Characterization of a Newfound Manganese Tungstate Mineral of Hübnerite in Turquoise Gemstone from Miduk Mine, Kerman, Iran

Authors : Zahra Soleimani Rad, Fariborz Masoudi, Shirin Tondkar

Abstract : Turquoise is one of the most well-known gemstones in Iran. The mineralogy, crystallography, and gemology of Shahr-e-Babak turquoise in Kerman were investigated and the results are presented in this research. The Miduk porphyry copper deposit is positioned in the Shahr-Babak area in Kerman province, Iran. This deposit is located 85 km NW of the Sar-Cheshmeh porphyry copper deposit. Preliminary mineral exploration was carried out from 1967 to 1970. So far, more than fifty diamond drill holes, each reaching a maximum depth of 1013 meters, have provided evidence supporting the presence of significant and promising porphyry copper mineralization at the Miduk deposit. The mineral deposit harbors a quantity of 170 million metric tons of ore, characterized by a mean composition of 0.86% copper (Cu), 0.007% molybdenum (Mo), 82 parts-per-billion gold (Au), and 1.8 parts-per-million silver (Ag). The Supergene enrichment layer, which constitutes the predominant source of copper ore, exhibits an approximate thickness of 50 meters. Petrography shows that the texture is homogeneous. In terms of a gemstone, greasy luster and blue color are seen, and samples are similar to what is commonly known as turquoise. The geometric minerals were detected in XRD analysis by analyzing the data using the x-pert software. From the mineralogical point of view; the turquoise gemstones of Miduk of Kerman consist of turquoise, quartz, mica, and hübnerite. In this article, to our best knowledge, we are stating the hübnerite mineral identified and seen in the Persian turquoise. Based on the obtained spectra, the main mineral of the Miduk samples from the six members of the turquoise family is the turquoise type with identical peaks that can be used as a reference for identification of the Miduk turquoise. This mineral is structurally composed of phosphate units, units of Al, Cu, water, and hydroxyl units, and does not include a Fe unit. In terms of gemology, the quality of a gemstone depends on the quantity of the turquoise phase and the amount of Cu in it according to SEM and XRD analysis.

Keywords : turquoise, hübnerite, XRD analysis, Miduk, Kerman, Iran
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