
Name

Section

Physical Geology
MINERAL IDENTIFICATION TABLES

Introduction

The following are mineral identification tables. Note that there are three types of mineral tables:

TABLE 1. METALLIC LUSTER

TABLE 2. NONMETALLIC LUSTER WITH DARK COLOR

TABLE 2a. HARDNESS < 2.5

TABLE 2b. 2.5 < HARDNESS < 5.5

TABLE 2c. HARDNESS > 5.5

TABLE 3. NONMETALLIC LUSTER WITH LIGHT COLOR

TABLE 3a. HARDNESS < 2.5

TABLE 3b. 2.5 < HARDNESS < 5.5

TABLE 3c. HARDNESS > 5.5

Take some time to look through these tables and familiarize yourself with them. Then use the tables to answer the questions related to some common minerals. Questions in Part I ask you to identify a mineral when given some of its physical properties. In Part II, you are given a mineral and are asked a question about its physical properties.

NOTE: Next week in lab you will be using these tables to identify common mineral specimens.

TABLE 1. METALLIC LUSTER

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Hematite	Reddish to Yellow- Brown to Black	Reddish Brown	Variable	5.2	Fracture	Fe ₂ O ₃ Distinctive streak
Galena	Blue-Black to Lead-Gray	Gray-Black	2.5	7.6	Perfect Cubic Cleavage	PbS Distinctive Perfect Cubic Cleavage; High Density; Bright Metallic Luster
Limonite	Yellow-Brown to Black	Yellow to Orange-Brown	1 to 5	4.4	Fracture	Fe ₂ O ₃ · H ₂ O Usually occurs in earthy masses; crystals rare
Chalcopyrite	Golden Yellow; may tarnish purple	Black to Greenish Black	4	4.2	Fracture	CuFeS ₂ Usually forms massive aggregates. Distinguished from pyrite by color, hardness, and does not form cubic crystals
Sphalerite	Yellow, Dark Brown to Black	Pale Yellow to Yellow-Brown	4	4.0	Perfect cleavage may be visible in several directions	ZnS Pale streak diagnostic; brilliant luster on fresh cleavage surface
Pyrite	Brass Yellow	Black to Greenish Black	6	5.0	Fracture	FeS ₂ Often forms cubic crystals w/striated faces
Magnetite	Black	Black	6	5.2	Fracture	Fe ₃ O ₄ Strongly magnetic
Bornite	Brownish Bronze to Purple	Grayish Black	3	5.0	Uneven to Conchoidal Fracture	Cu ₅ FeS ₄ Metallic copper ore; tarnishes variegated purple-blue
Graphite	Steel Gray	Gray to Black	1 to 2	2	1 Perfect Cleavage	C - Polymorphous w / Diamond Greasy feel; soft; smudges fingers

TABLE 2A. NONMETALLIC LUSTER - DARK COLOR with HARDNESS < 2.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Hematite	Yellow-brown to Black; Red	Reddish Brown	Variable	5.2	Fracture	Fe ₂ O ₃ Distinctive red-brown streak
Graphite	Iron-Black to Steel Gray	Gray to Black	1 to 2	2	1 Perfect Cleavage	C - Polymorphous w / Diamond Greasy feel; soft; smudges fingers
Limonite	Yellow to Orange-Brown	Yellow to Orange-Brown	1 to 5	4.4	Irregular Fracture	Fe ₂ O ₃ · H ₂ O Distinctive orange-brown streak. Usually occurs in earthy masses; crystals rare
Chlorite	Green to Dark Green	Greenish Black	2 to 2.5	2.5 to 3.5	1 Perfect Cleavage	Fe, Mg, Al phyllosilicate Commonly occurs in small foliated masses

TABLE 2B. NONMETALLIC LUSTER - DARK COLOR with HARDNESS > 2.5 to < 5.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Biotite	Black to Dark Brown	None	2.5 to 3	2.5 to 3.5	1 Perfect Cleavage	K, Fe, Mg, Al phyllosilicate Can be cleaved into thin elastic plates
Sphalerite	Yellow, Dark Brown to Black	Pale Yellow to Yellow-Brown	4	4.0	Perfect cleavage may be visible in several directions	ZnS Pale streak diagnostic; brilliant luster on fresh cleavage surface

TABLE 2C. NONMETALLIC LUSTER - DARK COLOR with HARDNESS > 5.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Pyroxene	Dark Green to Black	None	6	3.5	2 Cleavage directions at about 90°	Ca, Mg, Fe single chain inosilicate Commonly occurs in short prismatic crystals; cleavage distinguishes from amphibole
Amphibole	Dark Green, Brown, or Black	None	6	3.0 to 3.5	2 Cleavage directions at 60° & 120°	Na, Ca, Mg, Fe double chain inosilicate Commonly occurs in long prismatic crystals; cleavage distinguishes from pyroxene
Olivine	Olive Green	None	6.5 to 7.0	3.5 to 4.5	Conchoidal Fracture	Fe, Mg nesosilicate Aggregates of small round glassy grains or granular masses
Tourmaline	Variable Black, Brown common; Red, Green, Blue	None	7	3.0 to 3.3	Uneven to Conchoidal Fracture	$\text{NaMg}_3\text{Al}_6\text{B}_3\text{Si}_6\text{O}_{27}[\text{OH}, \text{F}]_4$ Crystals short to long prismatic, vertically striated; 3, 6, or 9 sides; translucent to opaque
Garnet	Red, Brown, Green, and Colorless	None	7.5	3.5 to 4.5	Conchoidal Fracture	Fe, Mg, Ca, Al nesosilicate Commonly occurs in 12 - to 24 -sided crystals
Corundum	Variable Brown, Gray, Green, Pink, Red, Blue	None	9	4.0	May show some cleavage	Al_2O_3 Hardness is diagnostic Usually, rudely crystallized or massive

TABLE 3A. NONMETALLIC LUSTER - LIGHT COLOR with HARDNESS < 2.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Sulfur	Bright Yellow	Yellow	2.5	2	Uneven to Conchoidal Fracture	S Brittle; characteristic odor; Twinning on some samples
Talc	Green to White	White	1	2.8	1 Perfect Cleavage	Mg phyllosilicate Soapy feel; pearl-like luster
Gypsum	White to Colorless	White	2	2.3	1 Perfect Cleavage 2 Other Poor Cleavages	CaSO ₄ · 2H ₂ O May form colorless crystals or white aggregate masses

TABLE 3B. NONMETALLIC LUSTER - LIGHT COLOR with HARDNESS > 2.5 to < 5.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Halite	Colorless to White	White	2.5	2.0	Perfect Cubic Cleavage	NaCl Salty Taste; Commonly in cubic crystals
Muscovite	Colorless to Pale Brown	White	2.5	2.8	1 Perfect Cleavage	K, Al phyllosilicate Can be cleaved into thin elastic plates
Apatite	Variable Green, Brown common	Pale Green to Yellowish Green	5	3.8 to 4.3	Poorly Developed Cleavage	Ca ₅ F(PO ₄) ₃ Transparent to Translucent; glassy
Barite	White to Yellow	White	3	4.5	3 Good Cleavages	BaSO ₄ High Density; often in aggregate plates

TABLE 3B (continued). NONMETALLIC LUSTER - LIGHT COLOR with HARDNESS > 2.5 to < 5.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Calcite	Colorless to White; but impurities may tint it different colors	White	3	2.7	3 Perfect Cleavages not at 90°	CaCO ₃ Cleaves to rhombohedrons; Vigorously effervesces in cold HCl
Dolomite	Gray or Tan	White to Pale Brown	3.5	2.8	3 Perfect Cleavages not at 90°; can be massive	CaMg(CO ₃) ₂ When powdered, effervesces in cold HCl
Fluorite	Colorless, Violet, Yellow, Green	White	4	3.0	4 Perfect Cleavages	CaF ₂ Grows in cubic crystals, but cleaves non-cubic
Asbestos	Light to Dark Green	White	2.5 to 5	2.5	1 Perfect Cleavage	Mg phyllosilicate Long stringy fibers

TABLE 3C. NONMETALLIC LUSTER - LIGHT COLOR with HARDNESS > 5.5

NAME	COLOR	STREAK	HARDNESS	DENSITY (g/cc)	BREAKAGE	COMPOSITION/REMARKS
Plagioclase	White to Blue-Gray	None	6	2.5	2 Good Cleavages at nearly 90°	Na/Ca feldspar Distinguished by striations on some cleavage faces
Orthoclase	Pink, White, or Green	None	6	2.5	2 Good Cleavages at 90°	K feldspar Does not have any striations on any cleavage faces
Quartz	Colorless to Variable	None	7	2.65	Conchoidal Fracture	SiO ₂ Varieties: Smoky, Milky, Rose, Amethyst
Garnet	Colorless, Green, Red, and Brown	None	7.5	3.5 to 4.5	Conchoidal Fracture	Ca, Al, Fe, Mg nesosilicate Commonly occurs in 12 - to 24 - sided crystals