Bouazzerite, Bi₆(Mg,Co)₁₁Fe₁₄[AsO₄]₁₈O₁₂(OH)₄(H₂O)₈₆, is a new mineral occurring in “Filon 7” at the Bou Azzer mine, Anti-Atlas, Morocco. Bouazzerite is associated with quartz, chalcopyrite, native gold, erythrite, talmessite/roselite-beta, Cr-bearing yukonite, alumopharmacosiderite, powellite, and a blue-green earthy copper arsenate related to geminite. The mineral results from the weathering of a Variscan hydrothermal As-Co-Ni-Ag-Au vein. The Bou Azzer mine and the similarly named district have produced many outstanding mineral specimens, including the world’s best erythrite and roselite.

Bouazzerite forms monoclinic prismatic {021} crystals up to 0.5 mm in length. It has a pale apple green color, a colorless streak, and is translucent with adamantine luster. \( d_{calc} = 2.81(2) \, \text{g/cm}^3 \) (from X-ray structure refinement). The new mineral is biaxial with very weak pleochroism from yellow to pale yellow; the refractive indices measured on the (021) cleavage face range from \( n_{min} = 1.657 \) to \( n_{max} = 1.660 \); the Gladstone-Dale relationship provides a value of 1.65. The empirical chemical formula is \( \text{Bi}_{6.14}\text{Fe}_{12.6}\text{Mg}_{8.45}\text{Co}_{0.48}\text{Ni}_{0.12}\text{Ca}_{0.23}(\text{As}_{17.0}\text{Cr}_{0.64}\text{Si}_{0.32})\Sigma_{18.0}\text{O}_{174.6}\text{H}_{184} \). Bouazzerite is monoclinic, \( P_2_1/n, Z = 2 \), with \( a = 13.6322(13) \, \text{Å}, b = 30.469(3) \, \text{Å}, c = 18.4671(18) \, \text{Å}, \beta = 91.134(2)^\circ \), and \( V = 7669.0(13) \, \text{Å}^3 \). The eight strongest lines in the X-ray powder diffraction pattern are \( d_{in} \, \text{Å} (I(hkl)) \): 11.79(100)(021), 10.98(80)(101/101), 10.16(80)(120), 7.900(80)(022), 12.45(70)(110), 15.78(60)(011), 3.414(40)(333/400), 3.153(40)(353/225).

The crystal structure of bouazzerite is based upon \([\text{Bi}_3\text{Fe}_7\text{O}_6(\text{OH})_2(\text{AsO}_4)_9]^{11–}\) anionic nanoclusters that are built around \([\text{trigonal prismaticFe}_{3+}(\text{octahedralFe}_{3+}\text{OH}O_{12})_2]^{29–}\) groups, containing one Fe³⁺ ion in trigonal prismatic coordination and six Fe³⁺ ions in octahedral coordination. The nanoclusters have a diameter of about 1.3 nm and are linked together by chains of Mg(O,H₂O)₆ octahedra. The resulting arrangement displays channels down [100] that contain structural water. Bouazzerite is the first mineral based upon Bi- and As-containing ferric nanoclusters. Its discovery provides a unique insight into transport mechanisms of toxic elements in the oxidation zones of sulfide mineral deposits in the form of complex Fe-As nanoparticles.

**Keywords:** Bouazzerite, new mineral, crystal structure determination, trigonal prismatic coordination, Bou Azzer province, Anti-Atlas, Morocco