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## Heavy Mineral Study of Dhosa Sandstone, Kachchh Basin, Western India: Implication for Provenance and Tectonic Setting

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### Abstract

This paper presents the results of an integrated heavy and detrital minerals study of Dhosa Sandstone of Chari Formation in the Kachchh basin, western India. Mineralogically, these medium to coarse-grained sandstones are mature quartz arenite to sub-arkose. Monocrystalline quartz is the dominant framework grain followed by polycrystalline quartz, feldspar and micas. The characteristic heavy minerals of the sandstone are zircon, tourmaline, rutile, biotite, muscovite, sillimanite chlorite, epidote, hornblende, staurolite and opaques. Zircon, tourmaline and rutile (ZTR) dominate the heavy minerals assemblage. The principal component analysis suggests four groups of heavy minerals comprising chlorite, sillimanite and hornblende in PCA-1, zircon, biotite and staurolite in PCA-2 and rutile, epidote and muscovite in PCA-3. Tourmaline is the lone member of PCA-4. The heavy minerals assemblage shows that Dhosa Sandstone Member was derived from a mixed provenance of granite-gneiss and meta-sedimentary supracrustals exposed in topographic highs of moderate relief under temperate to sub-humid climate. The cyclic nature and vertical trend of heavy mineral frequencies in the sandstones can be attributed to fluctuations in sea level relief of the source area. Mineralogical maturity coupled with characteristic heavy mineral associations, paleoflow evidence and tectonic history of the region indicates that Aravalli craton situated in the east and northeast and Nagar Parkar massif on north and northwest of the basin were the source areas of the Dhosa sandstone.

**Keywords:** Heavy minerals, Paleocurrent, Provenance, Principal component analysis, Dhosa Sandstone, Kachchh basin, Western India