

About mineralogical-geochemical peculiarities of copper-porphyrific ores in the Garadagh-Kharkhar ore field (Lesser Caucasus, Azerbaijan)

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Copper-porphyrific deposits due to the Cenozoic magmatism, in the Miskhan-Zangezur and Geicha-Akerine zones of the Lesser Caucasus have been known long ago. The NE part of the Lesser Caucasus in Mesozoic was characterized by strong manifestations of volcanic-plutonic magmatism, and a lot of ore formations are linked with this except for copper-porphyrific ones, where no copper-molibdenian deposits and ore-seeps have been ever known. For this reason, a false notion on «the hopelessness* or «the sterility» of the above mentioned magmatism in the region in respect of the copper-porphyrific mineralization, have existed for a long time. Only after the 60s of the XXth century, as a result of detailed geological survey and exploration-geochemical investigations of azerbaijan geologists and scientists, there has been proven falseness of such notions, as in the 60s-70s of the XXth century they discovered a new for this region commercial-genetic type of the copper-porphyrific ores characterized by relatively young zones of hypergenesis in the whole NE part of the Lesser Caucasus - in the Gyadabei, Garabagh and Murovdag ore regions. The copper-porphyrific mineralization in the NE part, on the whole, is genetically linked with ore-bearing hydrothermal phase of late Jurassic small intrusions and dykes of the quartz-dioritic porphyrites which are particular facies of the granitoid intrusion of the late Jurassic. Hence, it was determined that in the history of the evolution of the Lesser Caucasian eugeosyncline, the copper-porphyrific mineralization took part twice. Garadagh field can be characterized by its geological-genetic, mineralogical-geochemical, petrological-metasomatic and texture-structural peculiarities of ores which reflect typical features of copper-porphyrific formation ores. Sustainable material-mineral composition and simple association of initial ore minerals characterize an important peculiarity of Garadagh field. Mineral-material ore composition has been studied by precession mineralogical-analytic methods (roentgenometric, thermographic, microscopic, atom-absorbtion, roentgenospectral, quantitative-spectral, crystalloptic and so on). Peculiarities of copper-porphyrific ores composition and distribution patterns of the basic (Cu, Mo) and indicator (Ag, Pb, Co, Ni, Sc, V, Ba, Sr) elements in ore-bearing metasomatites enable to predict depths and flanges of fields. In Garadagh field and in its Khakhar and Khoshal areas stockwork bodies and mineralized zones contain Cu from 0,3-0,8 to 1,0-2,0 % and more, it is averagely 0,47 % (on flank 0,30 %), and Mo - 0,004 %. Garadagh field is also characterized by availability of hypergenesis which is represented by oxidation, leaching zones and secondary sulphide enrichment and also by mixed and primary ores which are differed in various Cu and Mo contents. A number of minerals (malachites, azurite, chalcosine, chrysocolla, turquoise, etc.) of hypergenesis zone can be used as direct search features to find buried copper-porphyrific ores. Texture and structure of primary ores and ores of hypergenesis zones are characterized by unusual monotony. Metasomatic changes of rocks-container are represented by secondary quartzites, propylites, argilizites. Geological-genetic, mineralogical-geochemical and texture-structural peculiarities of copper-porphyrific ores of Garadagh field reflect typical properties which are the same for copper-porphyrific formation ores as a whole. Sustainable material-mineral composition and simple association of primary ore minerals characterize an important peculiarity of copper-porphyrific formation fields.

Karadag-Kharkhar cevherleşme sahasındaki (Aşagi Kafkaslar, Azerbaycan) bakir ve porfiri(tik) cevherlerin mineralojik-jeokimyasal ozellikleri

Asagi Kafkaslarda Miskhan-Zangezur ve Geicha-Akerine zonlarda yeralan, Senozoik magmatizmasi sonucunda olusan bakir-porfiri(tik) yataklan uzun silredir bilinmektedir. Mesozoik'te Asagi Kafkaslarm KD bolumil yogun volkanik-plutonik magmatizmamn varligi ile karakteristikti ve bakir-porfiri(tik) yataklar haric, 90k sayida cevher olusumu bu ozellikle baglantidir. Bu bolgede hicbir bakir-molibden yatagi ya da cevher kaynagi bilinmemekteydi.

Bu nedenle, yukarida anilan bolgedeki magmatizmanin bakir-porfiri(tik) cevherleşme acisindan "umutsuz" ya da "steril" oldugu yanhs kanisi gecerliligini uzun silre korumustur. Ancak, 20.

yiizyilm 60'li yillanndan sonra Azerbaycanli jeologlarin ve bilim-insanlannin yuriittiigii jeolojik etilt ve aramalar ve jeokimyasal arastirmalar sonucunda 1960'li ve 1970'li yillarda Asagi Kafkaslarm tilm KD bolumilnde -Gyadabei, Garabagh ve Murovdag cevherlesme bolgeleri- bu bolge icin yeni olan, goreli gene ve yogun bicimde gelismis zonlari bulmalanyla bu dusiincenin yanhsliigi kamtlanmis oldu. KD bolumilndeki bakir-porfiri(tik) cevherlesmesi, bir biltiln olarak, gee Jura dilimindeki granitoid intrilzyonunun ozgilm bir fasiyesi olan gee Jura yasli kuvars-diyoritik porfir intrilzyonlari ve dayklarmm cevher-iceren hidrotermal evresi ile kokensel olarak iliskilidir. Bu nedenle, bakir-porfiri(tik) cevherlesmesinin Asagi Kafkaslar ojeosenklinalinin evrim tariheesine iki kez katildigi saptanmistir. Garadagh sahasi, cevherlerinin, bakir-porfiri olusumu cevherlerin tipik ozelliklerini yansitan jeolojik-kokensel, mineralojik-jeokimyasal, petrolojik-metasomatik ve dokusal-yapisal ozellikleri ile karakteristiktir. Stlrtdlrtilen malzeme-mineral bilesimi ve birincil cevher mineralleri birligi, Garadagh sahasmin onemli bir ozelligini karakterize eder. Cevher mineral-malzeme bilesimi mineralojik-analiz metodlari ile (rontgenometrik, termografik, mikroskobik, atomik-absorpsiyon, rontgen spektrumu, nicel spektrum, kristal-optik vd) cahsilmistir. Cevher-iceren metasomatitlerdeki bakir-porfiri cevherler bilesiminin ozellikleri ve temel (Cu, Mo) ve indikator elementlerin (Ag, Pb, Co, Ni, Sc, V, Ba, Sr) dagilim modeli, sahalarin derinliklerinin tahmin edilmesi olanagim saglar. Garadagh sahasinda ve bu sahamn Khakhar ve Khoshal yorelerindeki agsi (stockwork) olusuklar ve cevherlesme zonlarmm Cu icerigi % 0.3-0.8 ile %1.0-2.0 (ve daha fazlasi) araligmda degisir; ortalama deger % 0.47, kanatlarda % 0.30'dur. Mo icerigi ise ~% 0.004'dir. Garadagh sahasi, oksidasyon, lie zonlari ve ikincil sillfit zenginlesmesi ile kamtlanan yogun gelismislik ve degisik Cu ve Mo icerikleri ile farkhlasan karisik ve birincil cevherler varhgi ile karakteristiktir. Yogun gelisme zonundaki bir dizi mineral (malahit, azurit, kalkosin, krizokol, turkuaz vd), gomillil bakir-porfiri cevherlesmelerini bulmak igin dogrudan arastirma unsuru olarak kullamlabilir. Birincil cevherlerin ve yogun gelisme zonlari cevherlerinin doku ve yapilan ahsilmadik olctide tekdilzedir. Kayag topluluklardaki metasomatik degisimler, ikincil kuvarsitler, profillitler ve arjilitlemeler ile karakterize edilir. Garadagh sahasi bakir-porfiri cevherlerinin jeolojik-kokensel, mineralojik-jeokimyasal ve dokusal-yapisal ozellikleri, bir biltiln olarak bakir-porfiri olusuklan cevher(lesme)leri ile aym tipik ozellikleri yansitir. Stlrtdlrtilen malzeme-mineral bilesimi ve birincil cevher mineralleri birligi, bakir-porfiri olusuklari sahalarmm onemli bir ozelligini karakterize eder.