UTILIZATION OF RUBBER TREE (*Hevea brasiliensis*) SAP AS AN ADMIXTURE FOR AN ECO-EFFICIENT CONCRETE

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ABSTRACT

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The main objective of this research was to study the possibility of using of rubber tree sap or natural Rubber Latex as a natural polymer admixture. Specifically, the study aimed to determine the physical properties and composition of rubber tree sap; determine the effect of different proportioning of rubber tree sap to the ratio of cement to its water content and; determine the effect of rubber tree sap in concrete with different percentage in terms of its workability and compressive strength. Five different mixes were used in this study, namely: concrete with no rubber tree sap (C_0), concrete with 5 percent rubber tree sap (T_1), concrete with 10 percent rubber tree sap (T_2), concrete with 15 percent rubber tree sap (T_3), and concrete with 20 percent rubber tree sap (T_4). From these mixes, the researchers were able to determine the amount of water-cement ratio to the proportioning of rubber tree sap. The different tests that were performed to determine the effects of rubber tree sap as an admixture were the time setting test, slump test, and compression test.

Each treatment, C_0, T_1, T_2, T_3, and T_4, was analyzed individually according to the proportion of rubber tree sap in the concrete mix having different water-cement ratio. The water cement-ratio varied depending om the amount of admixture added. This study showed that as the amount of rubber tree sap added to the concrete mix increases, the water needed to incorporate the mixture also increases.

After conducting a series of compression test, the researchers were able to obtain the following average compressive strengths based on the ACI code. For results of curing days for C_0 wherein no rubber tree sap was added in the concrete mix and using a water-cement ratio of 0.7, the value of compressive strength of the concrete cylinders was increasing and gaining its maximum strength equal to 15.31 MPa on the 28th day.

For the compressive strength of concrete cylinders for T_1 with 5 percent latex, addition of 5 percent of the volume of water to the water-cement ratio of concrete was done to maintain the proper consistency of the concrete mix. Therefore, the total water-cement ratio for T_1 is 0.735. The results showed that the maximum strength was gained on the 28th day which is equal to 10.36 MPa. The second treatment (T_2) contained 10 percent rubber tree sap. Also, 5 percent of the volume of water to the water-cement ratio of concrete was added. It gained its compressive strength on the 28th day which has a value of 8.0 MPa. Treatment 3 (T_3), has a 15 percent rubber tree sap. Same as the other treatment, an addition is needed for water in the mixture. The third treatment (T_3) achieved its maximum strength of 6.96 MPa on the 28th day. For the last treatment (T_4) gained its maximum compressive strength of 5.89 MPa also on its 28th day.

The addition of latex in different proportions also affects the ratio of cement to its water content. However, as more latex was mixed with the concrete, it still does not attain high workability of concrete. The results also showed that the compressive strength reduced as the percentage of latex modification increased. Further research on incorporating chemical admixtures for better performance of rubber tree sap as concrete component.

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