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Analysis Index of Pozzolanic Reactivity on both Cassava Peel and Pulp Ash Using, the Modified Chapelle's Method

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Abstract
Pozzolans remain inorganic, siliceous or silico-aluminous ingredients that unaccompanied display slight before not at all necessary stuff, nevertheless excellently crushed and cutting-edge the attendance of water then calcium hydroxide This paper researched on the analysis of the pozzolanic reactivity of both cassava peel and pulp ash that are from Nigeria. The pozzolanic reactivity of the ash was determined by means of modified chapelle check. Both cassava peel and pulp were wastes from fufu production collected from site in Ilaro Yewa South local Government in Ogun State Nigeria. The modified chapelle test was carried out rendering to NF, P18 – 513 standards. The test agrees quantification of $Ca(OH)_2$ fixed (consumed) by 1g of cassava peel and pulp ash which mix per 2g of CaO and 250ml of distilled water. The deferral was heated at 90^{o}C throughout 6 hours by continuous rousing in a stainless steel of 500ml erlemger. Modified chapelle test, cassava pulp ash with a temperature of 750^0 C was 1186.28 mg Ca(OH), which determines the reactivity level of the cassava pulp. Rendering to the modified chapelle test in respect to the NFP 18 – 513 the amount of CaO used up essential not remain lower than 660mg. Pozzolanic reactivity of cassava at 750^o C meet the standard of been pozzzolan.

Keywords*: Ash, Cassava Peel, Cassava Pulp, Modified Chapelle and Pozzolanic*

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I. INTRODUCTION

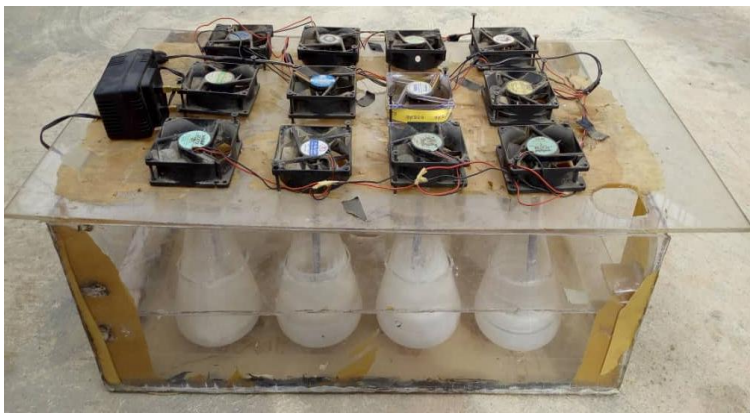
This paper investigated on the routine of modified chapelle test to determine the pozzolan reactivity level of both cassava peel and pulp ash. Many researchers has used different methods to determine pozzolan reactivity level, this study focused on modified chapelle. Pozzolans remain mineral, siliceous before silico-aluminous ingredients that solitary show minor before not at all essential property, but brilliantly pounded then in the attendance of water and calcium hydroxide, they reply and procedure mixes by required properties1 by area temperature. Therefore, these ingredients might be joint in the Portland cement manufacture to formula additional cement kinds or supplementary thru the fraternization of concrete and mortar. (Borges, Soaresa, Freitasb, Júniora,Ferreirac , Giannotti and Ferreiraa 2021). Modified chapelle method is extra examination used to govern the reactivity near of a pozzolanic materials, those pozzolan materials may be agricultural waste or industrials waste in usual chapelle can be used for their reactivity level. Borges et.al (2021) investigated that scheduled the extra gage, the traditional means usage normal returns to assess the aptitude of pozzolans to dose lime to formula hydrated mixes which, notwithstanding presence extra detailed related to secondary methods, take extra partial use due to high absorption. Modified Chapelle, Frattini technique and standard substance titration remain an insufficient straight approaches used to measure pozzolanicity. Secondary approaches and direct Chapelle's technique practical to the purpose of the reactivity of pozzolanic resources. The Chapelle's technique remains beached arranged the lime-pozzolan response then tallies the pozzolanic reactivity of slightly material planned to be practical by the cement manufacturing**. (**Quarcioni, Chotoli, Coelho and Cincotto 2015). Together (modified) Chapelle and Frattini test methods quantity of reactivity of the SCM through $Ca(OH)_2$, moreover by titrating the sum of $Ca(OH)_2$ residual in a weak interruption or by assessing the capacity grade of solution to $Ca(OH)_2$, correspondingly. The Chapelle exam incomes fewer than one day to bring out, the Frattini test at minimum of eight days, and aimed at fewer sensitive SCMs active toward fifteen days (Li, Snellings; Antoni, Alderete, Haha, Bishnoi, Cizer, Cyr, Weerdt,Dhandapani, Duchesne, Haufe and Doug 2018). Although modified chapelle test proceeds 16 hours that's style it faster than chapelle test and Frattini test. The "Fratini test" is the origin of the definite EN 196-5 regular. In resistance to Fratini procedure, Chapelle (1958) established a pseudo-dynamic test to assess the movement of a pozzolanic substantial, created on the ingesting of $Ca(OH)_2$ in a soaking water average. Benoit (1967) better the Chapelle procedure, mostly in relations of

temperature (90 ºC) and period (sixteen hours) of the exam, by one gram of pozzolan, one gram of CaO and 100 ml of purified water and provided the amount “Chapelle test" to this procedure. Largent (1978) reproachful the “Fratini test”, since the scheme fixes not influence firmness and is attained in a still situation, presented adjustments to the Chapelle exam, exactly the nonstop inspiring throughout the period of the test, and retitled the procedure to modified Chapelle exam.

II. METHODOLOGY

The pozzolanic activity of both peel and pulp cassava ash stayed measured by modified chapelle exam according to NF, P18 – 513 standard (Annex A). This assessment permits the quantification of $Ca(OH)_2$ stable (expended) by 1g of peel and pulp ash after diverse by 2g of CaO and 250ml of purified water. The holdup remained bubbled at 90^0C throughout sixteen hours through continuous stiring in a stailess harden 500ml Erlemeger.

After the exam period, the Erlemeger remained allowed near cool to ambient temperature by tap water. The portlandite gratified that remained not expended (allowed in explanation) remained resolute by sucrose withdrawal and acid titration for that, 250ml of additional sucrose solution (0.1m) remained supplementary to the solution which was stimulated with the attractive bar throughout fifteen minutes. 200ml of the last solution stood filtrated and occupied 25ml to titrate with HCl 0.1N through two to three drops of phenolpthlein (0.1w/v% in ethanol 50v/v%).



Samples in 250ml Tube Setup to Stirred for 16 hours

III. RESULTS AND DISCUSSIONS

Table 1: **The Reactivity Level of Cassava Peel and Pulp**

Temperature	PEEL (Reactivity) Mg/l	PULP(Reactivity) Mg/l
600	-991.0714	-210.23
700	-1231.331	300.325
750	-918.9935	1186.28
800	-1561.688	-840.91

According to the modified chapelle test, cassava pulp ash with a temperature of 750^0 C was 1186.28 mg Ca(OH), which determines the reactivity level of the cassava pulp. Agreeing to the modified chapelle exam in esteem to the NFP 18 – 513 the quantity of CaO expended must not be lower than 660mg, in order to be considered a material as pozzolanic the amount of CaO most not be less than 660mg while in the test the result of the others temperatures for both cassava peel and pulp were lower than 660mg. Ferraz et.al (2015) conducted modified chapelle test on metakaoline between the temperature of 750 to 940°C a meterial of modified chapelle test at 800°C pozzolanic activity value was 1240mg which show that the metakoline at 800^OC was pozzolanic. Pinheiro et.al (2023) reviewed that the lowest C-H Consumption outcome for material to be ordered as pozzolanic most not less than 660mg CaO/g.

IV. CONCLUSION

From the modified chapelle exam conducted it remained concluded that cassava pulp ash (CPA) with temperature of 750^0 C was pozzolanic in nature as it gives a value of 1186.28 mg$Cca(OH)_2$ allowing to the modified chappelle exam in esteem to the NFP 18 – 513 the quantity of CaO consumed must not be lower than 660mg/l pozzolan in directive to be measured the material as pozzolanic substantial.

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