

## Mineral Identification Chart - LECTURE

**NONMETALLIC MINERALS (listed in decreasing hardness)** Review mineral formula to connect to family! H=Hardness; SG = specific gravity

Mineral	H	SG	Streak	Color (and/or luster)	Form	Cleavage/Fracture	Distinctive properties
<b>Garnet</b> $X_3Y_2(SiO_4)_3$ where X and Y are combinations of Ca, Mg, Fe, Al	7	3.5-4.3	White	Red, black, or brown; can be yellow, green, pink. Glassy. Translucent.	Dodecahedrons (12-sided polygons)	No cleavage. Brittle. Conchoidal fracture.	Dodecahedron form, red, glassy, conchoidal fracture, H=7.
<b>Olivine</b> $(Mg,Fe)_2SiO_4$	7	3.3-3.4	White	Pale or dark olive green to yellow or brown. Glassy. Transparent.	Short prisms (usually too small to see).	Conchoidal fracture. Brittle.	Green, conchoidal fracture, glassy, H=7. Usually granular.
<b>Quartz</b> $SiO_2$	7	2.7	White	Colorless, white, or gray; can occur in all colors. Glassy and/or greasy.	Massive; or hexagonal prisms that end in a point.	Conchoidal fracture.	Glassy, conchoidal fracture, H=7. Hex. prism with point end.
<b>Plagioclase Feldspar</b> family: Anorthite and Labradorite $CaAl_2Si_2O_8$ to Oligoclase and Albite $NaAlSi_3O_8$	6	2.6-2.8	White	Colorless, white, gray, or black; can have iridescent play of color from within. Translucent to opaque.	Tabular crystals or thin needles	2 good cleavage planes at nearly right angles.	Twinning. 2 cleavages at 90°.
<b>Potassium Feldspar</b> family: Orthoclase and Microcline $KAlSi_3O_8$	6	2.5-2.6	White	Pink. Or white, orange, brown, gray, green. Translucent to opaque.	Tabular crystals	2 good cleavage planes at nearly right angles.	Subparallel exsolution lamellae. 2 cleavages at 90°. Pink color.
<b>Pyroxene</b> family: Augite $Ca(Mg,Fe,Al)(Al,Si)O_6$	5.5-6	3.2-3.5	White, pale grey	Green to black; opaque.	Short, 8-sided prisms (if visible).	2 good cleavage planes at nearly right angles.	H=5.5. Dark green or black. 2 cleavages at 90°. (Looks like HB.)
Amphibole family: <b>Hornblende</b> $Ca(Mg,Fe)_4Al(Si_7Al)O_{22}(OH)_2$	5.5	3-3.3	Grey-green, white	Dark green to black. Opaque.	Long, perfect prisms.	2 cleavages planes. Angles: 60° and 120°. Brittle. Splintery fracture.	H=5.5. Dark green or black. 2 cleavages at 60° & 120°. Splintery fracture. Long prisms.
<b>Serpentine</b> $Mg_6Si_4O_{10}(OH)_8$	2-5	2.2-2.6	White	Pale or dark green, yellow, grey. Opaque. Dull or silky.	Smooth, rounded masses.	No cleavage.	Mottled green color. Smooth, curved surfaces.
<b>Fluorite</b> $CaF_2$	4	3-3.3	White	Colorless, purple, blue, grey, green, or yellow. Glassy. Opaque to transparent. Rainbow luster in places.	Usually cubes or octahedrons.	4 excellent cleavage directions. Gives crystal shape triangular faces. Brittle.	Cubic or octahedral form. 4 directions of cleavage. Triangular faces. Rainbow luster in places.

Mineral	H	SG	Streak	Color (and/or luster)	Form	Cleavage/Fracture	Distinctive properties
<b>Calcite</b> $\text{CaCO}_3$	3	2.7	White	Usually colorless, white, or yellow, can be green, brown, or pink. Glassy. Opaque to transparent.	Rhombohedrons.	3 excellent cleavage planes. Angles: $< 90^\circ$ and $> 90^\circ$ .	Bubbles in HCL. Double refraction (2 images visible through clear sample). Rhombs, 3 cleavage planes (not $90^\circ$ ), $H=3$ .
Mica family: <b>Biotite</b> $\text{K}(\text{Mg,Fe})_3\text{AlSi}_3\text{O}_{10}(\text{OH})_2$	2.5-3	2.7-3.1	Grey-brown	Black, green-black, brown-black. Transparent to opaque.	Short tablets. Like a tablet of paper.	1 excellent cleavage – splits easily into thin, flexible sheets.	1 flexible cleavage plane (sheet), dark colored; brown streak.
Mica family: <b>Muscovite</b> $\text{KAl}_3\text{Si}_3\text{O}_{10}(\text{OH})_2$	2-2.5	2.7-3	White	Colorless, yellow, brown, or red-brown. Transparent to opaque.	Short tablets. Like a tablet of paper.	1 excellent cleavage – splits easily into thin, flexible sheets.	1 flexible cleavage plane (sheet), light colored; white streak.
<b>Halite</b> $\text{NaCl}$	2.5	2.1-2.6	White	Colorless, white, yellow, blue, brown, or red. Glassy.	Cubes.	Brittle. 3 excellent cleavage planes: cubes.	Salty taste. $H=2.5$ . Cubic form and cleavage.
<b>Gypsum</b> $\text{CaSO}_4 \cdot 2(\text{H}_2\text{O})$	2	2.3	White	Colorless, white, or grey. Translucent to transparent.	Tabular, prisms, blades, or needles.	1 good cleavage plane.	$H=2$ . 1 cleavage plane. Translucent.
<b>Talc</b> $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$	1	2.7-2.8	White	White, grey, pale green, or brown. Opaque. Greasy or silky luster.	Shapeless masses (if no cleavage visible) or tabular.	1 poor cleavage plane (may not be visible).	Feels greasy or soapy. $H=1$ . Opaque.

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Mineral	H	SG	Streak	Color	Form	Cleavage/Fracture	Distinctive properties
<b>Pyrite</b> $\text{FeS}_2$	6-6.5	5	Dark grey	Brass yellow; tarnishes brown.	Cubes or octahedrons	Brittle. No cleavage.	Cubic form, brassy color, and $SG=5$ .
<b>Magnetite</b> $\text{Fe}_3\text{O}_4$	6	5.2	Dark grey	Silvery grey to black. Tarnishes grey. Opaque.	Octahedrons	No cleavage.	Attracted to a magnet. $SG=5.2$ . No cleavage.
<b>Hematite</b> $\text{Fe}_2\text{O}_3$	1.5-6	2.1-2.6	Red to red-brown	Silvery grey, black, or brick red. Luster can also be nonmetallic.	Thin tabular crystals or shapeless masses.	No cleavage.	Red streak. Metallic + nonmetallic. Earthy red.
<b>Galena</b> $\text{PbS}$	2.5	7.6	Grey to dark grey	Silvery grey. Tarnishes dull grey.	Cubes and octahedrons	Brittle. 3 good cleavage planes (cubes).	$SG=8$ . Dense! Silver cubes (form and cleavage).
<b>Graphite</b> $\text{C}$	1	2.1-2.3	Dark grey	Silvery grey to black.	Flakes, short hexagonal prisms, and masses.	1 excellent cleavage plane.	Dark grey. $H=1$ . Greasy. Dark grey streak.