Karakteristik Alterasi dan Mineralisasi Endapan Emas pada Sistem Hidrotermal Magmatik di Daerah "X", Jawa Timur = Alteration and Mineralization Characteristics of Gold Deposits in The Magmatic Hydrothermal System in Area "X", East Java

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Abstrak

Daerah penelitian “X” merupakan daerah prospek alterasi dan mineralisasi endapan emas yang termasuk dalam Zona Pegunungan Selatan Jawa bagian Timur. Penelitian ini bertujuan untuk mengetahui karakteristik alterasi dan mineralisasi endapan emas meliputi kehadiran himpunan mineral alterasi, mineral bijih, geokimia bijih, tekstur mineralisasi, persebaran zona alterasi hidrotermal, serta paragenesa endapan mineral bijih pada daerah penelitian. Pada penelitian ini, terdapat empat metode yang dilakukan meliputi petrografi, mineragrafi, XRD, dan AAS. Analisis petrografi dilakukan untuk mengamati karakteristik tekstur urat, mengidentifikasi kandungan mineral penyusun batuan dan keterdapatan himpunan mineral penciri zona alterasi hidortermal pada sampel batuan. Analisis XRD dilakukan untuk mengidentifikasi asosiasi mineral-mineral ubahan yang terbentuk pada zona alterasi di daerah penelitian yang sulit teridentifikasi melalui analisis petrografi. Analisis mineragrafi dilakukan untuk mengetahui karakteristik mineral bijih yang hadir, tekstur mineral bijih, keterdapatan mineral bijih yang berasoasiasi dengan endapan emas, serta penentuan paragenesa endapan mineral bijih pada daerah penelitian. Analisis AAS dilakukan untuk mengetahui keterdapatan unsur logam beserta kadar masing-masing unsur logam yang teridentifikasi pada daerah penelitian. Berdasarkan analisis petrografi dan XRD, zona alterasi hidrotermal yang berkembang pada daerah penelitian terdiri dari zona alterasi argilik dan propilitik. Zona alterasi argilik dicirikan oleh kehadiran mineral montmorillonite dan dickite dengan temperatur pembentukan diperkirakan pada rentang suhu 200°-250°C. Zona alterasi propilitik dicirikan oleh melimpahnya kehadiran mineral klorit, epidot, dan kalsit dengan temperatur pembentukan diperkirakan pada rentang suhu 120°-320°C. Berdasarkan analisis petrografi menunjukkan kehadiran tekstur urat pada daerah penelitian meliputi tekstur comb dan mosaic. Berdasarkan analisis mineragrafi, mineral bijih yang hadir di daerah penelitian meliputi mineral magnetit, pirit, kalkopirit, galena, rutil, ilmenit, hematit, kalkosit, goethite, dan hydrous iron oxide dengan tekstur mineral bijih berupa tekstur open space filling, diseminasi, penggantian, intergrowth, colloform, dan eksolusi. Berdasarkan analisis AAS, kehadiran emas ditunjukkan oleh terdeteksinya kadar unsur logam Au sebesar 0,09 - 2,5 ppm. Terdapat beberapa unsur logam lainnya yang teridentifikasi pada analisis AAS meliputi Cu, Pb, Zn, dan Ag. Mineral bijih yang berasosiasi dengan endapan emas pada daerah penelitian meliputi mineral pirit, kalkopirit, dan galena. Paragenesa endapan mineral bijih daerah penelitian terbagi menjadi dua tahap pembentukan yang diawali oleh terbentuknya mineral primer pada tahap hipogen meliputi mineral magnetit, pirit, kalkopirit, galena, rutil, dan ilmenit serta dilanjutkan oleh terbentuk mineral sekunder pada tahap supergen meliputi mineral hematit, kalkosit, goethite, dan hydrous iron oxide. Berdasarkan karakteristik alterasi dan mineralisasinya daerah penelitian termasuk dalam sistem endapan porfiri dan epitermal sulfidasi rendah.

.....Research area "X" is a prospect area for alteration and mineralization of gold deposits which is included in the Southern Mountain Zone of Eastern Java. This research aims to determine the characteristics of

alteration and mineralization of gold deposits including the presence of alteration mineral assemblages, ore minerals, ore geochemistry, mineralization texture, distribution of hydrothermal alteration zones, as well as the paragenesis of ore mineral deposits in the research area. In this research, four methods were used including petrography, mineragraphy, XRD, and AAS. Petrographic analysis was carried out to observe the texture characteristics of the veins, identify the mineral content that makes up the rock, and the presence of mineral assemblages that characterize hydrothermal alteration zones in the rock samples. XRD analysis was carried out to identify alteration mineral associations formed in alteration zones in the research area that are difficult to identify through petrographic analysis. Mineragraphic analysis was carried out to determine the characteristics of the ore minerals present, the texture of the ore minerals, the presence of ore minerals associated with gold deposits, as well as determining the paragenesis of ore mineral deposits in the research area. AAS analysis was carried out to determine the presence of metal elements and the levels of each metal element identified in the research area. Based on petrographic and XRD analysis, the hydrothermal alteration zone that develops in the research area consists of argillic and propylitic alteration zones. The argillic alteration zone is characterized by the presence of montmorillonite and dickite minerals with formation temperatures estimated to range from 200°-250°C. The propylitic alteration zone is characterized by the abundant presence of chlorite, epidote, and calcite minerals with formation temperatures estimated to range from 120°-320°C. Based on petrographic analysis, it shows the presence of vein textures in the study area including comb and mosaic textures. Based on mineragraphic analysis, the ore minerals present in the research area include magnetite, pyrite, chalcopyrite, galena, rutile, ilmenite, hematite, chalcocite, goethite, and hydrous iron oxide with the ore mineral textures shown including open space filling, dissemination, replacement, intergrowth, colloform, and exsolution. Based on AAS analysis, the presence of gold was indicated by the detection of Au metal element levels of 0.09 - 2.5 ppm. There are several other metal elements identified in AAS analysis including Cu, Pb, Zn, and Ag. The ore minerals associated with gold deposits in the research area include pyrite, chalcopyrite, and galena. The paragenesis of ore mineral deposits is divided into two stages, starting with the formation of primary minerals at the hypogene stage including magnetite, pyrite, chalcopyrite, galena, rutile and ilmenite and continued by the formation of secondary minerals at the supergene stage including hematite, chalcocite, goethite, and hydrous iron oxide. Based on the characteristics of alteration and mineralization, the research area is classified within the porphyry and low-sulfidation epithermal deposit systems.