The effects of acid drainage in formation of environmental minerals (secondary minerals) in Galand-rud coal mines and waste materials of Vatani coal washing, Mazandaran province

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Abstract: The oxidation of sulfide minerals in coal and mine's waste materials produce acid mine drainage. The evaporation, oxidation, dilution and neutralization of this acid drainage lead to formation of secondary minerals. Due to having broad surface spreading these minerals have the potential of maintaining sulfates and many of the metallic elements. In order to carry out mineralogical and geochemical studies on environmental minerals formed, the sampling has been done in the dumping site of the Vatani coal washing factory and coal mine of Galand-rud on 2008. On the basis of X-ray diffraction results the minerals identified are epsomite, hexahyrate, gypsum, halite, goethite, hematite, dolomite, siderite, kaolinite, montmorillonite, illite and quartz as major minerals and jarosite as a minor mineral. The geochemical analyses indicate the enrichment of MgO, SO3 and trace elements of Cr, Pb, Co, Rb in secondary minerals relative to the mine's coal and dumped materials. On the other hand, the environmental minerals are enriched in Ni, Zn, pb, Cu, Cr, Co up to levels more than the Clarke abundance and average of China, America & world coal mines. On the basis of Gibb's diagrams the cations and anions present in mine’s drainages are originate from parent materials. According to hydrogeochemistry saturation index model in acid drainage of dumping area of Vatani coal washing factory, goethite, Iron, hydroxides, calcite, dolomite are in saturated, while iron sulfates melaniterite and jarosite are under saturated.

Keywords: Acid mine drainage; environmental minerals; Mazandaran province; Galand-rud coal.