

Isotopic and Geochemical characteristics of kimberlite from Raipur and Tokapal, Chattisgarh, Central India

A.M. Dayal

National Geophysical Research Institute, Uppal Road,
Hyderabad 500 007, India
dayalisotope@yahoo.com

Four kimberlite fields have been located from Mainpur kimberlite field (MKF) in Raipur district, Chattisgarh, central India. These Kimberlite fields are Payalikhhand, Bahradih, Jangra and Kodamalli. Later Tokapal and Bhejripadar kimberlite fields (TKF) in Bastar district were reported by Geological survey. Kodamalli kimberlite of MKF was intruded in the Late Proterozoic sediments. These kimberlites occur close to the junction of Bastar craton (BC) and Eastern Ghat Mobile Belt (EGMB). Mainpur kimberlite field is located within Bastar craton close to its contact with the granulite terrain of the lower to Middle Proterozoic Eastern Ghats Mobile belts in the east. Based on mineral assemblages and texture it can be classified as hypabyssal facies group I kimberlite.

The concentration of incompatible elements for Kodamalli kimberlite is higher than kimberlite from Tokapal from the same craton. The REE concentration at Kodamalli kimberlite is similar to Bhejripadar and Tokapal. The variation of abundance ratio for Zr/Hf indicates variable intensity of metasomatism by carbonates and suggests that the source magma of the kimberlite of Kodamalli and Bhejripadar/Tokapal are different and was metasomatically enriched in different degrees prior to kimberlite generation. The Zr/Nb vs La/Yb ratios of Kodamalli and Bhejripadar/Tokapal kimberlites show that the Kodamalli kimberlites have high Zr/Nb ratio and low La/Yb ratios. The plot of Ce/Yb vs Zr/Nb shows that the source rock for Kodamalli kimberlite is different than Bhejripadar and Tokapal kimberlites. The highly fractionated REE distribution (La/Yb >50) in kimberlites indicates that the source lithologies contain garnet and that partial melting occurred in the presence of garnet. The positive anomaly for Ta and Nb in both the kimberlite indicates the mantle source with residual titanite. The presence of Rb anomalies suggests the presence of residual phlogopite in the mantle.

Strontium isotopic data for these kimberlites gives an initial ratio of ~ 0.7045 at 1100 Ma. [Lehman et al. \(2002\)](#) reported $\epsilon_{\text{Nd}} = +11.8$ at 1080 Ma for this kimberlite, which is quite different than kimberlite, from Tokapal, Bhejripadar, Majhgawan and Lattavaram ($\epsilon_{\text{Nd}} \sim +2$ at 1080 Ma).

References

Lehman B., Mainkar D, Belyatsky B, (2002) Extended abstract, International conference on Diamonds and Gemstones, Raipur, Chattisgarh, 119-122.