AMPHIBOLE. Hornblende.

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Twins: (1) tw. pl. a(100), common as contact-twins; rarely polysynthetic. (2) c(001), as tw. lamellae, occasionally producing a parting analogous to that more common with pyroxene (Fig. 487, p. 195). Crystals commonly prismatic; usually terminated by the low clinodome, r(001), sometimes by r and p($\bar{1}$01) equally developed and then suggesting rhombohedral forms (as of tourmaline). Also columnar or fibrous, coarse or fine, fibers often like flax; rarely lamellar; also granular massive, coarse or fine, and usually strongly coherent, but sometimes friable.

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The problem of the composition of the amphiboles is a complex one and has been the object of much study. Extensive replacements of one element by another may take place, giving rise to a wide variation in chemical composition. It is impossible to summarize here the various interpretations of the composition that have been offered in the past or even to indicate all the views that different mineralogists hold at present. See p. 568 and further under the different varieties described below.

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4. TREMOLITE. Grammatite, nephrite in part. Calcium-magnesium amphibole. Formula has commonly been given as $CaMg_3Si_4O_{12}$; but from a study of the atomic structure by means of X-rays it is shown that the composition is more accurately given by the formula $Ca_2Mg_5(OH)_2(Si_4O_{11})_2$. Ferrous iron occurs replacing the magnesium, tremolite thus grading into actinolite. Small amounts of other molecules involving alkalies may also be present. Colors white to dark gray. In distinct crystals, either long-bladed or more rarely short and stout. In aggregates long and thin columnar, or fibrous; also compact granular massive (nephrite, below). G. = 2·9-3·2. Sometimes transparent and colorless. Optically -. Extinction-angle on b(010), or $Z \wedge c$ axis = +16° to 18°, hence $Bx_a \wedge c$ axis = -74° to -72°. 2V = 80° to 88°. α = 1·60, β = 1·61, γ = 1·62 for nearly pure tremolite, the values increasing with increase of the actinolite molecule.

Tremolite was named by Pini from the Tremola valley on the south side of the St. Gotthard.

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5. ACTINOLITE. Calcium-magnesium-iron amphibole. Formula $Ca_2(Mg,Fe)_5(OH)_2(Si_4O_{11})_2$. The amount of the iron molecule, $Ca_2Fe_5(OH)_2(Si_4O_{11})_2$, varies up to between 40 and

50 per cent of the total. Alkalies also sometimes present in small amounts. Color bright green and grayish green. In crystals, either short- or long-bladed, as in tremolite; columnar or fibrous; granular massive. G. = 3-3·2. Sometimes transparent. The variety in long bright-green crystals is called glassy actinolite; the crystals break easily across the prism. The fibrous and radiated kinds are often called asbestiform actinolite and radiated actinolite. Actinolite owes its green color to the ferrous iron present.

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Asbestos. Asbestus. Tremolite, actinolite, and other varieties of amphibole, excepting those containing much alumina, pass into fibrous varieties, the fibers of which are sometimes very long, fine, flexible, and easily separable by the fingers, and look like flax. These kinds are called asbestos (from the Greek for incombustible). The colors vary from white to green and wood-brown. The name amianthus is applied usually to the finer and more silky kinds. Much that is popularly called asbestos is chrysotile, or fibrous serpentine, containing 12 to 14 per cent of water. Byssolite is a stiff fibbous variety.

Copied from - Dana, E. S. and W. E. Ford, A textbook of mineralogy. John Wiley, N. Y. 4th ed. 1932, p. 571