A TABLE FOR THE IDENTIFICATION OF NEVADA'S COMMON MINERALS

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And the second	STREAK	Н.	SP. G		COLOR	LUSTER	STRUCTURE	COMMON CRYSTAL FORM		FRACTURE	TENACITY	DIAPHANEIT		NAME OF MINERAL	CHEMICAL COMPOSITION	PERCENTAGE OF CHIEF COMPONENT	OCCURRENCE	CHIEF USES
		1	1.	Colorless	te, colorless.	Silky	Fibrous, acicular rounded masses.				Brittle.	Transparent to translucent.	Tasteless, insoluble in water.	Ulexite.	NaCaB ₅ O ₉ .8H ₂ O	43.0% B ₂ O ₃	In salt marshes and dry lake beds.	Source of borax.
		1-1.1		White,	often colored, red, yellow,	Waxy, dull. Dull, pearly.	Massive, stalactitic, dendritic, encrustation. Earthy, compact, clayey, mealy, friable, scaly.	_		Conchoidal. Earthy.	Sectile.	Translucent.	Turns purple in the sunlight.	Cerargyrite, horn- silver.	AgCl	75.3% Ag	A mineral of the weathered and altered portions of silve ore bodies, zone of oxidation.	An ore of silver. Chief constituent of many clays and shales. Heed for make
		1-2.		Gray, yel	llowish, green- y, white, etc.	Pearly, greasy, dull.	Foliated, scaly, tabular, fibrous, compact, massive.		One good.	Uneven.	Brittle. Tough.	Opaque. Translucent to opaque.	Often plastic when wet, clayey odor, sticks to tongue. Soapy feel, thin, laminae, flexible, never plastic.	TALC.	H ₁ AI ₂ Si ₂ O ₃ H ₂ Mg ₃ Si ₁ O ₁₂		Formed by alteration of rock minerals, especially feldspare Found in platy, schistose metamorphic rocks.	Chief constituent of many clays and shales. Used for making brick, tile, porcelain, chinaware, cement, etc. Massive talc has a wide use in table tops, tanks, sinks, etc.; electric insulation, powder, soap, filler.
		1.5-2		green a	and brownish, and white.	Pearly, glistening, dull. Glassy.	Foliated, lamellar, radial, granular, compact, fibrous. Crystalline, massive, granular, encrustations.		One good.	Uneven.	Flexible. Brittle.	Subtransparent t opaque. Transparent.	Greasy or soapy feel. Like talc but contains Al instead o Mg. Not common. Soluble, cooling taste, alters to white, powdery thenardite	Pyrophyllite. Mirabilite, Glau-	H ₂ Al ₂ Si ₄ O ₁₂ Na ₂ SO ₄ .10H ₂ O	-	Found in schists and rocks associated with them. A mineral of dry lake basins.	Used in slate pencils and sometimes as a medium for carving.
		1.5-2	1.	Colorless dish,	s, white, red- , yellowish.	Glassy, silky, dull.	Delicate fibrous masses, encrustations, massive.		_		Brittle.	Subtransparent, subtranslucent.	Taste of common alum. Soluble in water. Cooling taste, gives violet coloration	Alunogen	Al ₂ (SO ₄) ₃ .18H ₂ O		Alteration product of aluminum minerals.	No present use. Possible source of alum.
	,	1.5-2	2.		less, white.	Glassy. Glassy.	Crystalline, granular, encrustations, acicular, tufted. Crystalline, granular, encrustation, massive.		Good. Rhombohedral.	Uneven. Conchoidal.	Brittle. Brittle.	Transparent to opaque. Transparent to opaque.	when held in flame. Gives brown fumes when heatewith potassium acid sulphate. Soluble in water, gives yellow flame. Cooling taste, ofter salty, also acts like niter with potassium acid sulphate.	Niter.	KNO ₃		Associated with guano. In caves inhabited by bats. Often bedded. Associated with guano, occurs in bat caves. Bedded or in layers.	Fertilizer, source of nitrogen compounds. Fertilizer, used in manufacture of nitric acid, and KNO ₃ . Source of iodine.
		1.5-2	2.	3 Color	less, white.	Glassy, pearly, silky (satin spar).	Crystalline, massive and fine granular (alabaster), columna fibrous (satin spar), earthy (gypsite), compact, scaly granular (rock gypsum), lamellar (selenite).	;	Two perfect; on very pronounced.	е	Sectile, not elastic.	Transparent (sel	Changes to a white powder when heated.	GYPSUM.	CaSO ₁ .2H ₂ O	•		Used chiefly for production of Plaster of Paris, fertilizer (land plaster), flux, cement.
		1-3		Yellow	s, white, red. rish to brassy green.	Glassy, dull. Glassy to dull.	Crystalline, earthy, powdery. Earthy, encrustation, stalactitic, fibrous, crystalline powdery.	;		Uneven. Uneven, con- choidal.	Brittle. Brittle.	Transparent to opaque. Transparent to opaque.	Soluble in water. Often occurs as a white powder or mirabilite. Cooling saline taste. Soluble in water. Astringent, metallic taste.	Thenardite. Melanterite Copperas.	Na ₂ SO ₄ FeSO ₄ .7H ₂ O		Found on shores of sult lakes and in lake beds. Altera tion product of mirabilite. Formed by alteration of marcasite.	No present use.
		2-2.5		Colorles	white, gray, ish white. s, white, pale colors.	Dull, glassy, resinous. Glassy.	Powdery, crystalline encrustation. Crystalline, granular, massive, encrustation.	Cubes.	Cubic.		Brittle. Brittle.	Transparent to opaque. Transparent,	Soluble in water, sweet taste. Changes to a white powder in air.	Borax.	Na ₂ B ₄ O ₇ .10H ₂ O	36.6% B ₂ O ₃	Dry lake beds, bedded.	Antiseptic uses, cleansing agents, soaps, used in medicines, metal cleaner. Boracic acid is made from it. Used as a preservative of meat, in manufacture of chemicals, as a condiment, production of glazes and enamels.
		2-3	2.7-3.	Colorless,	rown, black, nish black.	Submetallic, glassy.	Micaceous, platy, foliated, flaky, crystalline, often disseminated in rocks as scales.		One very good.		Elastic, sectile, tough.	translucent. Transparent, translucent.	Soluble in water, salty taste. Streak may be pale brown and shiny. Easily told by its mica characteristics and dark color.		(H.K) ₂ (MgFe) ₂ . (AlFe) ₂ (SiO ₄) ₃	-	Sedimentary rocks and in dry lake beds. Common rock mineral especially in igneous and metamor phic rocks.	cals, as a condiment, production of glazes and enamels. No commercial value.
		2-3	2.8-3.	White,	yellow, gray, ownish.	Glassy, pearly. Silky.	Micaceous, platy, foliated, flaky, crystalline, often disseminated in rock. Fine scaly aggregates foliated, fibrous.		One very good.		Elastic, sectile, tough. Flexible, sectile.	Transparent, translucent. Translucent to opaque.	Like biotite but not strongly colored. A whitish muscovite.	White mica "Isinglass." Sericite.	$\begin{bmatrix} H_2\left(K,Na\right),\\ \left[Al_3\left(SiO_4\right)_3\right] \end{bmatrix}$		Common rock mineral especially in igneous and metamorphic rocks. Formed by alteration of muscovite and other minerals.	Used as windows in furnaces, stoves, etc., electric insulation, used in heavy lubricants, paints, wall paper. Rock forming mineral in altered rocks especially metamor-
		2-3	10.8	Green, g	White.	Silvery, metallic.	Irregular masses, scaly, wiry, crystalline, disseminated in rock as filaments in cavities.			Hackly.	Malleable, ductile.	Opaque.	Tarnishes gray, brown or black.	Silver.	Ag	100% Ag	In veins, particularly in zones of oxidation and secondary enrichment.	phic rocks like schist. Ore of silver.
		2-4	2.5 5 2.5	brown,	sh gray, red, black. reenish blue.	ous, glassy.	Compact, earthy, columnar, fibrous, lamellar, foliated. Crystalline, stalactitic, reniform, drusy, fibrous, encrustation.			Splintery, con- choidal. Conchoidal.	Brittle, tough. Brittle.	Translucent to opaque. Transparent, translucent.	Multicolored, often mottled, often soapy feel, character- istically of a grayish green color. Metallic taste, blue solution in water. Becomes coated white on exposure to dry air.	SERPENTINE.	H ₁ MgSi ₂ O ₉ CuSO ₄ .5H ₂ O	25.9% Cu	A product of rock alteration. Found in metamorphic rocks. Formed by alteration of copper ores in zone of exidation.	A fibrous form is chrysotile or commercial asbestos, verde antique is a serpentine marble. Translucent variety used as a gem. Minor ore of copper.
		2.5-3	2.1	yellow Whitis	white, gray, wish gray. h, grayish, greenish.	Glassy. Pearly, waxy.	Massive, crystalline, encrustation, fibrous. Foliated, massive, fibrous.		One good.	Uneven.	Brittle. Flexible to elastic, folia, sectile.	Transparent, translucent. Transparent, translucent.	Soluble in water, alkaline taste. Will give bubbles of gas when treated with acid. Much like some forms of talc. Alters to hydromagnesite.	Trona, "Urao."	Na ₂ CO ₃ .NaHCO ₃ . 2H ₂ O	40% W-0	Found in muds of dry lakes and as thin coatings on altered rocks.	Source of soda.
		2.5-3	4.5	Colorless, yellow,	white, brown, blue, red.	Glassy, pearly.	Massive, crystalline, lamellar, nodular, granular, fibrous earthy, reniform.	Rhombohedrons	Good cleavage.	Uneven.	Brittle.	Transparent to opaque.	Easily distinguished as a soft heavy mineral.	Brucite. BARITE Barytes, heavy spar.	Mg(OH) ₂ BaSO ₄	69% MgO	In metamorphosed limestone, dolomite, and in serpentine. Common gangue in veins, hot spring deposit. Replacement in limestones.	Source of magnesia for stucco. Used in manufacture of paints, glass, lithopone, artificial ivory. Used as paper filler. Source of barium compounds.
	Z	3	6.4	Colorless,	yellow, red, reen. white, yellow, vn, gray.	Glassy to dull. Adamantine to greasy.	Crystalline, massive, granular, stalactitic, drusy, earthy encrustation, banded. Crystalline, granular, nodular, stalactitic.	prisms and pyra- mid-like forms.	Three, perfect rhombohedral.	. Conchoidal.	Brittle. Brittle.	Transparent to opaque. Transparent to opaque.	Usually shows the rhombohedral cleavage, will give off gas when treated with cold acid like vinegar. Chalk is an earthy variety. Mexican onyx or travertine is banded. Often coated black, occurs as a heavy white or yellow concentrate in gold pan.	Dog tooth spar.	CaCO ₃	56% CaO 68.3% Pb	Chief constituent of limestone. Product of rock weathering and alteration lake deposit. Formed by oxidation of lead sulfides in zone of oxidation. Occurs in upper part of veins.	ture of lime and cement, fertilizer. Has many uses.
		3-3.5		reddish,	uish, greenish, white, black.	Glassy, pearly.	Crystalline, granular, massive, fibrous. Crystalline, granular, earthy, fibrous.			Conchoidal.	Tough.	Translucent to opaque. Translucent to	Often has a sugary or marble-like appearance and most often pearly in luster. One of heavy white concentrates on panning for gold.	t Anhydrite.	CaSO ₄	03.370 FB	Occurs in upper parts of ore veins, in beds and in lake deposits.	Ore of lead. Used as a fertilizer, as a medium for ornaments and statu- ary. Much like alabaster gypsum.
		3-3.5		W	White.	Glassy to dull. Vitreous, pearly, dull.	Acicular, earthy, powdery, amorphous. Crystalline, columnar, concentric, stalactitic, banded, colitic,	The state of the s			Brittle.	opaque.	Effervesces with cold acid.	Cerrusite. Hydromagnesite.	PbCO ₃ 3MgCO ₃ .Mg(OH) ₂ . 3H ₂ O	77.9% Pb 43.9% MgO	Occurs in zones of oxidation and secondary enrichment. Alteration product of brucite.	Ore of lead. Possible source of magnesia for stucco, cement, etc.
	7. 3	3.5	2.9	or	white, gray tinted.	Glassy. Glassy, pearly.	Crystalline, compact, granular, fibrous, earthy.	Prisms, needle- like. Rhombohedrons.	One good. One plane.	Uneven, con- choidal.	Brittle.	Transparent, translucent. Transparent, translucent.	Effervesces in cold acid but is usually needle-like or columnar and does not have rhombohedral cleavage. Much like anhydrite but contains water and is harder.	Aragonite. Alunite, alum stone.	CaCO ₃ K ₂ SO ₃ .Al ₂ (SO ₄) ₃ . 4Al(OH) ₃	56% CaO	Bedded with gypsum, hot and cold spring deposit. Deposited from sulphate waters. Occurs in cracks and veins in acidic lavas. A product of rock alteration.	Can be used for calcite. Source of potash and aluminum. Almost a natural alum.
		3.5-4	2.9		white, tinted.	Glassy, pearly.	Crystalline, granular, massive.	Rhombohedrons.	Rliombohedral, not äs good as in cal- oite.		Friable, brittle.	Transparent, translucent.	Will not effervesce in cold acid as calcite does. Often granular. Rhombohedral faces often curved.	DOLOMITE Pearl spar.	CaMg(CO ₃) ₂	39.2% MgO	Common gangue and sedimentary rock mineral. In lime- stone and marble.	Source of magnesium salts. Building and decorative stone.
		3.5-4	3.1	Colorless,	white, gray, rown. white, gray, e tints.	Glassy to dull. Glassy, greasy.	Crystalline, dense, massive, granular. Crystalline, compact, acicular, radiating, fibrous, granular.		Imperfectly prismatic.	Conchoidal (when dense). Conchoidal.	Brittle.	Transparent to opaque. Transparent, translucent.	Often porcelaneous. Much like chert. Does not effervesce in cold acid. Much like aragonite, gives a deep crimson tinge to an alcohol flame when hydrochloric acid is added.	Magnesite.	MgCO ₃	85.8% MgO 70.1% SrO	Bedded in sediments. In veins, in metamorphic rocks. Occurs in limestones. Rare in Nevada.	Used as source of magnesium compounds, in bricks for furnace linings, in paper industry, for stucco, cement. Source of strontium compounds.
		3.5-4	3.9	Colorless,	sually brown, w, black. white, yellow-	Glassy to dull.	Crystalline, granular, massive, botryoidal, nodular, earthy. Crystalline, granular, massive.		Rhombohedral.	Conchoidal. Uneven, subcon-	Brittle.	Translucent to opaque. Transparent to		Siderite, spathic iron ore.	FeCO ₃	48.2% Fe	A bedded and nodular iron ore, a gangue in upper parts of veins.	
		3.5-4.5		Pink,	rose red.	Glassy, pearly.	Crystalline, granular, encrustations, botryoidal.	_	Rhombohedral.	Uneven.	Brittle. Brittle.	opaque. Translucent.	Often porcelaneous or chalky. Much like siderite but pink.	Colemanite. Rhodochrosite.	Ca ₂ B ₆ O ₁₁ .5H ₂ O MnCO ₃	52.9% B ₂ O ₃ 47.8% Mn	thermal attendation.	Source of borax and boracic acid. Source of manyanese compounds. Occasionally used as a gem.
		3.5-5	3,2	Colorless,	white, pale ints. white, green, blue, violet.	silky. Glassy.	Crystalline, acicular, fibrous, radiating, granular, massive. Crystalline, massive, granular, drusy, disseminated.	Cubes, octahedrons.	At least one good cleavage. Octahedral.	Uneven, con- choidal. Uneven.	Brittle.	Transparent to opaque. Transparent, translucent.	Flies apart on heating, shows good cleavage.	Zeolite group. FLUORITE Fluor spar.	Hydrated alkaline silicates.		Derived by alteration of minerals in igneous rocks, especially volcanic rocks. A common gangue in veins, in beds, in rocks subjected to igneous vapors.	Source of fluorine compounds, flux in iron smelting, used in enamels, lenses, as a gem.
		4.5-5	3.5	yellowish Nearly	eenish, bluish, h, brownish. white to yellow.	Glassy, pearly, Greasy, pearly, earthy.	Massive, granular, botryoidal, fibrous, stalactitic. Acicular.	Tabular.	Two good.	Uneven to sub- conchoidal. Uneven.	Brittle. Brittle.	Transparent to translucent.		Calamine.	H ₂ ZnSiO ₅	54.2% Zn	A secondary mineral usually found in from other zinc ores.	Zine ore.
		4-6	14-19	White, s	gray, black.	Silvery, metallic.	Granular, scaly, disseminated, crystalline.	-		Hackly.	Malleable, ductile,	Opaque.	Usually alloyed with other metals, sometimes magnetic.	Cervantite. Platinum.	Sb ₂ O ₃	78.9% Sb 100% Pt	Alteration product of stibnite. In placers, river gravels, in basic dark-colored igneous rocks.	Source of platinum for jewelry, scientific and industrial uses.
		4.5-5	3.6	White, ye	ellow, brown, en, red.	Glassy, pearly. Glassy.	Bladed, platy, crystalline, columnar. Crystalline, massive, granular, disseminated, reniform.	Tabular crystals, pyramids.	One excellent. One good.	Splintery. Uneven.	Brittle. Brittle.	Transparent, translucent. Translucent to opaque.	Hardness only four in long direction and seven at right angles to it. Yellow powder produced when boiled in nitric acid.	Cyanite, kyanite. Scheelite.	Al ₂ SiO ₅	80.6% Wo ₃	A mineral of metamorphic rocks as gneisses and schists. Occurs in gold quartz veins and at contact of veins with limestone.	Used in manufacture of porcelain and as a gem. Ore of tungsten and its compounds.
		5 5~5.5	3.2	Colorless,	gray, yellow, n, brown. green, brown, yellow.	Glassy, pearly, waxy, duil. Glassy to resinous.	Botryoidal, stalactitic, encrustation, reniform, cellular, earthy, crystalline. Crystalline, granular, nodular, massive, compact.	Prisms, tabular.		Uneven, splintery. Uneven, con- choidal.	Brittle.	Translucent to opaque. Transparent to opaque.	Usually hard to detect in Nevada ore. Occurs in beds with limestone and shales. Often brown but will not scratch glass easily if at all.	Smithsonite, "Dry bone ore." Apatite, rock phosphate.	ZnCO ₃ 3Ca ₃ (PO ₁) 2. Ca (F,Cl) 2	52.1% Zn	Occurs in upper oxidized part of veins as residuum on limestone, and in veins in limestone. Common accessory mineral of igneous rocks. Contact	An ore of zinc.
		5-5.5	8.5	Yellow, g	reen, brown, , black.	Adamuntine to resinous.	Crystalline, disseminated, lamellar, massive, compact.	Wedge-like.	Two.	Conchoidal.	Brittle.	Transparent to opaque.	Besides occurrence noted it also is found on walls of cavities in acid igneous rocks and as an alteration product of other titanium minerals.	_	CaTiSiO ₅		metamorphic mineral. Common accessory mineral of igneous rocks. Contact metamorphic mineral.	Fertilizer, source of phosphorous and its compounds. Transparent variety used as a gem.
		5-6	2.8	green	n green to nish blue. rass green.	Waxy, dull. Glassy, silky.	Botryoidal, stalactitic, reniform, disseminated, encrustation. Crystalline, bladed, fibrous, columnar, granular.		Prismatic.	Conchoidal. Uneven, splintery.	Brittle. Brittle.	Translucent to opaque. Transparent to opaque.	See copper test under azurite. Grass green color characteristic.	Turquois. Actinolite.	[I ₅ [Al(OH) ₂] ₆ . Ĉu(OH) (PO ₄) ₄ (MgFe) ₃ Ca (SiO ₃) ₄		An alteration product. A metamorphic rock forming mineral.	Gem mineral.
		5.5-6.5	2.1		milky, red, blue, green, brown.	Pearly, waxy, dull.	Massive, botryoidal, stalactitic, reniform, earthy.			Conchoidal.	Brittle.	Transparent to opaque.	Earthy varieties as diatomaceous earth are as soft as 1. Massive opal checks in drying.	OPAL.	SiO ₂ .xH ₂ O		Occurs as a hot spring deposit (gyserite, or sinter), as an alteration product, and in sedimentary beds.	Used for gems, ornaments. Earthy varieties as tripolite and diatomite used as scouring agents, fillers, in concrete, etc.
		6	2.5-2.8	Gray, yelle	white, cream, een, gray.	Glassy. Glassy, silky,	Crystalline, massive, disseminated.		Two good.	Uneven.	Brittle.	Transparent to opaque. Transparent,	Often striated, sometimes iridescent, especially gray labra- dorite. Transparent variety is sanidine.	FELDSPARS.	Aluminum silicates of K,Na,Ca		Common rock mineral.	Transparent variety used as gem, iridescent variety as ornamentation, other varieties are used in glazes, fluxes, fillers, etc.
		6-7.5	3.2	Brown,	red, yellow, reen.	Glassy, resinous.	Acicular, fibrous. Crystalline, granular, disseminated.	Dodecahedrons, most common.	One good.	Uneven, con- choidal.	Brittle. Brittle.	translucent. Transparent, translucent.	Surface often coated by softer minerals. Usually brown and hard enough to scratch glass.	fibrolite.	Al ₂ SiO ₅ (Ca,Mg,Fe,Mn) ₃ . (Al,Fe,Cr) ₂ (SiO ₁) ₃		A metamorphic rock, schist forming mineral. In veins and as a metamorphic mineral, especially in contact metamorphosed limestones.	Spark plug porcelain. Transparent varieties used as gems, hard varieties used as abrasive.
		6.5-7	35	brown, c	bottle green, y, brown.	Glassy.	Crystalline, granular, bladed. Crystalline, granular, disseminated.		One good.	Conchoidal.	Brittle.	Transparent to opaque. Transparent,	Its yellowish green to olive green color, columnar or needle-like structure, and glassy luster are characteristic. Often sugary, friable, occasionally found in metamor-	Epidote, pistazite.	Ca ₂ (Al,Fe) ₂ Al(OH). (SiO ₁) ₃		A mineral of metamorphic rocks. Often in contact metamorphic zone.	
		7	2.7	Colorless, amethyst	white, pink, t, red, gray, brown, black.	Glassy, waxy, dull.	Crystalline, granular, nodular, banded, sintery, colitic, botryoidal, massive, etc.	Pyramid-like faces and prisms.		Conchoidal.	Brittle.	Transparent to opaque.	phosed limestones. Crystal faces often striated, the porcelaneous variety, chert is common in limestones. Infusible, insoluble.	Olivine, peridot. QUARTZ.	(Mg,Fe) ₂ SiO ₄		Rock forming mineral of basic igneous rocks. Occurs in all kinds of rocks and under many conditions. Common vein mineral.	Transparent green peridot is a gem. Used as abrasive, as building material as in sand and sand- stone and quartzite, in pottery, jewelry, etc.
		7	3.3	Colorless,	blue, pink, ite, colorless. green, pink, llow. Usually	Glassy, dull.	Fibrous, columnar, acicular, spherulitic, massive.	Prisms.	One good.	Even. Uneven, con-	Brittle.	Transparent, translucent.		Dumortierite.	HBAl ₃ Si ₃ O ₂₀		In igneous and metamorphic granular rocks.	Used in manufacture of spark plug porcelain.
		7-7.5		Gray, bro	own, reddish n, bluish.	Glassy, pitchy. Glassy, dull.	Crystalline, massive, disseminated. Crystalline, granular, columnar.	prisms. Nearly square prisms.	Prismatic.	choidal. Uneven.	Brittle.	Transparent to opaque. Transparent to opaque.	Crystals vertically striated and usually black, long and six-sided. Surface often coated by softer minerals.	Tourmaline. Andalusite.	Complex boro-aluminum silicate. Al ₂ SiO ₅		and innestone.	Transparent variety used as a gem and in optical instru- ments. Transparent varieties are used as gems. Used in produc- tion of spark plug porcelain and refractory bricks.
	ti ej	9 2.5	2.3	Deep blue	e, pale blue, ish blue.	Adamantine, glassy.	Crystalline, granular, disseminated. Crystalline, encrustation, stalactitic, reniform, fibrous.	Pyramids, prisms.	A plane of parting.	Conchoidal, uneven.	Brittle.	Transparent, translucent. Transparent, translucent.	Crystals striated, very hard. Soluble in water, metallic taste, becomes coated white in	Corundum, emery. Chalcanthite, blue	Al ₂ O ₃		Occurs in mine waters and formed by oxidation of copper	Used as an abrasive. Transparent red variety is ruby. Transparent blue variety is sapphire.
	### ###	3.5-4	3.8	azur	to pale e blue.	Glassy, dull.	Crystalline, earthy, massive, botryoidal, reniform, encrustation.	Tabular.			Brittle.	Transparent to opaque. Translucent to	air. Yields blue solution. Like other copper minerals it will dissolve in acid and yield a blue solution on addition of ammonia water.	AZURITE Blue carbonate.	CuSO ₄ .5H ₂ O 2ĈµCO ₃ .Cu(OH) ₂	25.9% Cu 55.2% Cu	copper sunities.	Minor ore of copper. Sometimes used as a gem. Ore of copper, used for ornamental and decorative purposes.
-	Green or uish Gree	3.5-4	3.9	Bright green, blue	ckish green.	dull. Adamantine, silky, dull.	Compact, reniform, earthy, globular, encrustation. Encrustations, massive, concentric, reniform, botryoidal, stalactitic, earthy, fibrous, acicular.			Conchoidal, Conchoidal, splintery.	Brittle. Brittle.	opaque. Translucent to opaque.	Glaze-like appearance, often contains malachite. See copper test under azurite.	CHRYSOCOLLA. MALACHITE.	CuSiO ₃ .H ₂ O	86.2% Cu 57.5% Cu	Occurs in upper part of copper veins, alteration product of copper sulfides. Occurs in upper parts of copper veins, alteration product.	Minor ore of copper, sometimes used as a gem. Ore of copper, also used for ornamental purposes and as a gem.
	Light Light Bl	3.5-4 5-6	3.9	dark	dd green, green.	Glassy, pearly. Waxy, dull.	Crystalline, drusy, fibrous. Amorphous, earthy, compact, botryoidal.	Prisms.	One good.	Splintery.	Brittle, Brittle.	Transparent, translucent. Translucent to opaque.	See copper test under azurite. See copper test under azurite.	Brochantite. Turquois.	CuSO ₁ .3Cu (OH) ₂ H ₅ [Al(OH ₂)] ₀	56.2% Cu	A mineral formed by alteration of copper sulfides. Formed by alteration of copper minerals.	Minor ore of copper.
	tyish n	1-2.5	2.6-3	Green, y	reen, green- black.	Submetallic, greasy. Dull, resinous,	Foliated, lamellar, scaly, earthy.		One perfect.	Splintery, con-	Brittle, tough, flexible.	Translucent to opaque. Translucent to	Soapy feel, usually dark green, foliated.	CHLORITE.	Cu (OH) (PO ₄) 1 H ₈ Mg ₅ Al ₂ Si ₃ O ₁₃		A common metamorphic mineral.	Ashatas is a film of the second of the secon
	Light Gre Gree	5-6	2.9-3.3	Black, gree	enish black,	Glassy, dull.	Compact, massive, earthy, fibrous, foliated, columnar. Crystalline, granular, bladed, fibrous, columnar, massive, disseminated.	Prisms.	Prismatic.	Uneven.	Brittle. Brittle.	opaque. Translucent to opaque.	Often mottled, clouded, multicolored, soapy feel. Long lath-like crystals and cleavage faces.	SERPENTINE. HORNBLENDE.	H ₁ MgSi ₂ O ₉ Complex silicate.		Occurs in metamorphic rocks. Common rock forming mineral.	Asbestos is a fibrous form, verde antique is used in interior decoration.
	nite]	5-6	3.2-3.6	Bright ler	mon yellow	Glassy, dull.	Crystalline, granular, compact, disseminated. Encrustation, columnar, granular, disseminated, crystalline, foliated.	Short prisms.	Prismatic. Vertically striated, one good, beachy,	Uneven.	Brittle. Flexible plates, brit-	Translucent to opaque. Subtransparent, subtranslucent.	Short, stout crystals and cleavage faces.	AUGITE.	Complex silicate.		Common rock forming mineral.	
	early W7	1.5-2.5	2		ge yellow. ellow, deep sh yellow.	Resinous, pearly.	Crystalline, massive, globular, stalactitic, powdery.	Prisms, indistinct. Prisms, pyramids.	pinacoid.	Conchoidal.	tie, sectile. Brittle.	subtranslucent. Transparent, translucent.	Becomes red on heating. Low melting point, burns with blue flame and gives a pungent gas. Gives a peculiar noise when two pieces are rubbed together.	Orpiment. Sulphur.	As ₂ S ₃	61% As	Hot spring deposit, occurs in lead and silver quartz veins. Ground volcanoes hot spring deposit. Interbedded with gypsum.	Not a commercial source of As. Used in manufacture of sulfuric acid, matches, insectides, medicines, insulation, vulcanizer, bleaching agent.
	llew or N	2-3	19.5	Colorless, g	vellow to lite. ray, orange,	Metallic.	Granular, scaly, nodular, disseminated, filiform, crystalline.			Hackly.	Malleable, ductile.	Opaque.	Often alloyed with silver. Often occurs as small crystals in vugs. Moistened with	Gold.	Au	100% Au	Occurs in veins and in stream deposits.	Ore of gold. Nuggets sometimes used as gems.
BIACK OR WEARLY SO	Light Yel	3.5-4	6.8	green. Brown, bla	brown, red,	Glassy, resinous. Submetallic, resinous.	Crystalline, granular, drusy, massive.	Thin, tabular.	One good. Good, dodecahedral, more than one	Conchoidal.	Brittle.	Transparent, translucent. Transparent to	hydrochloric acid and rubbed with knife will yield a blue color. Often highly contaminated by hematite, seldom pure, color-	Wulfenite. SPHALERITE	PbMoO ₄	39.3% MoO ₃ 56.5% Pb	Occurs in zone of oxidation of lead veins. Disseminated in limestone. In veins and in contact meta-	Ore of molybdenum. Minor ore of lead.
	Light rown or Nearly White	2-3	2.7-3.2	Dark brov		Submetallic, glassy.	Crystalline, massive, disseminated, botryoidal. Micaceous, platy, foliated, fiaky, crystalline, scaly, disseminated. Crystalline, granular, botryoidal, nodular, encrustation,		One very good.	Conchoidal.	Brittle. Elastic, sectile, tough.	Transparent, translucent.	less. Easily distinguished by micaceous character and dark color.	Jack. BIOTITE Black mica.	ZnS (H.K) ₂ (Mg.Fe) ₂ . (Al.Fe) ₂ (SiO ₄) ₃	67% Zn	morphic deposits. Common rock mineral.	Ore of zinc, often contains silver and cadmium.
	ow Br	3.5-4	3.9	Brown, yel Yellowish		Glassy, pearly. Dull.	carthy. Compact, earthy, massive.		Rhombohedral.	Conchoidal.	Brittle. Brittle.	Translucent to opaque. Opaque.	Like any iron ore it will yield a magnetic residue if heated before blowpipe with soda and charcoal. Plastic when wet.	Siderite, spathic iron ore. Ocher.	FeCO ₃ A limonite bearing kaolin.	48.2% Fe	Occurs in beds and in nodules gangue in ore deposits. A residual product of weathering.	Minor ore of iron. Often contains enough manganese for use in spiegeleisen. Paint.
	ish Brow nish Yell	3-6	3.4-4	Reddish bro ish brown Pale yell	n, black. low, red,	Submetallic, dull. Submetallic,	Earthy, encrustation, botryoidal, reniform, massive, porous, amorphous.	Sometimes cubic after pyrite.			Brittle.	Opaque. Translucent to	Often mixed with kaolinite, forms varnish-like coats on rocks, very common brown mineral.	LIMONITE Brown hematite, bog iron ore.	Fe ₂ O ₃ .xH ₂ O	Variable up to 60% Fe	A product of rock weathering. Found in beds and in upper parts of veins.	Ore of iron, often carries gold, silver, lead, zinc. Used in paint.
	Yellow Brow.	4.5-5.5 6-7	2.8	Browns a	and reds.	dull. Waxy, dull.	Crystalline, bladed, compact, lamellar, fibrous. Concretionary, dense, massive.		One.	Uneven. Conchoidal.	Brittle. Brittle.	Translucent to opaque. Opaque.	Like any manganese mineral, it will yield a green color on fusion with soda. Stained and contaminated by iron oxides, chert is dense, dull, jasper is waxy.	Huebnerite. QUARTZ.	MnWO ₄	76.6% WO ₃	Occurs in quartz veins. Occurs in sedimentary rocks.	Ore of tungsten. Road metal, colored varieties, used in some decorative work.
	frown or sh Red	1-6 3-4	5.2 4.8-5.4	Red, reddie steel gray	y, black.	Dull to splendent metallic. Dull, metallic.	Earthy, clayey, oolitic, granular, compact, botryoidal, columnar, reniform, platy, micaceous, disseminated. Massive, compact, granular, disseminated, crystalline.	Tetrahedrons.		Uneven. Uneven.	Brittle. Brittle.	Opaque. Opaque.	A very common reddish brown mineral. See iron test under siderite.	HEMATITE Specular iron ore. Tetrahedrite, gray	$\mathrm{Fe_2O_3}$	70% Fe	Occurs in all rocks but is usually due to weathering of other iron minerals. A common rock stain. Bedded. A primary sulfide of copper occurring in veins below zone	Chief ore of iron, used in paint, often contains gold, silver, lead, zinc. Used as a polishing powder. Ore of copper, quite variable in composition. May carry
	Leddish B Brownia	3.5-4	4	Brown,	black.	Submetallic.	Crystalline, massive, disseminated.	Tabular or	One good.	Conchoidal,	Brittle.	Opaque. Translucent on	Tarnishes dull. Contains hematite. Sometimes feebly magnetic. Gives tests for manganese and	copper ore SPHALERITE Black Jack.	Cu _S Sb ₂ S ₇ ZnS	52.6% Cu 67% Zn	of oxidation. A primary sulfide of zinc in veins and disseminated.	Ore of zinc often containing cadmium and silver.
	ping	1.5-2	3.6	Bright red	l, orange,	Resinous.	Crystalline, bladed, lamellar, granular. Crystalline, encrustation, massive, granular, disseminated.	columnar. Prisms, vertically striated.	One perfect. One rather good, clinopinacoidal.	Uneven. Conchoidal.	Brittle.	thin edges. Transparent, translucent.	Burns with a garlic odor. Alters to orpiment.	Wolframite. Realgar.	FeMnWO ₄		In veins and pegmatite dikes. Occurs in veins and in hot spring deposits.	Ore of tungsten. Not a commercial source of As.
	. Reds	2-2.5	5.6 8.1	Grayish scarl Vermilli	let.	Adamantine. Adamantine, dull.	Crystalline, disseminated, massive, banded, encrustation. Crystalline, encrustation, massive, granular, disseminated, earthy.				Brittle, Slightly sectile.	Transparent, translucent. Transparent to opaque.	Will give white streaks when moistened with acid and rubbed on copper.	Proustite, light ruby silver. Cinnabar, natural vermillion.	$ m Ag_cAs_2S_6$ $ m HgS$		In veins, usually in zone of secondary enrichment. In veins and in sediments cut by veins. In hot spring deposits.	Ore of silver.
	Various	2.5-3	5.8	Grayish bla	d		Crystalline, disseminated, encrustation, massive, banded.		One.	Uneven, con- choidal.	Brittle.	Thin splinters trans- mit red light.	ransed on copyer.	Pyrargyrite, dark ruby silver.	$ m Ag_0Sb_2S_6$	60% Ag	In voins, usually with pyrargyrite. In upper parts of veins. In sediments cut by veins. In	Ore of mercury. Ore of silver.
	1 - 2	3.5-4	6	Reddish bro	own, red,	Metallic. Glassy, earthy.	Crystalline, massive, granular, disseminated, wiry. Crystalline, granular, earthy, massive.			Hackly. Uneven, con- choidal.	Ductile, malleable. Brittle.	Opaque. Transparent to opaque.	Often tarnished brown, green or blue. See copper test under azurite.	Copper. Cuprite.	Cu CuO	100% Cu 88.8% Cu	igneous rocks. Found in upper oxidized portion of copper veins.	Ore of copper.
	Gray Green	1-1.5	4.7 4.8 2.2	Bluish Black to		Metallic. Submetallic, dull.	Scaly, foliated, disseminated, granular. Scaly, platy, foliated in clayey masses, disseminated in rock.		One very good. One good.		Flexible, sectile. Flexible in thin plates, sectile.	Thin flakes, trans- lucent to opaque. Opaque.	Soapy feel, marks paper. Distinguished by its blue tinge.	Molybdenite. Graphite, pencil ore, plumbago.	MoS	-	Occurs in granite, gneiss, limestone and in quartz veins. Occurs in all types of rocks. Chiefly a metamorphic mineral.	Ore of molybdenum. Used in manufacture of black paint, polish, crucibles, lead peneils lubricants
	Sluish Dull	1-2.5	4.8	Black, da	rk steel	-	Earthy, granular, compact, radiating, dendritic, encrustation.	Vertically striated,	One good, face often		Brittle.	Opaque.	Often carries gold. See manganese test under huebnerite.	PYROLUSITE.	MnO ₂		Occurs in all types of rocks. Chiefly a metamorphic mineral. Occurs in upper part of veins. A product of rock weathering.	pencils, lubricants. Used in manufacture of ferro manganese steels and bronzes, in paint, and in chemicals.
	ву	2	4.6	Lead g		Metallic.	Acicular, crystalline, bladed, radiating, columnar, granular. Foliated, acicular, massive, disseminated.	needle-like, pris- matic. Needle-like.	striated trans- versely. One good.	Subconchoidal.	Slightly sectile, flexible, brittle. Slightly sectile.	Opaque.	Fuses easily, tarnishes black to iridescent or alters to a yellowish white oxide. Acicular structure not common as it is in stibnite. Often coated with a yellow iridescent tarnish.	STIBNITE.	Sb ₂ S ₃		A quartz vein mineral.	Source of antimony and its compounds. Used in fireworks, safety matches, rubber goods, percussion caps.
	Lead Gr	2-2.5	7.3	Lead g	cray.	Metallic, dull.	Massive, encrustation, arborescent, disseminated.	Cubes, octahe-		Subconehoidal.	Sectile, brittle.	Opaque.	coated with a yellow iridescent tarnish. Becomes dull on exposure. Swells and fuses when heated on charcoal before blowpipe.	Bismuthinite. Argentite.	B ₁₂ S ₃ Ag ₂ S		A mineral of the zone of secondary enrichment.	Not common. Ore of silver.
	08	2.5	5.8	Lead g	ray.		Crystalline, granular, massive, disseminated. Massive, disseminated, granular, crystalline, earthy.	drons.	Good cubic.	Conchoidal.	Brittle. Brittle.	Opaque.	Readily distinguished by its weight and cleavage. Takes on a black or dull red tarnish or a blue or green coat. Often coats other copper sulfides.	GALENA. CHALCOCITE Copper glance.	PbS Cu ₂ S			Ore of lead, often carries silver. Ore of copper.
	NEARLY r-Black	3-4	4.3-5.4	Bronze, cop purpl Steel gray black	le.		Compact, granular, disseminated. Massive, compact, granular, disseminated, crystalline.	Tetrahedrons.		Uneven. Uneven.	Brittle.	Opaque. Opaque.	Tarnishes easily giving a peacock play of colors. Tarnishes dull, variable composition.	BORNITE "Horse-flesh ore." Tetrahedrite.	Copper iron sulfide. $Cu_SSb_2S_T$	63.2% Cu	A primary sulfide in quartz veins, a contact impregnation in sediments, also a mineral of secondary enrichment zone. Primary vein ore, disseminated in country rock. Common	Ore of copper, frequently carries small amounts of gold, silver.
	CK OR	3-4	6 4.2	Brown, gra			Massive, earthy, encrustation. Massive, granular, disseminated, crystalline.		One.	Uneven, con- choidal.	Brittle.	Opaque.	Infusible. See copper test under azurite. Tarnishes, becomes darker and takes on an iridescent coat.	Melaconite, Tenorite. CHALCOPYRITE	CuO	79.8% Cu	Found in zone of oxidation of copper bearing veins. Primary sulfide in quartz veins. Contact metamorphic	Ore of copper, often carries silver, lead, zinc, mercury. Ore of copper.
	BIR BIR	4	4.5	Bronze-gray copper	red. E	Bronzy, metallic. (Massive, granular, disseminated, crystalline. Crystalline, granular, disseminated.	Wedge-shaped.		Uneven.	Brittle. Brittle.	Opaque. Opaque.	Tarnishes bronze, slightly magnetic.	Copper pyrites. Pyrrhotite.	CuFeS ₂ A variable iron pyrites.	34.5% Cu	mineral. Also occurs in zone of secondary enrichment. Magmatic segregation, contact metamorphic fissure filling, vein mineral.	Ore of copper, often contains gold and silver. Often contains sufficient nickel and cobalt to be an ore. Source of sulfuric acid.
		5–5.5 5–5.5	7.1-7.5	Pale coppe	rown.	greasy. (Crystalline, bladed, lamellar, granular. Usually massive. Reniform, columnar, disseminated.	Columnar and tabu- lar crystals.	One perfect.	Uneven. Uneven.	Brittle. Brittle.	Opaque.	Occasionally feebly magnetic. Tarnishes gray, black, green.	Wolframite.	f'eMnWO ₄	76.5% WO ₃		Ore of tungsten.
	Brown- ish	5-6 5-6	3.7-4.7 4.5-5	Dark gray, ir Black			Botryoidal, reniform, nodular, stalactitic, encrustation. Massive, compact, granular, disseminated.	Tabular.			Brittle.	Opaque.	See manganese test under huebnerite.	Psilomelane, black hematite.	MnO ₂ .xH ₂ O	Variable.	A product of alteration of manganese minerals. Zone of oxidation. Common minor constituent of igneous and metamorphic	Source of manganese. Used to some extent in making ferro-titanium and in the
		5.5-6	4.5	Black Silver, whi	k. ite, steel	Metallic, dull.	Crystalline, massive, granular, disseminated.	Octahedrons, dodecahedrons.		Conchoidal.	Brittle. Brittle.	Opaque.	Slightly magnetic. Strongly magnetic.	Ilmenite. MAGNETITE Magnetic iron ore.	FeTiO ₃ Fe(FeO ₂) ₂		rocks. Occasionally occurs in large deposits. Found in segregations and disseminations in igneous rocks	Used to some extent in making ferro-titanium and in the preparation of linings for puddling furnaces. Ore of iron.
	een- sh	5.5-6 6-6.5	4.7	Pale yellos	w, steel		Disseminated, granular, massive. Crystalline, granular, massive, nodular, acicular, reniform, stalactitic, disseminated, drusy.	Never the forms of pyrite.	One.	Uneven. Uneven.	Brittle. Brittle.	Opaque.	Often accompanied by a greenish stain. When struck with steel it emits a garlic-like odor. Tarnishes easily and forms a dull coat with the metallic astringent taste of melanterite.	ARSENOPYRITE Arsenical pyrites. Marcasite.	FeAsS		Vein mineral, disseminated in country rock, fissure filling. Deposited from circulating water. Occurs chiefly in sedimentary rocks.	Source of arsenic. Used with pyrite as a source of sulfuric acid.
	- P	6-6.5	5	Bright y	ellow E	Brassy, metallic.	Crystalline, massive, granular, nodular, disseminated, drusy.	Cubes, octahedrons, pyritohedrons.	One.	Conchoidal.	Brittle.	Opaque.	Crystals often striated, or coated brown. Lighter yellow than chalcopyrite.	PYRITE Fools gold.	FeS ₂			Source of sulfuric acid, often contains gold, silver.

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