Geochemical evaluation of contaminants around waste disposal site - Jawahar Nagar, Hyderabad, India

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As environmental degradation continues due to population explosion, industrialization, urbanization etc, it becomes important to understand the dynamic interaction between man and environment. The environmental geochemistry becomes a successful tool to understand the complex geochemical phenomena found particularly in the urban and sub-urban environment such as distribution, dispersion, mobility and movement of potentially toxic elements in the environment. Environmental geochemical studies were carried out around Jawahar Nagar Municipal Waste Dump Yard, Hyderabad, India, which receives over 3000 tones of solid waste round the clock from the city with population more than 6 million. The soil samples were collected and analysed using X-ray fluorescence to ascertain the extent of pollution due to potentially harmful elements in the study area. The analytical results revealed the elevated concentration of toxic/heavy metals such as Arsenic (7.50 - 26.5 $mg.kg^{-1}$), Zinc (40.0 - 534.4 $mg.kg^{-1}$), Chromium (35.2 - 158.6 $mg.kg^{-1}$), Copper (44.8 - 65.4 $mg.kg^{-1}$), Nickel (30.4 - 63.3 $mg.kg^{-1}$), Vanadium (36.6 - 228 $mg.kg^{-1}$) and Lead (60.5 - 87.5 $mg.kg^{-1}$), which are exceeding the values prescribed by WHO Guidelines and Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. These elements have a prolonged resident time in the soil and are bio-accumulatory in nature, which pose a significant impact on environment at global scale. Based on above geochemical evaluation of pollution risks associated with metals, suitable remedial measures can be adopted to bring down the levels of metal pollution in urban environment.

Electrical resistivity of Ti-rich phologopite under mantle pressures

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We report here for the first time the pressure and tempersature dependecne of the electrical resisitivty of Ti-rich phlogopite up to 8 GPa and 800K respectively. The samples were collected from 1.2 Ga old Ramannapeta lamproit body of Krshna Lamproites, Andhra Pradesh, India. Ti-rich (6 wt %TiO_2) phologopite was collected from the phologopite-leucite and richterite- phologopite lamporoite. The presence of mantle peridotite xenoliths and xenocrystic minerals such as chrome-diopside, spinel, and garnet indicate deep seated mantle derivation of the Krihna lamproites [4]. In order to understand the thermodynamic phase stability of Ti-rich minerals relavant to Lunar mineralogy we have carried out systematic high-pressure-temperature studies on mantle derived Ti-rich minerals.[3] The electrical resistivity studies were carried out by using the four-probe mthod and Bridgman anvil cell technique [2, 3]. The composition of the samples were determined by EPMA. Typical composition of the sample is 5.8 wt % TiO_2; 12 wt % Al_2O_3; 20 wt % MgO; 7.4 to 12 wt % FeO; 0.4 wt % Cr_2O_3, 0.33 to 0.11 wt % NiO. The electrical resistivity decreases from 8.30 X 10 E+06 ohm m at room pressure to 5.60 X 10 E +03 ohm.m at 5.8 GPa. At 6.0 GPa, Ti-rich phologopite undergoes irreversible and partial dehydration. The amount of dehydration has ben determined by Fourier-transform infrared spectroscopy [1]. Ti-rich phologopite also undergoes a pressure induced order-disorder structural phase transition at about 6.5 GPa. The present obesrvation has significant bearing in understanding of dehydartion processes at mantle conditions and Lunar mineralogy.

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