## MINERAL IDENTIFICATION KEY

| Minerals with Metallic Luster | | | | | |
|---|---|---|---|---|---|
| **Hardness** | **Streak** | **Cleavage** | **Specific Gravity** | **Other Properties** | **Mineral Chemical Composition** |
| 1 - 5.5 | Yellowish-brown | None | 3.5 - 4 | Massive, coatings, botryoidal crusts, earthy masses. Yellow, brown, black color. | Limonite Hydrous iron oxides |
| 2.5 | Dark gray | None. Conchoidal fracture. | 5.7 | Massive. Crystals are rare. Steel-gray to black color. | Chalcocite $Cu_2S$ |
| 2.5 | Gray to gray-black | Three perfect at right angles | 7.6 | Cubic crystals. Lead-gray color | Galena PbS |
| 2.5 - 3 | Copper | None | 9 | Massive. Copper color but commonly stained green. Malleable. | Copper Cu |
| 3.5 - 4 | Dark green to black | None. Uneven fracture. | 4.2 | Massive or granular. Golden yellow to brassy yellow color. | Chalcopyrite $CuFeS_2$ |
| 3.5 - 4 | White to yellowish-brown | Perfect in six directions | 4 | Fine to coarse granular masses. Tetrahedron shaped crystals. Yellowish-brown to black color. Resinous luster. | Sphalerite ZnS |
| 5 - 6 | Reddish-brown | None. Uneven fracture. | 5 | Massive, granular. Reddish-brown, gray to black color. Can have metallic luster or earthy red color. | Hematite $Fe_2O_3$ |
| 5.5 | Dark brown | None. Uneven fracture. | 4.6 | Massive or granular. Golden yellow to brassy yellow color. | Chromite $FeCr_2O_4$ |
| 5.5 - 6 | Brown-reddish | None. Uneven fracture. | 4.7 | Massive or irregular grains. Iron-black color. | Ilmenite $FeTiO_3$ |
| 5.5 - 6.5 | Black | None. Uneven fracture. | 5 | Massive, granular. Crystals have octahedral shape. ***Strongly magnetic***. Black color. | Magnetite $Fe_3O_4$ |
| 6 - 6.5 | Greenish-black | None. Uneven fracture. | 5.2 | Cubic crystals with striated faces. Massive. Pale brass-yellow color, darker if tarnished. | Pyrite $FeS_2$ |

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| 6 - 6.5 | Brownish | Good in one direction. Conchoidal fracture in other directions. | 4.2 | Slender, prismatic crystals or granular masses. Reddish-brown (common) or black (rare) color. Adamantine luster. | Rutile $TiO_2$ |
| **Minerals with Nonmetallic Luster** | | | | | |
| 1 | White to greenish | One, perfect | 2.6 - 2.8 | Small scales, compact masses. Feels slippery. White to greenish color. Pearly luster. | Talc $Mg_3Si_4O_{10}(OH)_2$ |
| 1 - 2 | Black | One, perfect | 2.2 | Scaly masses. Forms slippery flakes. Black color. Metallic to dull luster. | Graphite C |
| 2 | Colorless | One, perfect | 2.3 | Elongate or tabular crystals. Fibrous and earth masses. Colorless. Vitreous to pearly luster. | Gypsum $CaSO_4 \cdot 2H_2O$ |
| 2 - 2.5 | Colorless | One perfect, parallel to flakes | 2.6 - 2.9 | Flaky masses of minute scales. Light to dark green color. Greasy luster | Chlorite $(Mg,Fe)_5(Al,Fe)_2Si_3O_{10}(OH)_8$ |
| 2 - 2.5 | White | One, perfect | 2.6 | Soft, earth masses. Submicroscopic crystals. White, yellowish color. Plastic when wet. Emits clayey odor. Dull luster | Kaolinite $Al_2Si_2O_5(OH)_4$ |
| 2 - 2.5 | Colorless | One, perfect | 2.7 | Thin flakes. Colorless, pale green or brown color | Muscovite $KAl_3Si_3O_{10}(OH)_2$ |
| 2.5 | Colorless | Perfect to give cubes | 2.2 | Cubic. Colorless. Tastes salty | Halite NaCl |
| 2.5 - 3 | Black | One, perfect | 2.8 - 3.2 | Irregular masses of flakes. Black, brown, dark green color. | Biotite $K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$ |
| 2.5 - 5 | White | One, perfect | 2.2 - 2.6 | Platy or fibrous. Light to dark green. Smooth, greasy feel. | Serpentine $Mg_3Si_2O_5(OH)_4$ |
| 3 | Colorless | Three perfect, give a rhomb-shaped fragment | 2.7 | Rhomb-shaped crystals and granular masses. Colorless or white. Effervesces with dilute HCl | Calcite $CaCO_3$ |

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| 3.5 | Colorless | Three perfect, give a rhomb-shaped fragment | 2.8 | Rhomb-shaped crystals and granular masses. White or gray color. Pearly luster. Similar to calcite but does not effervesce in cold, dilute HCl unless powdered. | Dolomite $CaMg(CO_3)_2$ |
| 4 | Colorless | Perfect in four directions | 3.2 | Cubic crystals and granular masses. Colorless, bluish green. | Fluorite $CaF_2$ |
| 4.5 | White | One perfect, one imperfect | 3.6 | Bladed crystals. Blue, white, gray color. | Kyanite $Al_2SiO_5$ |
| 5 | White | Poor. One direction | 3.2 | Perfect six-sided crystals and granular masses. Green, brown, blue, or white color. | Apatite $Ca_5(PO_4)_3(OH,F,Cl)$ |
| 5 - 6 | Green, greenish-black | Two, perfect, nearly at right angles | 3.2 - 3.9 | 8-sided stubby crystals and granular masses. Dark green to black. Distinguished from hornblende on the basis of the nearly right-angle cleavage. | Augite $Ca(Mg,Fe)Si_2O_6$ |
| 5 - 6 | Green, greenish-black | Two, intersecting at 56° and 124° | 2.9 - 3.8 | Long, six-sided crystals, fibers, irregular grains. Dark green to black. Distinguished from augite on the basis of the different cleavage | Hornblende Complex |
| 6 | White | Two perfect at right angles | 2.6 | Prism-shaped crystals and granular masses. Flesh-colored, pink, white, or gray color | Orthoclase $KAlSi_3O_8$ |
| 6 - 6.5 | White | Two perfect, not quite at right angles | 2.6 - 2.7 | Tabular crystals and irregular grains. White to dark gray. Cleavage planes may show fine parallel striations. | Plagioclase $NaAlSi_3O_8$ to $CaAl_2Si_2O_8$ |
| 6 - 7 | None | One perfect, one poor | 3.4 | Small elongate crystals. Fibrous. Yellowish-green to dark green color. | Epidote Complex |
| 6 - 7 | None | Breaks irregularly | 3.2 | Long, needle-like crystals and fibers. White or gray in color | Sillimanite $Al_2SiO_5$ |
| 6.5 - 7 | None | None. Conchoidal fracture | 3.2 - 4.3 | Small grains and granular masses. Olive green to yellowish-green color. | Olivine $(Mg,Fe)_2SiO_4$ |

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| 6.5 - 7 | None | None. Uneven fracture | 3.5 - 4.3 | Perfect crystals with 12 or 24 sides and granular masses. Red, brown, yellowish-green, black color | Garnet Complex |
| 7 | None | None. Conchoidal fracture | 2.6 | 6-sided crystals and granular masses. Colorless, white, gray but may have any color depending on impurities. Vitreous to greasy luster. | Quartz $SiO_2$ |
| 7 - 7.5 | None | None | 3 - 3.3 | Elongate crystals commonly with triangular cross section. Black, brown, red, pink, green, blue, and yellow color. | Tourmaline Complex |
| 7.5 | None | Weak, parallel to length of crystal | 3.2 | Long crystals, often square in cross-section. Often flesh-colored. | Andalusite $Al_2SiO_5$ |
| 9 | None | Poor | 4 | Hexagonal crystals common. Gray to brown color. | Corundum $Al_2O_3$ |