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The tetrahedrite group: Nomenclature and classification

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Abstract

The classification of the tetrahedrite group minerals in keeping with the current IMA-accepted nomenclature rules is discussed. Tetrahedrite isotypes are cubic, with space group symmetry $I\bar{4}3m$. The general structural formula of minerals belonging to this group can be written as ${}^{M(2)}A_6{}^{M(1)}(B_4C_2)^{X(3)}D_4{}^{S(1)}Y_{12}{}^{S(2)}Z$, where A = Cu^+, Ag^+, □ (vacancy), and $(Ag_6)^{4+}$ clusters; B = Cu^+, and Ag^+; C = Zn^{2+}, Fe^{2+}, Hg^{2+}, Cd^{2+}, Mn^{2+}, Cu^{2+}, Cu^+, and Fe^{3+}; D = Sb^{3+}, As^{3+}, Bi^{3+}, and Te^{4+}; Y = S^{2-} and Se^{2-}; and Z = S^{2-}, Se^{2-}, and □. The occurrence of both Me^+ and Me^{2+} cations at the $M(1)$ site, in a 4:2 atomic ratio, is a case of valency-imposed double site-occupancy. Consequently, different combinations of B and C constituents should be regarded as separate mineral species. The tetrahedrite group is divided into five different series on the basis of the A, B, D, and Y constituents, i.e., the tetrahedrite, tennantite, freibergite, hakite, and giraudite series. The nature of the dominant C constituent (the so-called "charge-compensating constituent") is made explicit using a hyphenated suffix between parentheses. Rozhdestvenskayaite, arsenofreibergite, and goldfieldite could be the names of three other series. Eleven minerals belonging to the tetrahedrite group are considered as valid species: argentotennantite-(Zn), argentotetrahedrite-(Fe), kenoargentotetrahedrite-(Fe), giraudite-(Zn), goldfieldite, hakite-(Hg), rozhdestvenskayaite-(Zn), tennantite-(Fe), tennantite-(Zn), tetrahedrite-(Fe), and tetrahedrite-(Zn). Furthermore, annivite is formally discredited. Minerals corresponding to different end-member compositions should be approved as new mineral species by the IMA-CNMNC following the submission of regular proposals. The nomenclature and classification system of the tetrahedrite group, approved by the IMA-CNMNC, allows the full description of the chemical variability of the tetrahedrite minerals and it is able to convey important chemical information not only to mineralogists but also to ore geologists and industry professionals.

Keywords: Tetrahedrite group, sulfosalts, nomenclature, classification