



Effect of Weathering Processes on Mineralogical and Mechanical Properties of Volcanic Rocks Used as Ballast Material for Railway Between Sabuncupinar and Kütahya in Western Turkey

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Geomaterials used in engineering projects and man-made structures such as railway ballasts, buildings, historical structures, monuments and tombstones naturally weather as a result of various physico-chemical factors. Due to being long-term exposure to the anthroposphere, geomaterials used for these purposes provides important information to the researchers for understanding the effect of weathering processes on their time dependent physical, mineralogical and mechanical changes. Thus, researchers frequently can take advantage of available engineering time of man-made structures to assess weathering properties of the geomaterials used in their construction in terms of time dependent durability and stability of these structures. Considering the fact that railway ballasts produced from natural deposits of limestone, dolomite, granite, basalt etc., supply an important contribution for evaluation weathering processes, a research was carried out to determine the effect of weathering as a function of time on physical, mineralogical and mechanical properties of ballasts used for railway between Kütahya and Sabuncupinar in western Turkey. For this purpose, fresh and weathered rock samples exposed to physical and chemical weathering processes at different times were collected from quarry located in Sabuncupinar and nearby railway. This volcanic rock was previously classified as basalt based on the detailed mineralogical and geochemical analyses performed at the laboratories of the Mineral Research & Exploration General Directorate located in Ankara (Turkey). In-situ characteristics of sampling site were also investigated at different locations of quarry site by line surveying technique to describe the influence of discontinuity conditions on the weathering rate of selected rocks. Several techniques were utilized to determine time dependent deterioration in mineralogical and chemical composition of these samples for understanding their weathering rate. The porosity, water absorption by weight, weight loss after slake durability index and freezing-thawing tests and Los Angeles abrasion value of these samples subjected to weathering processes at different time intervals at field conditions were also determined to measure the time dependent resistance of collected ballast materials against natural weathering processes. When all results obtained from mineralogical and chemical analyses, field observations and further laboratory tests are considered, it can be concluded that collected ballast materials provide important information for understanding weathering rate of basalt. Furthermore, despite of being exposure to the anthroposphere for very long time, the very little water absorption content, resistance to extreme weather conditions and very angular characteristics of collected samples indicate that these previously used materials can still serve the purpose as ballast materials in accordance to related standards (TS 7043 and EN 13450).