

Geochemistry of the Deccan Trap Lava Flows Around Bhir, India: Contemporaneous Tholeiitic and Alkalic Lavas

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Deccan trap basalts, which form a thick vertical sequence of lava flows around Bhir area ($75^{\circ}35'E:19^{\circ}00'N$) in the central part of the Deccan volcanic province have been examined. In a pile of 282 m thick basalt, ten flows have been established. Of these, nine are tholeiitic flows and one is an alkalic basalt flow. Principal phases are plagioclase, augite, ironoxide, and glass. Olivine is confined to few flows. Resorbed and unresorbed plagioclase phenocrysts and compositional bimodality of plagioclase in some samples suggest that magma mixing has occurred.

The chemical data reveal that the parental basaltic magma of Bhir flows was in an advanced stage of evolution prior to its eruption. The low Mg#s, large variation in incompatible element (K_2O , TiO_2 , P_2O_5 , Rb, Ba, and Sr) contents, and limited variation in major element chemistry indicates an open system fractional crystallisation process in a near surface magma chamber fed regularly with batches of parental magma which has mingled with the liquids already present. Samples of flow 1 and 4 suspected of being contaminated all show enriched SiO_2 , K_2O , Rb, and Ba contents.

The alkalic basalts differ from tholeiitic basalts in low SiO_2 and high TiO_2 , Na_2O , K_2O , P_2O_5 , Rb, Ba, Zr, and REE. The composition of alkalic basalts was probably controlled by different degrees of melting and/or inhomogenities in the mantle source. The variability of chemical and mineralogical characters within the Bhir basalts may be due to the combined effects of degree of partial melting, fractional crystallisation, and crustal contamination.