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# Shear strength characteristics of cadmium-contaminated red clay following the analysis of dry-wet cycles and water content

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**ABSTRACT**

The purpose is to study the influence of water content on the shear strength of red clay under heavy metal pollution and dry-wet cycles. The red clay in Guilin is taken as the research object. Direct shear tests are carried out on red clay under different initial environments. Meantime, cadmium-contaminated red clay is artificially prepared through cadmium chloride in the laboratory. Then, with the aid of the triaxial shear test, the variation characteristics of the shear strength of the red clay with different cadmium concentrations under dry-wet cycles are studied. According to the results of the direct shear test, the relationships between water content and cohesion, and internal friction angle of red clay is explored. Also, the changes of cohesion and internal friction angle under different cadmium ion concentrations and dry-wet cycles are analyzed, and the relationship between shear strength and dry-wet cycles, as well as between peak shear strength and pollutant concentration is revealed. The results show that the cohesion and internal friction angle generally decrease with the increase of water content. Under different dry-wet cycles, the shear strength decreases with the increase of pollution concentration. The results of the triaxial test show that the lower the metal pollution on the soil is, the more obvious the effect of dry-wet cycles on the shear strength of contaminated red clay is. On the contrary, when the pollution concentration increases, the internal structure of red clay is significantly damaged, and the increase of the number of the dry-wet cycles has a less obvious effect on the enhancement of shear strength. This proves that when red clay is polluted by a low concentration of cadmium, the water evaporation cycle formed by natural rainfall can significantly improve the shear strength of red clay. This study can provide a theoretical reference for seismic disaster prevention and control of the pollution of red clay in heavy metal contaminated areas.

*Keywords:* Dry-wet cycle; Shear strength; Water content; Red clay

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