Mica

Micas are a group of minerals whose outstanding physical characteristic is that individual mica crystals can easily be split into extremely thin elastic plates. This characteristic is described as perfect basal cleavage. Mica is common in igneous and metamorphic rock and is occasionally found as small flakes in sedimentary rock.[5] It is particularly

prominent in many granites, pegmatites, and schists,[6] and "books" (large individual crystals) of mica several feet across have been found in some pegmatites.[7]

Mica

General

Category	Phyllosilicates
Formula (repeating unit)	$AB_{2-3}(X, Si)_4O_{10}(O, F, OH)_2$

Identification

Color	purple, rosy, silver, gray (lepidolite); dark green, brown, black (biotite); yellowish-

	brown, green-white (phlogopite); colorless, transparent (muscovite)
Cleavage	Almost perfect
Fracture	flaky
Mohs scale hardness	2.5–4 (lepidolite); 2.5–3 biotite; 2.5–3 phlogopite; 2–2.5 muscovite
Luster	pearly, vitreous
Streak	White, colorless
Specific gravity	2.8–3.0
Diagnostic features	cleavage

Dark mica from Eastern Ontario

Micas are used in a variety of products ranging from drywalls, paints, fillers, especially in parts for automobiles, roofing and shingles, electronics etc.

Properties and structure

The mica group includes 37 phyllosilicate minerals. All crystallize in the monoclinic

system, with a tendency towards pseudohexagonal crystals, and are similar in structure but vary in chemical composition. Micas are translucent to opaque with a distinct vitreous or pearly luster, and different mica minerals display colors ranging from white to green or red to black. Deposits of mica tend to have a flaky or platy appearance.[8]

The crystal structure of mica is described as *TOT-c*, meaning that it is composed of parallel *TOT* layers weakly bonded to each other by cations (*c*). The *TOT* layers in turn

consist of two tetahedral sheets (*T*) strongly bonded to the two faces of a single octahedral sheet (*O*). It is the relatively weak ionic bonding between *TOT* layers that gives mica its perfect basal cleavage.[9]

The tetrahedral sheets consist of silica tetrahedra, which are silicon ions surrounded by four oxygen ions. In most micas, one in four silicon ions is replaced by an aluminium ion, while half the silicon ions are replaced by aluminium ions in brittle micas. The tetrahedra each share

at higher temperatures (to 900 °C (1,650 °F)) and is used in applications in which a combination of high-heat stability and electrical properties is required. Muscovite and phlogopite are used in sheet and ground forms.[17]

Ground mica

The leading use of dry-ground mica in the US is in the joint compound for filling and finishing seams and blemishes in gypsum wallboard (drywall). The mica acts as a filler and extender, provides a smooth

consistency, improves the workability of the compound, and provides resistance to cracking. In 2008, joint compound accounted for 54% of dry-ground mica consumption. In the paint industry, ground mica is used as a pigment extender that also facilitates suspension, reduces chalking, prevents shrinking and shearing of the paint film, increases the resistance of the paint film to water penetration and weathering and brightens the tone of colored pigments. Mica also promotes paint adhesion in aqueous and oleoresinous formulations. Consumption

of dry-ground mica in paint, the second-ranked use, accounted for 22% of the dry-ground mica used in 2008.[17]

Ground mica is used in the well-drilling industry as an additive to drilling fluids. The coarsely ground mica flakes help prevent the loss of circulation by sealing porous sections of the drill hole. Well drilling muds accounted for 15% of dry-ground mica use in 2008. The plastics industry used dry-ground mica as an extender and filler, especially in parts for automobiles as lightweight insulation to

reinforcing additives for polymers to increase strength and stiffness and to improve stability to heat, chemicals, and ultraviolet (UV) radiation; in heat shields and temperature insulation; in industrial coating additive to decrease the permeability of moisture and hydrocarbons; and in polar polymer formulations to increase the strength of epoxies, nylons, and polyesters.[17]