

GEOTECHNICAL, PETROGRAPHIC AND GEOCHEMICAL STUDY OF SHEKHAN FORMATION, SHEKHAN NALA SECTION, KOHAT BASIN

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Abstract

Limestone being a valuable sedimentary rock, is largely used in the construction and chemical industries in all parts of the world. This work investigates petrography, geochemistry and mechanical properties of the Eocene limestone of the Shekhan Formation for its suitability as a concrete aggregate. The limestone is yellowish-grey in colour, medium-thin bedded with interbedded shale partings, compact and fossiliferous at its type locality. Petrographic analysis shows that calcite is present in the form of micrite (fine-grained calcite) with lesser amount of sparite (coarse-grained calcite). Fractures as micro-veins are observed, mostly filled with carbonates. The rock is dense and has a low porosity. Geochemical analysis of the studied limestone suggests CaO is a dominant mineral whereas SiO₂, MgO, Fe₂O₃, Na₂O, K₂O, TiO₂, Al₂O₃, MnO, P₂O₅ are in trace amounts. The loss on ignition (L.O.I) has an average amount of 40.94 wt. %. The alkali-silica and alkali carbonate reactivity tests indicate the innocuous nature of the aggregates and verify the petrographic observations. The tested Shekhan limestone (SL) samples i.e. SL1, SL5, and SL6 show higher Unconfined Compressive (UCS) and Tensile Strength (UTS) values and occurs in moderately strong to strong category while, SL2, SL3 and SL4 show low UCS and UTS values which can be correlated to the presence of an abundance of micro-fractures, stylolites and bioclasts. All the physico-mechanical properties of aggregates of the studied limestone (i-e., Specific gravity, Water absorption, Unit weight, Los Angeles abrasion value, Clay lumps, Flakiness, Elongation, Aggregate crushing value, Aggregate impact value and Soundness) are generally in accordance with the American Standard for Testing Materials (ASTM) for aggregates to be used in concrete.