Availability and release of Chromium from Barro Alto and Crominía mining areas (Goiás state, Brazil)

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Mining and metallurgical activities may release into the environment an important amount of Cr. However, only hexavalent chromium (Cr(VI)) is known to be highly soluble in water, bioavailable and toxic. In the present study, the two mining areas of Barro Alto, BA and Crominía, CA (Goiás State, Brazil) were studied, in order to determine the potential release of Cr(VI) from mining activities and understand the involved processes. Iron oxy(hydr)oxydes, spinels and serpentines were identified by X-Ray Diffraction as the main mineral phases in ores, whereas in soils the contents of quartz and chlorite were the highers. Chemically and isotopically exchangeable pool of Cr (E_{Cr}) were determined in ores, sediments and soils, showing up to 97 mg/kg of exchangeable Cr(VI) in BA ores, while this pool is lower than 19 mg/kg in BA soils. According to ionic chromatography results (LC-HR-ICPMS), exchangeable Cr is mainly under hexavalent form. Both X-Ray Fluorescence and acid digestion analyses reveal higher total Cr in soils of BA (3,15at%) than in CA (0,68at%). However, the amount of extracted Cr(VI) was similar in both sites, with values up to 22 mg/kg in the deeper horizons of soils profiles. Additionally, E_{Cr} values determined in both SPM and sediments from BA retention ponds could reach up to 13 and 6 mg/kg, respectively. This suggests that ores and sediments stored into the mining area could potentially be the main sources of Cr(VI), potentially mobilized into surface waters and deeper soil profiles.