

Mineralogical, textural and weathering controls on the physical and strength characteristics of intrusive rocks from North Pakistan

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The utilization of intrusive igneous rocks for construction and decorative purposes depends primarily on the mineralogy, texture and weathering grades. This study evaluates these properties of intrusive igneous rocks from north Pakistan and show how these factors affect the rocks' physical and strength characteristics. In comparison to the felsic rocks, the mafic and intermediate rocks displayed low cumulative percentages of quartz, feldspar, and plagioclase as well as higher specific gravity, strength (i.e., compressive strength and Schmidt hammer values), and ultrasonic pulse velocity values. Likewise, samples with anhedral grain shape, irregular boundary, and fine to medium grain size displayed higher strength values, i.e., compressive strength (from 91 to 121 MPa) and tensile strength (from 9, and 12 MPa), respectively. The various weathering grades given to the samples under investigation, such as fresh, slightly weathered, and highly weathered, were in good agreement with their physical and strength characteristics. With the rise in grade, the porosity and water absorption increased (0.28% and 0.72% respectively), while the specific gravity, compressive strength, and tensile strength decreased (2.04, 20 MPa and 2.5 MPa, respectively). Rock strength is influenced by quartz content, but there was no explicit relationship between rock strength and the maximum and mean grain sizes of the various minerals. These findings can be used as a guideline for evaluating intrusive igneous rocks for construction and decorative purposes.

Keywords: Intrusive igneous rocks; Mineralogy; Texture; Weathering grades; Schmidt hammer; Ultrasonic pulse velocity