

In Vitro Genotoxic Effect Of Secondary Minerals Crystallized In Rocks From Coal Mine Drainage

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Abstract

Coal processing generates a large volume of waste that can damage human health and the environment. Often these wastes produce acid drainage in which several minerals are crystallized (evaporites). This study aimed to identify secondary minerals, as well as the genotoxic potential of these materials. The samples were collected at two sites along the Rocinha River in Santa Catarina state (Brazil): (1) directly from the source of the acid drainage (evaporite 1), and (2) on the river bank (evaporite 2). The samples were characterized by X-ray diffraction and by particle-induced X-ray emission techniques. In vitro genotoxicity testing using Comet assay and Micronucleus test in V79 cells was used to evaluate evaporite samples. Our study also used System Biology tools to provide insight regarding the influence of this exposure on DNA damage in cells. The results showed that the samples induced DNA damage for both evaporites that can be explained by high concentrations of chromium, iron, nickel, copper and zinc in these materials. Thus, this study is very important due to the dearth of knowledge regarding the toxicity of evaporites in the environment. The genetic toxicity of this material can be induced by increased oxidative stress and DNA repair inhibition.

Keywords

Coal Mine Drainage; Comet Assay; Evaporite; Micronucleus Test; System Biology.