The geochemistry, mineralogy and consideration of AMD of Karmozd coal mine and Zirab coal cleaning factory, Mazandaran, Iran

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The Karmozd mine and Zirab coal cleaning factory in Mazandaran Province are one of the largest and oldest coal extraction and coal concentration in Central Alborz Coal Basin.these coals are classified as low sulphur,low ash group.Mineralogy and geochemistry studies shows that excluding P_2O_5, all other main oxides are related to the mineralc within the coal layers.The concentration of some major, trace and rare elements such as Ti, Mn, Sr, Ba, Nb, ce Zr, Rb, V, Cr, Co, Ni, Cu, Zn, Pb, Mo, W, Th, and U in Karmozd are much more higher compared to the most coals in the world.

Two types of drainges exists in Karmozd: Acid drainage of Mg-SO_4 type (pH=4.59) and alkali drainage of Na-HCO_3-SO_4 type.Hydrogeochemistry modeling indicates that minerals such as jarusite, alonite, iron and aluminum oxides and hydroxides are basicalyy oversaturated, whearas carbonate minerals like calcite, dolomite and aragonite are undersaturated.Blodite and secondary minerals are formed in arid seasons due to evaporation of hydrosuphate solutions. The river water tends to change from Ca-HCO_3 type to (Na-Ca-Mg)-HCO_3-SO_4 type in arid seasons. Potential considerationof water shows that in acid mine drainage: EC, TDS, SO_4, PO_4, NO_3, Mg,y) Fe, Sr, As, and Mn and in neutral to alkali mine drainage (as well as seepage water from tails and coal cleaning factory) SO_4, PO_4, Ca, As, Sr, Sb and Bi are more than standard value, which may leads to surface and underground water pollution in this region.

According to acid mine drainage managemen standard methods, limestone pond is suggested in order to control AMD in Karmozd. However, because the Zirab coal cleaning factory tail dumps are discharged in the riversides, using precipitation ponds and constricted wetlands seems to be suitable controls

Carbon dioxide degassing and estimation of thermal energy release from volcanic lakes

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Introduction

Periodical surveys are carried out in geochemistry since 1993 to understand the hydrothermal system of Kelud volcano (Indonesia). The last eruption of Kelud volcano was occurred in 1990 and it contains a crater lake with near neutral waters (pH ≈ 6): a part of CO_2 is dissolved as bicarbonates, and another part of CO_2 escape through the lake as bubbles and by diffusion to the surface.

CO_2 flux degassing

From 2001 to 2006, measurements of CO_2 flux emitted by the surface of the lake were performed by using the accumulation chamber method (Chiodini, 1998) modified in order to work at the surface of a crater lake. Two statistical methods were used to process data: the graphical statistical (Sinclair, 1974) and stochastic simulation methods (Deutsch and Journel, 1998). The results of graphical statistical approach permit to quantify the different degassing processes that are acting at the lake surface: one corresponding to CO_2 fluxes resulting from rising bubbles close to the lake shore (from 2633 to 9072 $g/m^2/d$); the second corresponding to CO_2 fluxes from rising bubbles in the middle of the lake (from 478 to 945 $g/m^2/d$); and the last corresponding to equilibrium diffusion of dissolved CO_2 at the water-air surface (from 151 to 209 $g/m^2/d$). Total CO_2 emission rate estimated by stochastic simulation ranges from 105 t/d for 2001 to 35 t/d for 2006.

Thermal energy

Thermal energy released by the lake was estimated by using physical characteristics of the lake and meteorological data (wind speed, rainfall rate). The results of gases analysis and CO_2 fluxes have provided a new constraint in the quantification of the input of steam and brine from the hydrothermal system. The thermal flux decreased from 200 MW (2001) to 60 MW (2006) and estimated inflow steam from 12 to 4 kg/s and inflow brine from 429 to 235 kg/s.

References

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