Geology, alteration, mineralogy and geochemistry of Cheshmeh Zagh Cu±Au occurrence, Khorasan Razavi province: probably evidence of volcanic massive sulfide mineralization

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Abstract: The Cheshmeh Zagh area is located on Khorasan Razavi Province, the southern parts of the Sabzevar zone, which is one of the most important metallogeny zones of Iran. Lithologically, the area includes a variety of Late Cretaceous volcanic rocks (dacite to basalt), intrusions (gabbro to synogranite), Oligo-Miocene sedimentary rocks, and Quaternary sediments. Alteration zones of propylitic, chloritization, and epidotization well developed but the main mineralization zones can be seen in the form of two lens-shaped zones which are surrounded by argillic and silicification-sericitation alterations. Hypogene minerals include pyrite, chalcopyrite, and magnetite; while secondary minerals contain malachite, covellite, and iron oxides. The maximum content of the main elements in the main mineralization zones includes 1.5% Cu, 2230 ppb Au, 40 ppm Mo, 363 ppm Pb, and 738 ppm of Zn. Factors, such as the tectonic setting of the Sabzevar zone, the presence of a large number of Cu-Mn and deposits in relation to the submarine volcanic activities in the region, and the accompanying mineralization with dacitic volcanic rocks containing specific alterations in the Cheshmeh Zagh area, all indicate a probability of the Bimodal Felsic-type (Kuroko) volcanic massive sulfide origin for these deposits. The Sabzevar structural zone has a great potential for exploration of this type of deposit, which should be taken into consideration.

Keywords: Mineralization; geochemistry; volcanic massive sulfide deposit; Cheshmeh Zagh; Sabzevar zone.

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