EFFECTS OF INTRINSIC PROPERTIES ON THE PHYSIO-MECHANICAL CHARACTERS OF MAFIC-ULTRAMAFIC ROCKS FROM THE JIJAL COMPLEX, NORTHERN PAKISTAN

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Abstract

The intrinsic characteristics including textures, mineralogy and degree of weathering of the mafic and ultramafic rocks of the Jijal complex are investigated and correlated with their respective physical, mechanical and aggregate properties. The studied samples include clinopyroxenite (CP), serpentinite (SP), garnet granulite (GG) and hornblendite (H). The former three rock types are ranging from fine to medium grained, while the hornblendite is very coarse-grained rock. The clinopyroxenite exhibit granular texture with very less degree of alteration. The serpentinite contains abundant serpentine as a secondary mineral which is formed by the alteration of primary clinopyroxene and olivine. The mono-mineralic hornblendite have prominent fractures both in hand specimen and microscopic view. The garnet granulite sample contains highly fractured garnet with hornblende and chlorite as secondary product formed due to the alteration of primary clinopyroxene. The physio-mechanical and aggregate properties including unconfined compressive strength (UCS), unconfined tensile strength (UTS), specific gravity, porosity and water absorption, ultrasonic velocity (USV), Los Angeles abrasion (LA), impact value (AIV) and bulk density of the studied samples were also determined. The UCS and UTS values for clinopyroxenite and serpentinite falls in category of strong rocks while hornblendite and garnet granulite sample shows relatively weak character. Based on the mechanical tests results, the clinopyroxenite samples are recommended to be used as coarse aggregate in construction projects. Due to higher degree of alteration, the serpentinite and garnet granulite are relatively proved to be low quality aggregates while hornblendite is not recommended to be used as aggregate material due to its low strength and coarse-grained nature. The statistical analysis between intrinsic features and physio-mechanical properties reveals an adverse effect of weathering degree on the strength, elastic moduli, LA and USV. Higher degree of weathering not increases the abrasion of rocks but also enhances the strain during compressional conditions.