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PS-009

EFFECT OF RICE HUSK ASH AND PALM OIL BOILER ASH AS A MIXTURE ON CONCRETE POROSITY

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ABSTRACT

This study aimed to determine effect of water absorption in the concrete mix with rice husk ash and boiler ash palm on the ideal composition of on concrete porosity. The research method is done by adding the mixing rice husk ash and boiler ash palm oil on composition (5%, 10%, 15%, and 20%) and soaking in the period (7 days, 14 days, 21 days, 28 days, and 60 days) in the sample preparation and testing of samples (water absorption and variable regression analysis of the porosity of the concrete to immersion) and of the best composition of the XRD analysis. From the results obtained by the addition of a mixture (Rice Husk Ash, Boyler Ash Palm Oil, and both of them) on a concrete base is the addition of the composition of the mixture of 5%. This suggests that the presence of the concrete mixing resulting SiO_2 content in the concrete is reduced and by the addition of a significant SiO_2 content approaches the SiO_2 content in the concrete is the mixture Rice Husk Ash 5%. The concrete with a mixture of 5% rice husk ash had been a low water absorption which are supposed to improve the quality of concrete. Relationship variables showed a relationship is negative in addition to the concrete mixture to produce water absorption.

Keywords: *Concrete, Porosity, and Water Absorption*

INTRODUCTION

From 1880 to 1996, the annual Portland cement consumption increased from 2milliontons to1.3 billion tons. Because demand due to development in many countries, the cement price sare increasing, it encourages investigation using mixed materials (additive) and the added material (admixture) such asrice husk ash which can reduce the cost of expenses, is also alighter material forreducing costs and the new cement with special feature sorspecial.

The use of partial cement replacement materials (SCM) through an innovative mixcomposition will reduce the amount of cement used in order to reduce emissions of green house gases and the use of fossil energy consumption of the earth in the cement industry (Bakri, 2009). The use of adhesive or ceramic or inorganic matrix fornatural fibers began to be develope dinvarious countries, including the use ofnatural fibersandRice Husk Ash and Boyler Ash Palm Oil. Mortar that uses Boyler Ash Palm Oil from Malaysia (Salihuddin, 1993, inMuhardi, et al, 2004)andThailand(Hussin, 1997 inMuhardiet al, 2004)as apartial replacement for cement showed that the maximum compressive strength obtained at levels Boyler Ash Palm

Oil 20% and 30%. Light weight concrete maybe made of Rice Husk Ash for properties in the concrete mix can reduce the density of the concrete (Jauberthie et al., 2000).

Reactivity between silica in Rice Husk Ash with calcium hydroxide in the cement paste can be influential in improving the quality of concrete (Harsono, 2002). Habeeb and Fayyadh (2009) reported an increase in fineness Rice Husk Ash will increase the strength of the concrete mix, is due to increased activity and because pozzolanics of Rice Husk Ash acts as microfillers in the concrete matrix.

Boyler ash Palm Oilis a waste of agro-residues resulting from the burning of palm oil mill Boylers Palm Oil industry. Malaysia, Indonesia and Thailand is a major producer of palm oil, which is the leading agricultural cash crop in tropical countries (Safiuddin, et. al., 2010). After burning, the ash produced, known as POFA (Palm Oil Fuel Ash), generally disposed in the open field, thus creating environmental and health problems. In order to find a solution to this problem, several studies have been conducted to examine the feasibility of using POFA in construction materials.

Positive properties of concrete, among others, are relatively easy to do and printed in accordance with the wishes, resistant to pressure, and resistance to weather. While the negative traits such as not impermeable to water (relatively high permeability of concrete), a low concrete tensile strength, easy integrated by sulfate contained by ground (Murdock, 1991). Positive and negative properties of the concrete is determined by the properties of the constituent materials, mixing ratio, and how the implementation of the work (Sudipta and Sudarsana, 2009).

There areseveral key factors that can determine the success of the provision of high-quality concrete, such as: a. Concrete water factor(fas, w/c) is low, b. The quality ofthe building blocks of good concrete, c. Use of admixture, either chemical admixture or mineral admixture in the right amount, d. Procedures are true and accurateat the entire production processof concrete, and e. Strict supervision and control oft hew hole procedure and quality of execution, which is supported by optimal operational coordination.

METHODOLOGY

The research method is done by adding the mixing rice husk ash and boiler ash palm oil on composition (5%, 10%, 15%, and 20%) and soaking in the period (7 days, 14 days, 21 days, 28 days, and 60 days) in the sample preparation and testing of samples (water absorption and variable regression analysis of the porosity of the concrete to immersion) and of the best composition of the XRD analysis. Test the water absorption (water absorbtion) was performed

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using a cylindrical specimen. Tod etermine the amount of water absorption is calculated using the following equation (Van Vlack, 1994):

$$WA = \frac{\text{mb} - \text{mk}}{mk} \text{ x } 100\%$$

Description: WA=WaterAbsorption (cc /h) WA, mb=wetmass of specimen (grams), and mk=drymass of the specimen (grams)

Analysis of XRD (X-Ray Diffractometry) is used to identify the crystalline phases in the material by determining the parameters of the lattice structure and to obtain particle size. The Characterization X-Ray Diffractometry (XRD), which is used in a room temperature by using a Shimadzu XRDX- ray diffractometer 600 (40 kV, 30 mA), using a nickelfor Cu Kαradiation filter which is used scanning rate of 0,010/CP Sin range 2θ= 5^0-60^0.

RESULTS AND DISCUSSION

For the water absorption of concrete at 60 days it appears that the value of the lowest water absorption is at mixconcrete with Rice Husk Ash (SP) 5% by 1197% and followed by concrete without a mixture of 1.219% and subsequently for all concrete with a mix of SP and KS and SPK Sin crease is not significant. This may occur because Rice Husk Ash (SP) and Boyler Ash Palm Oil (KS) are note liminated that have a water absorption higher than that of concrete.

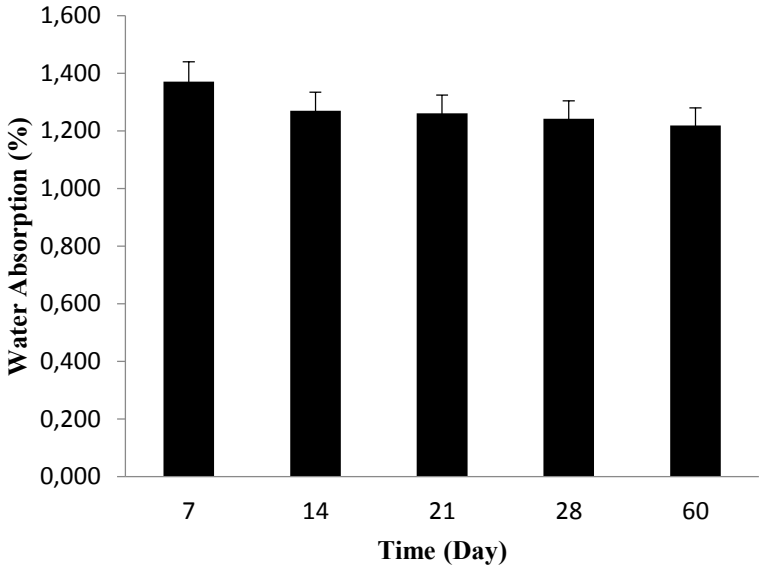

Figure1.Graph Concrete Water Absorption by Time

From Figure1 shows reduced water absorption of concrete in immersion length.

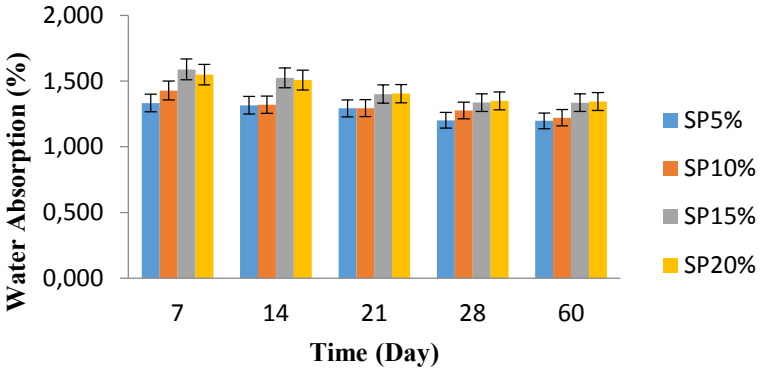

Figure 2. Graph Water Absorption Concrete Mixtures with Rice Husk Ash by Time

From Figure 2 seen reduced water absorption of concrete on each additional composition Rice Husk Ash in immersion length.

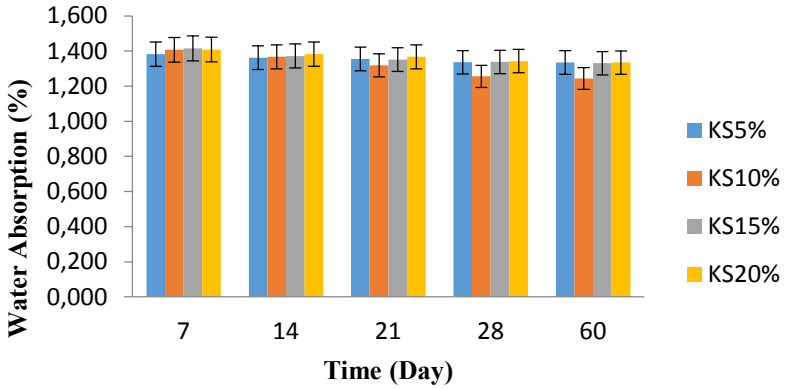

Figure 3.Graph Water Absorption Concrete Mixtures with Boyler Ash Palm Oil by Time

From Figure 3 shows the reduced water absorption of concrete on each additional composition Boiler Ash Palm Oil in the length of immersion.

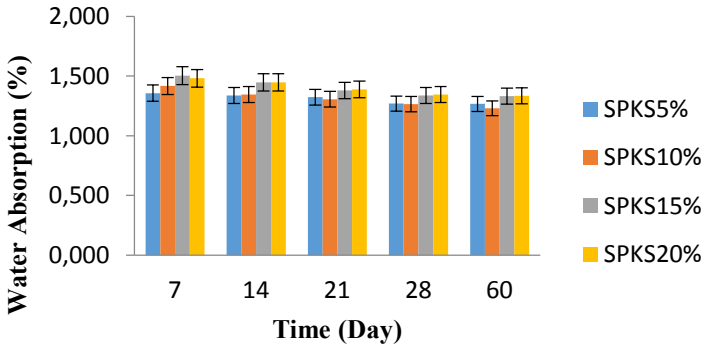

Figure4. Graph Water Absorption Concrete with Mixed Rice Husk Ash and Boyler Ash Palm Oil by Time

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From Figure 4 looks reduced water absorption of concrete on each additional composition Rice Husk Ash and Boyler Ash Palm Oil in the length of immersion.

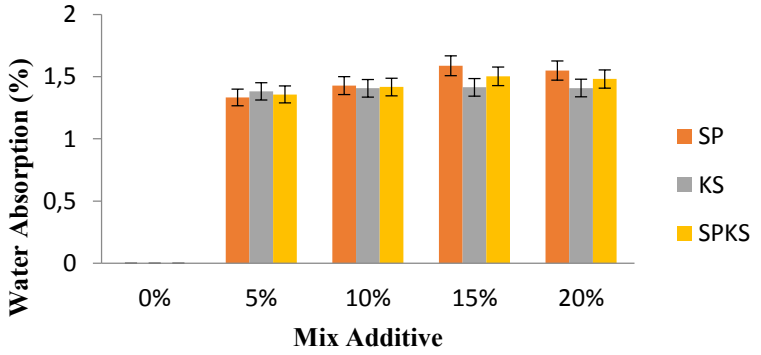

Figure 5. Graph Based Absorption Addition In 7 Days

From Figure 5 seen in creased water absorption of the largest concrete in Rice Husk Ash 5% in immersion for 7 days.

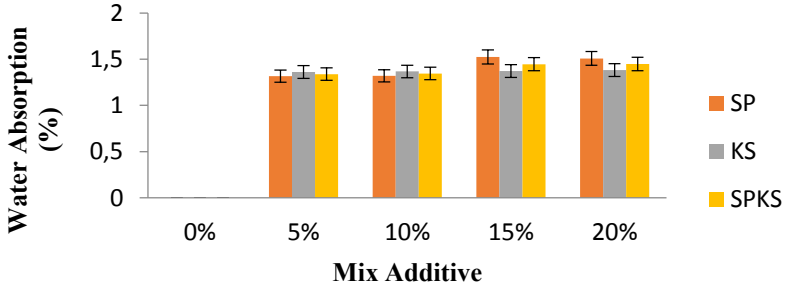

Figure 6.Graph Based Absorption Addition In 14 Days

From Figure 6 seen in creased water absorption of the largest concrete in Rice Husk Ash 5% in immersion for 14 days.

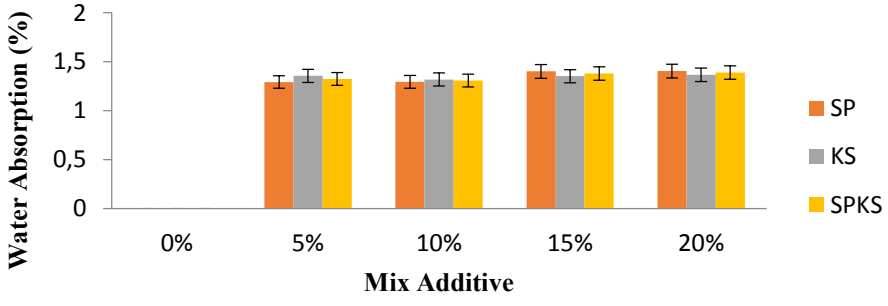

Figure 7. Graph Based Absorption Addition In 21 Days

From Figure 7 seen in creased water absorption of the largest concrete in Rice Husk Ash 5% in immersion for 21 days.

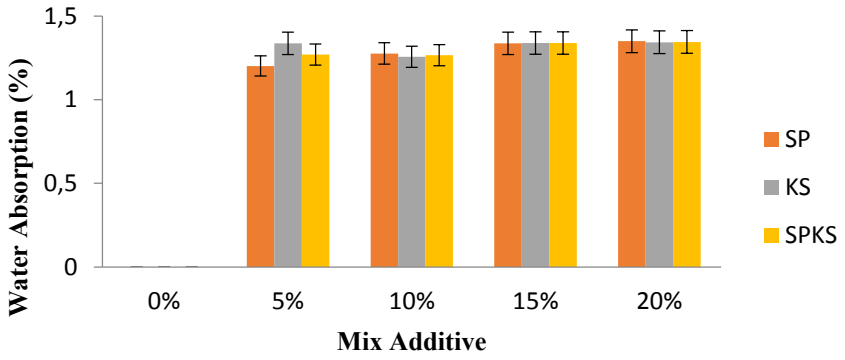

Figure 8. Graph Based Absorption Addition In 28 Days

From Figure 8 seen in creased water absorption of the largest concrete in Rice Husk Ash 5% in immersion for 28 days.

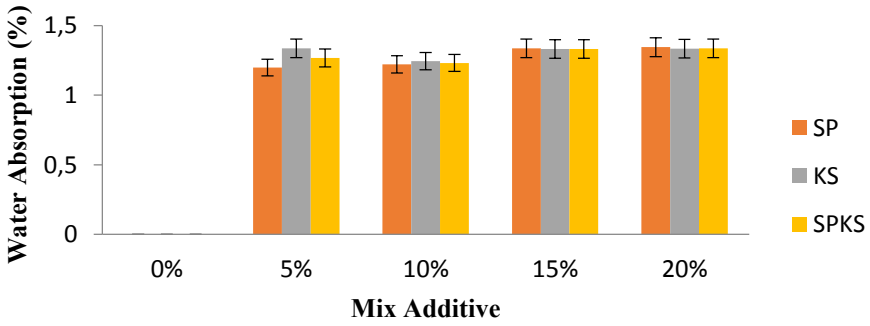

Figure 9.Graph Based Absorption Addition In 60 Days

From Figure 9 seen in creased water absorption of the largest concrete in Rice Husk Ash 5% in immersion for 60 days.

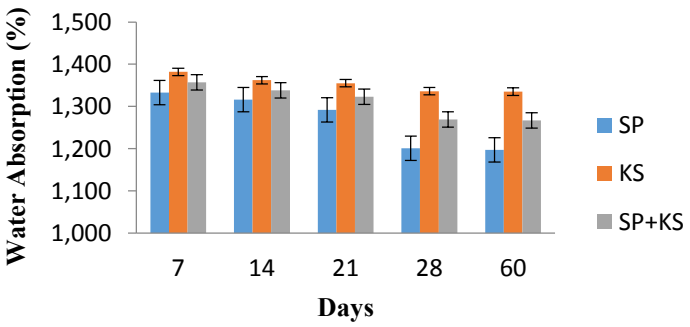

Figure 10.Graph Based Absorption Addition In 5% Composition

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From Figure10 seen reduced water absorption in the most concrete Rice Husk Ash in the composition of 5%.

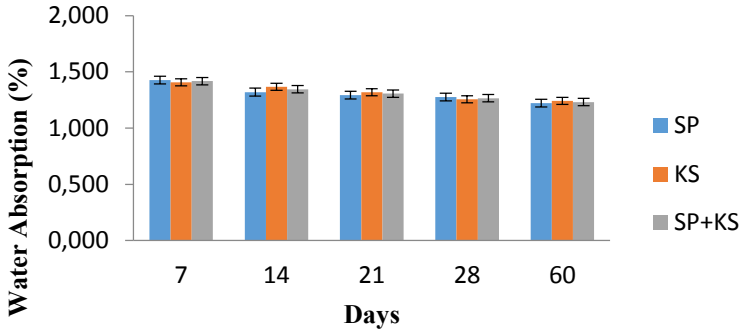

Figure 11.Graph Based Absorption Addition In 10% Composition

From Figure11 seen reduced water absorption in the most concrete Rice Husk Ash in the composition of 10%.

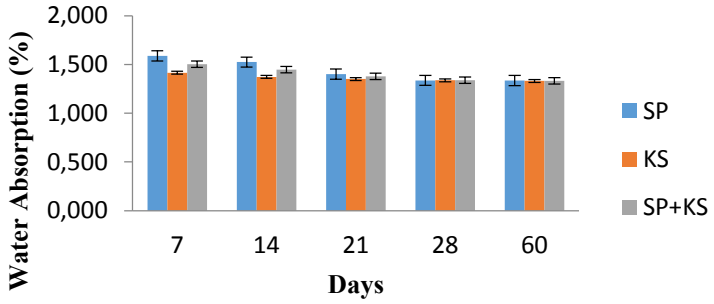

Figure 12.Graph Based Absorption Addition In 15% Composition

From Figure12 seen reduced water absorption in the most concrete Rice Husk Ash in the composition of 15%.

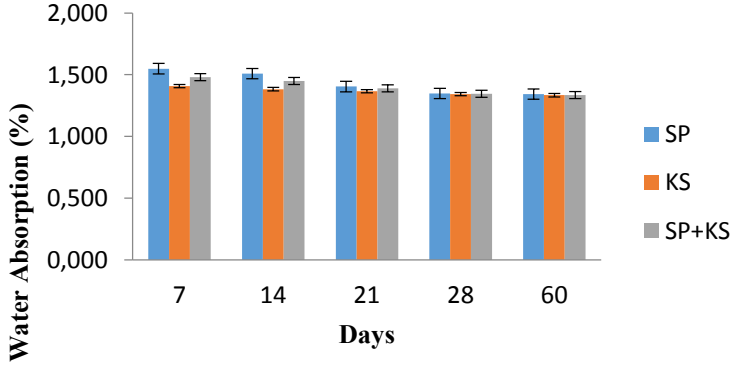

Figure 13. Graph Based Absorption Addition In 20% Composition

From Figure 13 seen reduced water absorption in the most concrete Rice Husk Ash in the composition of 20%.

Table 1.Anova[b]Water Absorption Test

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.269	3	.090	45.543	.000[a]
	Residual	.110	56	.002		
	Total	.380	59			

a. Predictors: (Constant), Composition, Time, Sample; b. Dependent Variable: DS

From Table 1 it can be seen by Significant values, shown in the columnsig is 0,000 less than 0.05 then H_o is rejected. Conclusion: There is an on-zero coefficient or coefficientmeans, itis stated that the regression model can be used to predict the sample Absorption.

Table 2. Coefficients[a]Water Absorption Test

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.388	.023		59.616	.000
	Sample	-.003	.007	-.026	-.363	.718
	Time	-.038	.004	-.682	-9.465	.000
	Composition	.035	.005	.494	6.850	.000

Based onthe above analysis, it can be made regression model equationis $Y=1.388 – 0.038X_2+0.035X_3$.

CONCLUSION

In this study showed that the addition of the mixture (Rice Husk ash, Boyler Ash Palm Oil, and both of them) on a concrete base is the addition of the composition of the mixture of 5%. This is because the concrete with a mixture of 5% rice husk ash as a low water absorption compared with other compositions which are supposed to improve the quality of concrete. In mechanical tests show with the addition of a concrete mixture to produce water absorption into decline.This is demonstrated by the relationship is negative variables through regression test.

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