

# **“DEVELOPMENT OF MASONRY BLOCKS USING SOIL, COPPER SLAG AND CEMENT WITH DIFFERENT ADDITIVES”**

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**CIVIL ENGINEERING**

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## ABSTRACT

For developing countries, urbanization and industrialization is a must and this activity extremely demands to uplift nation's economy and for increase in the living standards of people. However, industrialization on the other hand has also caused serious problems relating to environmental pollution due to the disposal of industrial waste materials. Therefore, efforts are to be made for controlling pollution arising out of the disposal of wastes by conversion of these unwanted industrial wastes into utilizable raw materials for various beneficial uses. Over recent decades, the utilization of industrial wastes and by-products for use as construction materials has been considered as an important means to achieve a sustainable society. Lately, there has been an increase in the consumption of raw materials in the construction industry at a rate far exceeding their production.

In the present study, Copper slag, one of the industrial by-product produced at huge amount from the copper industry during copper smelting process is used as a construction material for making blocks. The Copper slag is used as partial replacement for soil in percentages of 0-25% by weight of soil along with 7% Cement as stabiliser and 3% RBI Grade-81 as additive in making blocks for experimental studies. Also M-Sand is used as a partial replacement for soil in-order to make it well graded.

From the results and observations of the preliminary study, it can be concluded that, the blocks made with soil, M-Sand, 20 and 25% Copper slag in combination with (i) cement alone and (ii) cement and RBI Grade-81 together gives better strength. Based on the conclusion of the preliminary study, the blocks are made in the detailed studies to determine the mechanical properties namely compressive strength, water absorption, impact resistance, sorptivity and prism test under compression.

From the results and observations of the detailed study, it can be concluded that the addition of 25% Copper slag and RBI Grade-81 to the blocks gives more compressive strength. The percentage of water absorption for blocks was within the permissible limits as per IS: 1077-1986. The blocks with 20% Copper slag and RBI Grade-81 gives more resistance to impact. The blocks with Copper slag shows higher density than the blocks without Copper slag, this is because of high density of Copper slag, thus with the addition of Copper slag to the blocks the density of about 2150 Kg/m<sup>3</sup> can be achieved. When RBI Grade-81 and 25% Copper slag are used together in the blocks



the strength of prism under compression improves. Considering the results obtained and observations made the two types of blocks can be manufactured, one with RBI Grade-81 and the other without RBI Grade-81. Both these type of blocks are manufactured in the presence of cement as stabiliser and Copper slag to enhance its properties, thus it paves the way for economical masonry construction.