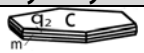
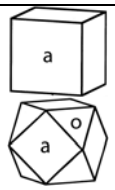
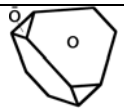
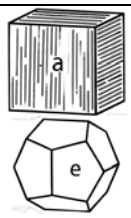
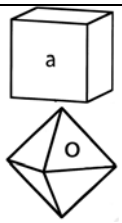
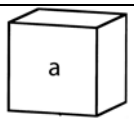
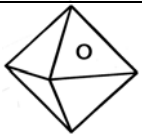
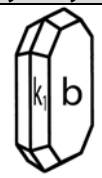
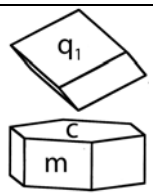
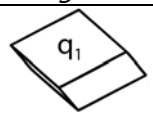
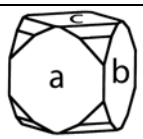
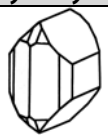
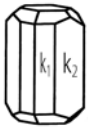
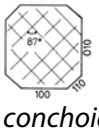
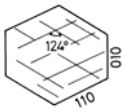
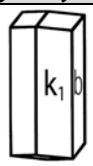
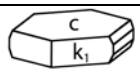
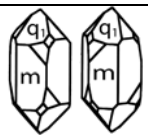
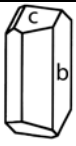
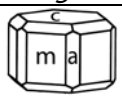
Mineral Category	Mineral name Chem. formula	Colour *Streak*	Hard ness	Lustre *Transparency*	Cleavage *Fracture*	Habit *Cryst. Syst.*	Remarks
Elements	**Graphite** C	steel grey, black *grey to black*	1	metallic, dull *opaque*	5 (excellent) *elastic flexible*	 hexagonal	colours paper, greasy touch
Sulfides	**Galena** PbS	lead grey *grey to black*	2,5-3	metallic *opaque*	5 (excellent) *conchoidal*	 *cubic*	sometimes iridescence
	Chalcopyrite $CuFeS_2$	brass yellow *Greenish black to black*	3,5-4	metallic *opaque*	1 (indistinct) *uneven*	 *tetragonal*	often Iridescence: brownish, blackish, colourful
	Pyrite FeS_2	bright to bright brass yellow *greenish and brownish black*	6-6,5	metallic *opaque*	1 (indistinct) *conchoidal*	 cubic	often iridescence: golden yellow, brownish, colourful
	Orpiment As_2S_3	lemon yellow, brownish yellow, orange yellow *pale lemon-yellow*	1.5 – 2	resinous, pearly on cleavage surface *translucent*	2-4 (fair to perfect) *uneven*	*monoclinic*	pigment found in wall paintings in Ladakh
Halides	**Fluorite** CaF_2	usually coloured, rarely colourless, *white*	4	glassy *transparent to opaque*	4 (perfect) *uneven*	 *cubic*	often fluorescent, during crushing typical unpleasant odour
	Halite **= Salt** NaCl	colourless to white, often coloured *white*	2	vitreous, greasy *transparent to opaque*	5 (excellent) *conchoidal, uneven*	 *cubic*	easily soluble in water, salty taste; cooking salt
Oxides, Hydroxides (cont. next page)	**Corundum** Al_2O_3	rarely colourless, often grey, blue, red *white*	9	vitreous *Transparent to opaque*	0 (none), *conchoidal*	 *trigonal*	varieties: Sapphire (blue), Ruby (red) etc.
	Hematite Fe_2O_3	greyish black *bright red to reddish brown*	5,5-6,5	metallic, dull *opaque*	0 (none) *uneven, conchoidal,*	 *trigonal - hexagonal*	pigment found in wall paintings in Ladakh (red ochre)
	Magnetite Fe_3O_4	Ferrous black *black*	5,5-6	metallic, dull *opaque*	1 (indistinct) *conchoidal,*	 *cubic*	magnetic

Mineral Category	Mineral name Chem. formula	Colour *Streak*	Hard ness	Lustre *Transparency*	Cleavage *Fracture*	Habit *Cryst. Syst.*	Remarks
Oxides, Hydroxides (cont.)	**Limonite** $FeOOH \cdot nH_2O$	brown to yellow, brownish black *braun bis gelb*	5-5,5	silky, often dull *transparent, mostly opaque*	4 (perfect) – difficultly detectable *uneven*	 *orthorhombic*	amorphous and cryptocrystalline mixture of Goethite and Lepidocrocite; pigment found in wall paintings in Ladakh (yellow ochre)
Carbo-nates	**Calcite** $CaCO_3$	colourless, often white, grey or coloured *white*	3	vitreous, silky, pearly *transparent to opaque*	5 (excellent) *conchoidal*	 *trigonal*	strong reaction in cold HCl (10%)
	Dolomite $CaMg[CO_3]_2$	colourless, white, often yellowish *white*	3,5-4	vitreous *transparent to translucent*	4 (perfect) *conchoidal*	 *trigonal*	hardly any reaction in cold HCl (10%)
	Malachite $Cu_2CO_3(OH)_2$	green, dark green, blackish green *light green*	3.5-4	vitreous - silky *Translucent to opaque*	2 – 4 (fair to perfect) *uneven*	*monoclinic*	pigment found in wall paintings in Ladakh
	Azurite $Cu_3[CO_3]_2(OH)_2$	azure blue, blue, light blue, dark blue *light blue*	3.5-4	vitreous *transparent to subtranslucent*	2 – 4 (fair to perfect) *Brittle - conchoidal*	*monoclinic*	pigment found in wall paintings in Ladakh
Sulfates	**Baryte** $BaSO_4$	Colourless, white, often pale pink *white*	3-3,5	vitreous, greasy looking *often translucent to opaque*	3 (good) *uneven, conchoidal*	 *orthorhombic*	high density, platelike habitus
	Anhydrite $CaSO_4$	colourless, white to grey *white to greyish white*	3-3,5	vitreous *transparent to translucent*	3 - 4 (good to perfect) *conchoidal*	 *orthorhombic*	Fractures into nearly dice shaped grains
	Gypsum $CaSO_4 \cdot 2H_2O$	colourless, whitish grey, yellow *white*	1,5-2	Vitreous *Transparent, translucent, opaque*	5 (excellent) *conchoidal, fibrous*	 *monoclinic*	Varieties: Selenite (glasslike), Alabaster (fine grained); efflores-cence
	Mirabilite $Na_2SO_4 \cdot 10H_2O$	colourless, white *white*	1,5-2	Vitreous *Transparent, translucent, opaque*	4 (perfect) *conchoidal*	*monoclinic*	easily soluble in water; efflorescence
	Thenardite Na_2SO_4	White *white*	2.5	vitreous, greasy *transparent*	4 (perfect) *Splintery*	*ortho-rhombic*	easily soluble in water; efflorescence
	Epsomite $MgSO_4 \cdot 7H_2O$	colourless, white *white*	2-2.5	vitreous *Transparent to translucent*	4 (perfect) *Acicular*	*ortho-rhombic*	easily soluble in water; efflorescence, bitter taste

Mineral Category	Mineral name Chem. formula	Colour *Streak*	Hard ness	Lustre *Transparency*	Cleavage *Fracture*	Habit *Cryst. Syst.*	Remarks
Silicates and Quartz	**Olivine** $(Mg,Fe)_2[SiO_4]$	pale green, oliv *white*	6,5-7	prism surfaces vitreous, fractured surfaces waxy *transparent to translucent*	2-3 (fair to good) *conchoidal*	 *ortho-rhombic*	"saccharoidal" apparence
	Chrysotile = Asbestos $Mg_3(Si_2O_5)(OH)_4$	green *white*	2.5	silky *translucent*	0 (none) *fibrous*	*monoclinic*	
	Lizardite $Mg_3(Si_2O_5)(OH)_4$	green, green blue, yellow, white *white*	2.5	silky *translucent*	4 (perfect)	*triclinic*	found in "Karsi"
	Garnet $X_3Y_2[SiO_4]_3$ X = Mg, Fe^{2+}, Mn^{2+}, Ca Y = Al, Fe^{3+}, Cr^{3+}, V^{3+}	very variable dependent on composition *white*	6,5-7,5	vitreous to resinous *translucent to opaque*	1 (indistinct) *conchoidal, splintery*	  *cubic*	varieties: Pyrope (MgAl; dark red), Almandine (Fe Al; brown red), Spessartine (Mn Al; brown), Grossular (Ca Al; pale green), Uwarowite (Ca Cr; green) etc.
	Kyanite (Disthen) $Al_2[O/SiO_4]$	clear blue, whitish *white*	4-4,5 and 6-7	vitreous *transparent to translucent*	2 und 4 (fair to perfect) *uneven*	 *triclinic*	anisotropic hardness
	Topaz $Al_2[F_2/SiO_4]$	clear (if no impurities), blue, brown, orange, gray, yellow, pink, reddish pink and green *white*	8	vitreous *transparent to translucent*	4 (perfect) *conchoidal*	 *ortho-rhombic*	
	Tourmaline XY_3Z_6 $[(OH)_4/(BO_3)_3/Si_6O_{18}]$ X = Na, Ca Y = Al, Fe^{2+}, Fe^{3+}, Mg, Ti^{4+}, Cr^{3+} Z = Al, Fe^{3+}, Mn	very variable according to composition *white*	7	vitreous *transparent to translucent*	0 (none), *conchoidal, uneven, splintery*	 *trigonal*	varieties: Schorl (black), Dravite (brown), Elbaite (green) etc.
	Pyroxene $XY[Z_2O_6]$ X = Li, Na^+, Ca^+, Fe^{2+}, Mg Y = Fe2+, Fe3+, Mg, Mn, Ti, Al, Cr^{3+} Z = Si^{4+}, Al^{3+}	often black, greenish and brownish black *Not very characteristic: greyish green or brown, white*	5,5-7	vitreous *Opaque, rarely translucent*	2-3 (fair - good), angle of cleavage planes +/- 90°  *conchoidal, uneven*	 *monoclinic*	often more stocky habit and more dull fracture plains than Amphiboles

Mineral Category	Mineral name Chem. formula	Colour *Streak*	Hard ness	Lustre *Transparency*	Cleavage *Fracture*	Habit *Cryst. Syst.*	Remarks
	Amphibole $A_{0\text{-}1}B_2C_5[(OH, F)_2/T_8O_{22}]$ $A = Na^+, K^+$ $B = Ca^{2+}, Na^+, Mg^{2+}, Fe^{2+}, Mn^{2+}$ $C = Mg^{2+}, Fe^{2+}, Mn^{2+}, Al^{3+}, Fe^{3+}, Ti^{4+},$ $T = Si^{4+}, Al^{3+}$	often black, greenish and brownish black *Not very characteristic: greyish green, yellow or brown, white*	5-6	vitreous *opaque*	4 (perfect) angle of cleavage planes +/- 120°  *uneven*	 *monoclinic*	often more columnar habit than Pyroxenes
	Talc $Mg_3[(OH)_2/Si4O_{10}]$	Bright green, white, grey, yellowish *white*	1	waxy, pearly, dull *translucent*	5 (excellent) *uneven*	*monoclinic*	greasy touch
	Muscovite = white mica $KAl_2(OH)_2AlSi_3O_{10}$	colourless, silvery, yellowish, greenish *white*	2-2,5		5 (excellent) *micaceous*	 *monoclinic*	easily delaminated
	Biotite = dark mica $K(Mg,Fe)_3(OH)_2 (Al,Fe)Si_3O_{10}$	black, dark brown, dark green *white*	2,5-3	pearly *translucent to opaque*	5 (excellent) *micaceous*	*monoclinic*	easily delaminated; golden weathering colour
	Quarz SiO_2	colourless, often white to grey, various colours *white*	7	prism surfaces vitreous, fractured surfaces waxy to dull *transparent, to opaque*	0 (none) *conchoidal, also granular, splintery fibrous*	 *trigonal*	many varieties: rock cryst., Citrine, Onyx, Agate, Amethyste, smoky quartz, rose quartz, Chalcedony, Carnelian, Jasper, Chrysoprase etc.
	Opal $SiO_2 \cdot nH_2O$	colourless, diverse colourations *white*	5,5-6,5	vitreous, dull waxy, *opaque to transparent*	0 (none) *conchoidal*	*amorphous no crystals*	amorphous, glasslike and dense material, opalescent!
	Orthoclase = alkali feldspar $K[AlSi_3O_8]$	reddish, yellow, white *white*	6	vitreous *opaque*	3-4 (good – perfect) cleav. planes angle 90° *conchoidal*	 *monoclinic*	typically displays carlsbad twinning, fractures in right angles
	Plagioclase Albite (Ab): $Na[AlSi_3O_8]$ Anorthite (An): $Ca[Al_2Si_2O_8]$	white, grey, greenish, yellowish *white*	6-6,5	vitreous *translucent*	4 (perfect) angle of cleav. planes 86°-88° *conchoidal*	 triclinic	often polysynthetic twinning
	Leucite $K[AlSi_2O_6]$	white, grey, colourless *white*	5,5-6	glassy waxy *translucent to opaque*	0 (none) *conchoidal, uneven*	 *tetragonal*	does not occur together with quartz
	Nepheline = nephelite $Na[AlSiO_4]$	colourless, white *white*	5,5-6	vitreous on prism surfaces, waxy on fract. *translucent to opaque*	0-1 (none to indistinct) *conchoidal*	 *hexagonal*	does not occur together with quartz
	Lazurite = Lapis Lazuli $Na_3CaAl_3Si_3O_{12}S$	blue *light blue*	5.5	vitreous -d ull *translucent*	1 (indistinct) *conchoidal*	*cubic*	does not occur together with quartz