

# A Comparative Study on Different Burning Method of Sewage Sludge Ash in Mortar Brick with Eggshell Powder as Additive

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**Abstract.** Population growth that increase every year has led to the increasing amount of waste generated annually. The content of heavy metal Cadmium (Cd), Lead (Pb) and Zinc (Zn) represent the biggest concentrations of heavy metals in sewage sludge waste which can be the source of pollution. Furthermore, the excessive disposal of eggshells waste to landfills may attract rats and worms due to the organic protein matrix that may pose health problem to the public. In the last decade, the demand on cement mortar brick has increased has resulted in higher cement production. However, cement plant is one of the major contributors of carbon dioxide emission. Hence, this research focuses on the production of environmental friendly cement with sewage sludge since there is occurrence of pozzolonic material in Sewage Sludge Ash (SSA). From the initial finding, the major components of SSA are Silicon Dioxide (SiO<sub>2</sub>), Calcium oxide (CaO), Aluminium Oxide (Al<sub>2</sub>O<sub>3</sub>), Iron (III) Oxide (Fe<sub>2</sub>O<sub>3</sub>), Sodium Oxide (Na<sub>2</sub>O), Potassium oxide (K<sub>2</sub>O), Magnesium Oxide (MgO) and Iron (II) Oxide (FeO). Sewage sludge needed to be incinerated to remove the heavy metal before it can be used as cement replacement in mortar brick production. The sewage sludge were treated using two methods namely incineration and microwave. Both types of sewage sludge were then added with eggshell powder as additive. Eggshell powder act as additive in this research due to its high content of calcium carbonate and has nearly same composition of limestone used in the production of cement. Different percentages of Eggshell Powder (ESP) (0%, 5%, 10%, 15%) and 10% fixed of Microwaved Sewage Sludge Ash (MSSA) and Incinerated Sewage Sludge Ash (ISSA) as optimum dosage partially replacing the cement used to test the brick mortar properties in term of compressive strength, flexural strength and also water absorption. Result showed that ISSA with 5% of ESP is the most optimum brick with highest compressive strength and flexural strength compared to MSSA brick. While, MSSA brick with 10% of ESP shown the best result in water absorption. But, the water absorption rate for 10% ESP in ISSA is still within acceptable range.