

Uranium in phosphate bearing sedimentary rocks in parts of Lalitpur district, Uttar Pradesh, India: implications for its source.

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Phosphorous and potash are the essential elements for plant growth. The importance of phosphate and potash in soil in agriculture has long been recognized. Phosphates are regarded as one of the most important fertilizer minerals used by man. The paper presents the uranium (U) concentration and distribution pattern in the Paleoproterozoic phosphorites of Lalitpur district of Uttar Pradesh. The study of thin sections, SEM and XRD reveal that apatite is the essential phosphate mineral while quartz and feldspars are the dominant gangue in the phosphorites of the investigated area. The collophane is observed to be mostly oolitic in form and microspherulitic in texture. The major element geochemistry indicated that the phosphorite samples are rich in P_2O_5 , CaO, SiO_2 and Fe_2O_3 whereas depletion of MgO, MnO, K_2O and Al_2O_3 was observed. The CaO/ P_2O_5 ratio ranges from 1.13 to 1.46 which is slightly lower than that of cations and anions substituted francolite (1.621) and close to that of carbonate-fluorapatite (1.318). The trace element geochemistry indicates that the phosphorites of Lalitpur have the significant range of U concentration (1.67 to 129.67 $\mu\text{g/g}$) which is more than that of Th (0.69 to 0.09 $\mu\text{g/g}$) among the analysed trace elements in the phosphorite samples of the area. The positive correlation of U with P_2O_5 , CaO and U/ P_2O_5 indicates a close association of U with phosphate minerals like collophane (apatite), whereas negative correlation of U with SiO_2 and Fe_2O_3 may be due to mutual replacement.