

BYTOWNITE

Calcium-rich plagioclase feldspar · $An_{70}-An_{90}$ · Mineralogical fact sheet

COLLECTORS & GEMOLOGY
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$(Na,Ca)(Si,Al)_4O_8$ · Triclinic system · Plagioclase series

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Physical Properties		Main Localities		
Property	Value	Country / Region	Relevance	
Hardness (Mohs)	6 – 6.5	Mexico	Main source of facetable gem material · transparent golden	
Specific gravity	2.74 – 2.75 g/cm³	USA (Oregon, Montana)	Lake County Oregon · Stillwater Complex Montana	
Refractive index	nα 1.563–1.572 / nβ 1.568–1.578 / nγ 1.573–1.583	USA (Arizona, New Mexico)	Lucky Cuss Mine Tombstone · facetable crystals	
Birefringence	Low (biaxial character)	South Africa (Bushveld)	Large masses in layered mafic intrusion	
Optical character	Biaxial	Madagascar	Crystal masses · strong colour saturation	
Fracture	Irregular to subconchoidal	Canada (Ottawa)	Historical type locality · original material no longer exists	
Cleavage	Perfect in 2 directions · angle ~86°			
Lustre	Vitreous to pearly			
Streak	White			
Crystal habit	Tabular prismatic · polysynthetic twinning			
Varieties & Colours		Differentiation from Other Gems		
Colour	Description	vs.	Bytownite	Key distinction
White / grey / cream	Most common in mineralogical specimens worldwide	Labradorite	An70–An90 SG 2.74–2.75	Labradorite: An50–An70 · typical labradorescence · lower RI
Golden / honey	Most prized in gemology · Mexico and Oregon	Chrysoberyl	Hardness 6–6.5 Cleavage ~86°	Chrysoberyl: hardness 8.5 · orthorhombic · much harder
Pale yellow / orange	Transparent crystals · highly appreciated by collectors	Yellow topaz	SG 2.74–2.75	Topaz: hardness 8 · perfect basal cleavage · orthorhombic
Diagnostic polysynthetic twinning: fine parallel striations on cleavage faces, visible to the naked eye or with a loupe. Unequivocal characteristic of plagioclase feldspar. Labradorescence is exceptional in bytownite and highly prized.		Citrine quartz	Perfect cleavage 2 dir.	Quartz: no cleavage · conchoidal fracture · SG 2.65
Identification & Optical Phenomena		Care & Maintenance		
✓ Natural bytownite	Visible twinning striations · double cleavage ~86° · SG 2.74–2.75	✓ Cleaning	Warm water + mild neutral soap + very soft brush + dry immediately	
✗ Warning signs	No twinning striations on cleavage · incorrect SG · no double cleavage	✓ Storage	Padded case · away from harder gems (corundum, topaz, diamond)	
Labradorescence	Exceptional in bytownite · very particular local conditions · collector's rarity	✗ Avoid	Ultrasonic · steam · impacts on edges · abrasives · harsh chemicals	
Precise analysis	Chemical analysis · XRD · petrography · Michel-Lévy extinction angles	⚠ Cleavage	Perfect in 2 directions · very susceptible to fracture · use protective settings	

SCIENTIFIC & PLANETARY IMPORTANCE

Rock-forming mineral in gabbros and anorthosites — most abundant minerals of the mafic crust. Bytownite-anorthite plagioclase is characteristic of lunar highland rocks. Also present in meteorites and other planetary bodies.

Historical context	Mineralogical classification	Scientific curiosity
Described in 1836, named after Bytown (now Ottawa), Canada. In 1893 the original material was confirmed to be a mixture; in 1915 the Geological Survey of Canada concluded it was a mixture of bytownite, anorthosite, spinel and chondrodite. The original locality no longer exists.	The IMA does not recognise bytownite as an independent species (50% rule). It is a valid compositional term for plagioclases $An_{70}-An_{90}$, widely used in petrology and gemology. Classification: Tectosilicates · Plagioclase feldspars.	Bytownite-anorthite plagioclase is abundant in the lunar highlands. The Japanese orbiter SELENE detected nearly monomineralic anorthosites on the Moon, analogous to terrestrial bytownite-bearing anorthosites.