gray, pink, purple, etc.) | Colorless | Conchoidal fracture | Gemstones; glass production; foundry sand |
| ***D.*** **Fluorite** | Coahuila, Mexico | $CaF_2$ | 4 | Green, purple, blue, yellow, white | White | Good in 4 directions | Hydrofluoric acid; metallurgy |
| ***E.*** **Iron pyrite** | Chihuahua, Mexico | FeS | 6.5-7 | Brassy | Dark gray | Perfect in 3 dimensions; forms cubes | Sulfuric acid production |
| ***F.*** **Potassium feldspar** | India | $KAlSi_3O_8$ | 6 | White, light pink, orange | White | Good in 2 directions | Glass and ceramics |
| ***G.*** **Magnetite** | Utah, USA | $Fe_3O_4$ | 5-6.5 | Dark gray, black, somewhat metallic | Gray-black | Fracture | Principal iron ore |
| ***H.*** **Gypsum (selenite)** | Utah, USA | $CaSO_4{\cdot}2H_2O$ | 2 | White, yellowish, clear | White | Excellent in 3 directions | Drywall, plaster, agricultural uses |
| ***I.*** **Halite** | Pakistan | NaCl | 2.5 | White, clear, other colors with impurities | White | Excellent in 3 directions | Ice melt, food seasoning |
| ***J.*** **Muscovite mica** | Colorado, USA | $KAl_2(Si_3AlO_{10})(OH)_2$ | 2-2.5 | Brown to silvery; transparent in thin sheets | White | Perfect in 1 directions | Filler in paint; cosmetics; rubber; drilling mud |

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| ***K.*** **Chert** | Oklahoma, USA | $SiO_2$ | 7 | Cream, tan, gray, or black | White | Fracture | Jewelry; historically used to make tools (arrowheads, spears, etc.) |
| ***L.*** **Fluorite** | Coahuila, Mexico | $CaF_2$ | 4 | Green, purple, blue, yellow, white | White | Good in 4 directions | Hydrofluoric acid; metallurgy |
| ***M.*** **Hematite** | India | $Fe_2O_3$ | 5-6.5 | Red, gray, tan, black; earthy to metallic | Brick red | Fracture | Principal iron ore; can be attracted to a magnet |
| ***N.*** **Plagioclase feldspar** | India | $NaAlSi_3O_8$ – $CaAl_2Si_2O_8$ | 6-6.5 | White, pink, orange, gray | White | Fair in 2 directions | Building stone; gemstones |
| ***O.*** **Olivine** | Pakistan | $(Mg, Fe)Si_2O_4$ | 6.5-7 | Yellow, green | White | Cleavage | Refractory material. Jewelry for good-clarity specimens |

| Rock Specimen | *Source Location* | *Geologic System* | *Description & Major Minerals* | *Uses* |
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| ***1.*** **Basalt** | Virginia, USA | Triassic | Dense gray to black, fine-grained texture. Minerals are pyroxene, plagioclase, olivine | Building and construction, crushed aggregate |
| ***2.*** **Diorite** | North Carolina, USA | Pennsylvanian / Permian | Gray or black/white speckled, coarse-grained texture. Plagioclase feldspars, micas, amphibole and/or pyroxene, little/no quartz | Building and construction, crushed aggregate |
| ***3.*** **Granite** | North Carolina, USA | Pennsylvanian / Permian | White, gray, or pink, coarse-grained texture. Minerals may include quartz, potassium and/or plagioclase feldspars, micas, and hornblende | Building and construction, crushed aggregate, sculpture |
| ***4.*** **Obsidian** | Mexico | Quaternary | Black, shiny, and generally opaque; glassy texture with conchoidal fracture. Primarily $SiO_2$ and other materials in non-crystalline form | Jewelry, sharpened for tools and weapons, precision scalpels |
| ***5.*** **Pumice** | Peru | Quaternary | Light-colored with many holes (vesicular texture). Quartz, potassium and/or plagioclase feldspars, micas | Abrasives |
| **6. Rhyolite (tan)** | Colorado, USA | Tertiary | Light-colored and sometimes banded appearance; fine-grained texture. Quartz, potassium and/or plagioclase feldspars, micas | Crushed aggregate, building stone |
| ***7.*** **Shale** | Virginia, USA | Ordovician | Wide range of colors including tan, gray, black, red, and green. Fine-grained clay particles and smooth texture | Crushed and decorative rock; cement production; source of clay minerals and occasionally pigments |
| ***8.*** **Limestone** | Virginia, USA | Ordovician | Cream-colored, tan, gray or black; calcite-rich matrix. May contain fossils. *Effervesces with weak acid* | Concrete production; crushed rock and building materials; acid neutralizer; calcium supplement |
| **9. Sandstone** | Tennessee, USA | Pennsylvanian | Tan, white, brown, or red. Quartz sand grains dominate, may also include feldspar and mica. Cement is commonly clay, hematite, or silica | Crushed stone or building materials (pavers, façade, etc.); source of silica |
| ***10.*** **Conglomerate** | Virginia, USA | Cambrian | Rounded rock fragments, pebbles, and sand | Few uses; building and crushed stone if the rock is well-cemented |

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| ***11.*** **Bituminous coal** | Pennsylvania, USA | Mississippian | Black, brittle rock made from altered plant material. Can be burned | Fuel source for electricity generation, metallurgy, and cement production |
| ***12.*** **Siltstone** | Virginia, USA | Triassic | Silt-sized particles with a fine- to gritty texture; red color comes from hematite | Crushed and decorative rock |
| ***13.*** **Gneiss** | North Carolina, USA | Cambrian | Micas, feldspars, and other minerals; may have a banded appearance | Building and decorative stone; crushed rock. |
| ***14.*** **Slate** | Virginia, USA | Ordovician | Fine-grained and splits along flat surfaces. Rock began as clay, shale, siltstone, or mudstone | Roofing tiles and classic blackboards; decorative and crushed stone |
| ***15.*** **Marble** | Virginia, USA | Precambrian / Cambrian | Coarse-grained crystals of calcite. Rock began as limestone or dolostone. *Effervesces with weak acid* | Building and sculpture materials; crushed stone; acid neutralizer; calcium supplement |
| ***16.*** **Quartzite** | Colorado, USA | Ordovician | Welded and regrown sand grains; frequently white, may also be tan, cream, or pink | Building and decorative stone. |
| ***17.*** **Schist** | North Carolina, USA | Precambrian / Cambrian | Visible mica minerals with a glittery and layered / banded appearance | Building and construction stone; source of mica and other minerals (e.g., garnet) |
| ***18.*** **Phyllite** | Virginia, USA | Precambrian / Cambrian | Gray or dull shine; may have wavy surfaces | Few uses (the rock is usually weak); crushed rock |

| Fossil | *Source Location* | *Geologic System* | *Kingdom* | *Phylum / Division* | *Environment and Life Habit* |
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| ***a.*** **Clam** | Morocco | Eocene | Animalia | Mollusca | Clams have two shells of equal but mirrored shapes (unlike brachiopods) and filter-feed on the ocean floor. |
| ***b.*** **Gastropod** | Morocco | Triassic | Animalia | Mollusca | Snails are herbivorous or carnivorous, and create a coiled shell for protection |
| ***c.*** ***Goniatites*** | Morocco | Devonian | Animalia | Mollusca | *Goniatites* is a genus of nautiloid, a group of cephalopod mollusks similar to squid and octopuses, but having a long, conical shell |
| ***d.*** **Shark teeth** | Morocco | Eocene | Animalia | Chordata | Sand sharks are near-shore ocean predators and shed their teeth regularly |
| ***e.*** **Petrified wood** | Madagascar | Paleocene | Plantae | Angiosperm | Hardwood plants mineralized by silica. The red tint comes from traces of hematite |
| ***f.*** **Crinoid stems** | Morocco | Permian | Animalia | Echinodermata | Animal with a long stalk (your fossil), on top of which was the body with mouth many arms to filter-feed. Few alive today. |
| ***g.*** **Trilobite** | Morocco | Devonian | Animalia | Arthropoda | Animal with jointed exoskeleton; trilobite bodies are divided front-to-back with a head, thorax, and pygidium. All are extinct today |
| ***h.*** **Brachiopod** | Morocco | Devonian | Animalia | Brachiopoda | Brachiopods have two unequally sized shells (unlike clams) and filter-feed |