

# THE UTILISATION OF RICE HUSK ASH AND EGGSHELLS IN MAKING CONCRETE

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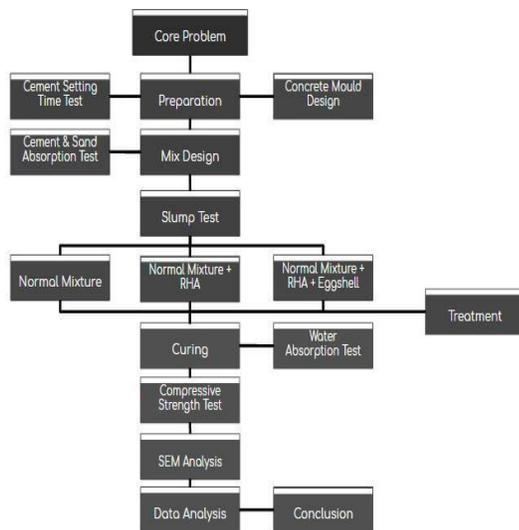
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## 1. Introduction

With the increase of population and development around us, there has been an increasing demand for new infrastructures, housing, and facilities to satisfy the population and their needs. Furthermore, the recent series of earthquakes in Indonesia impacted on an increasing demand of concrete. Rice husks and eggshells are usually considered as wastes by the majority of people. However, that is totally untrue and that research says otherwise. Both rice husks and eggshells can be used to reduce the amount of cement needed in making concrete, also giving a useful benefit when used & implemented properly. By this research, we are hoping that we can successfully give a solution to concrete production with organic wastes such as eggshells and rice husks.

## 2. Experiment Design

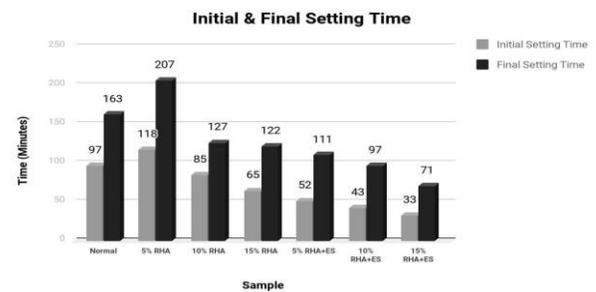


Eggshells and rice husk ash were collected (after washed and dried) and were calcined in a furnace at 900°C for 2 hours (for eggshells) and 600°C for 4 hours (for rice husk ash). After calcined, they were filtered with a 200 mesh sieve to obtain smaller particles. furnace at 600°C for 4 hours, then filtered with a 200 mesh sieve. Preparation of

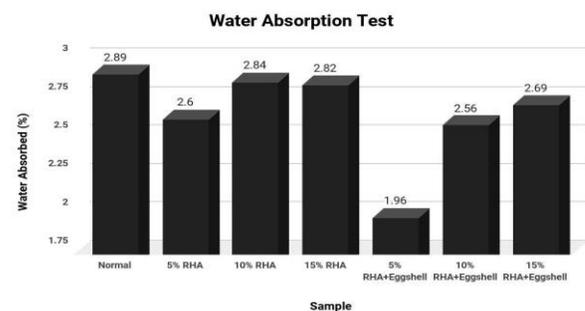
concrete raw materials; cement, fine aggregate, coarse aggregate, and water, also the concrete moulds. Next process is mix design, in which raw materials were mixed together. In this research, 3 samples were made; normal concrete, concrete with RHA (rice husk ash), and concrete with RHA and ES (eggshells). Research underwent 6 examinations; cement setting time, cement and sand absorption test, slump test, water absorption test, compressive strength test and Scanning Electron Microscopy Analysis.

## 3. Result

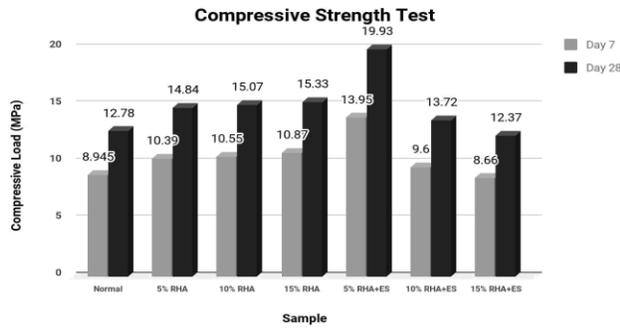
Here are the results for cement setting time :



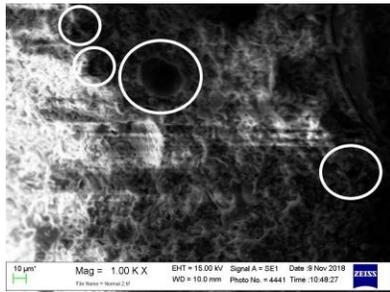
Here are the results for cement and sand absorption test :  
 Here are the results for the Slump Test:  
 Here are the results of water absorption test :



Here are the results for the compressive strength test of the concrete blocks:

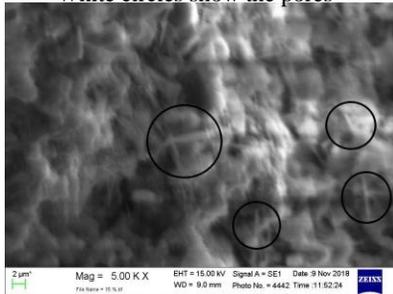


Here are the results of Scanning Electron Microscopy Analysis :



Normal(magnification 1000×)

White circles show the pores



15% RHA(magnification 5000×)

Black circle show the rice husk ash

#### 4. Conclusion

Based on the research done, we can conclude that rice husk ash does increase the compressive strength of concrete. By day 28, the compressive strength of 5% RHA is 12.78 MPa, 10% RHA is 14.84 MPa, and 15% RHA is 15.07 MPa. It is proven that concrete with rice husk ash is stronger than the normal concrete when tested in the compressive strength machine and that the more RHA added (by reducing the amount of cement), the stronger the concrete gets. But, result is different in concrete with rice husk ash and eggshells. By day 28, the compressive strength of 5% RHA + 14% eggshells is

19.93 MPa, 10% RHA + 14% eggshells is 13.72 MPa, 15% RHA + 14% eggshells is 12.37 MPa. This proves that by adding more RHA with constant eggshell amount weakens the compressive strength. Therefore, the most effective concrete is the concrete with 5% RHA + 14% eggshells. On the SEM Analysis results, we can clearly see that normal concrete has large pores on it. On the other hand, concrete with RHA has 'spikes' appearing on it, which is caused by the utilisation of RHA — creating tighter bonds between the particles. Therefore, by utilising rice husk ash, concrete produced will be stronger.

#### 5. References

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