Occurrence of hexavalent chromium in Sukinda ultramafic complex

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The Sukinda ultramafic complex contributes nearly 95% of the total chromite reserve in India. The occurrence of high level of Cr(VI) in the area has been reported. The Cr(VI) is highly mobile than Cr(III) and it is carcinogenic in nature. Thus, main objective of this study is to understand the governing mechanism that influences the Cr(VI) in various water bodies. The pH varies from 6.46 to 8.48 and the Eh varies from 12.3 to 245.9 mV. Most of the water is classified into Mg-HCO_3^- facies. This Mg-HCO_3^- type water is may be derived from the weathering of serpentinite. The Cr(VI) concentration varies from 0.01 to 4.25 mg/L. Ground water shows Cr(VI) concentration in the range of 0.014 to 0.58 mg/L. Mine water is mostly dominated by Cr(VI) whereas surface water and ground water dominated by Cr(III). The Fe^{2+} is the most dominant species of Fe in ground water; while Fe^{3+} is dominant in mine discharge. The pCO_2 in groundwater is higher than that of mine discharges and most of the surface water. Thus, the occurrence and distribution of Cr(VI) in the study area is possibly due to the interplay of oxidative dissolution of chromite and serpentinite, the presence of Fe^{2+} and organic carbon.