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Retarding the Setting Time of Geo-Polymer Binder by the Use of Borax

Pawan Kumar K R[1]
[1]Department of Civil Engineering, New Horizon College of Engineering,VTU , Bangalore, Karnataka, India

Abstract: ***the research was carried out to ascertain the retardation effect of borax on ggbs based geo-polymer binder. To ascertain the retardation effect of borax, the normal consistency of ggbs was determined using vicat apparatus with is standards. Activator solution was used at a rate of 25% of ggbs. 0% to 3% of ggbs was added to the binder mix. It was observed that addition of borax delayed the flash setting of ggbs based binder as the percentage of borax increased.***
Keywords: geo polymer binder, ambient curing.

I. INTRODUCTION

It is well established that Geo-Polymer binders are a novel and green binding material as it consumes the industrial bi-products and creates a satisfactory binder with chemical resistant characteristics. However the usage of Geo-Polymer is becoming limited to pre-cast and other minor applications due to it flash setting properties. Hence, there is a dire need to deter the flash setting of Geo-Polymer paste to make it viable for long distance transport and for the mainstream applications.

II. METHODS AND MATERIAL

The use of GGBS as a standalone binder is proven to provide better results and it is more predictable than using FLY ash alone. Since GGBS has a higher glass content it is a better material than Fly Ash for the synthesis of Geo-Polymer.
Vicat Appratus was used for finding out the normal consistency of GGBS and was found to be 35%.
The water content of alkaline activator solution was fixed based on the normal consistency.
Alkaline activator solution was used a rate of 25 % of GGBS by weight. The Sodium Silicate(NS) and Sodium Hydroxide(NH) was used at a ratio of 1:1, molarity of NH was fixed at 5M.
The above mentioned ratios and contents were fixed for the entire experiment, adding BORAX at incremental additions of 1% from 0% to 3% by the weight of GGBS.
Initial and Final setting times were found out using VICAT apparatus.

III.RESULTS AND DISCUSSION

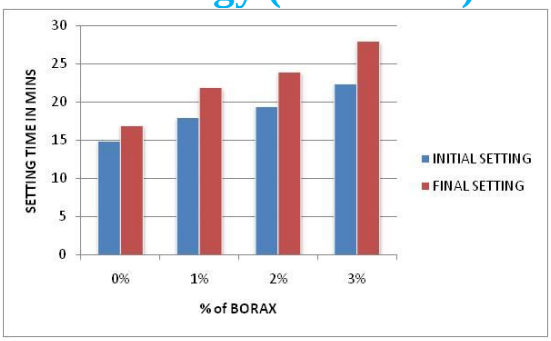
The initial setting time and final setting time results that were obtained are tabulated below.
During the observations we observed that there was not a very high time lag between Initial and Final setting time. Both Initial and Final setting time happen in succession with a little time lag when the procedure used for testing Initial and Final setting time was used.

TABLE I
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SL No	GEO POLYMER PASTE WITH BORAX CONTENT			
	0 %	1%	2%	3%
INITIAL SETTING TIME in min	15	18	19.5	22.5
FINAL SETTING TIME in min	17	22	24	28
Difference	2	4	4.5	5.5

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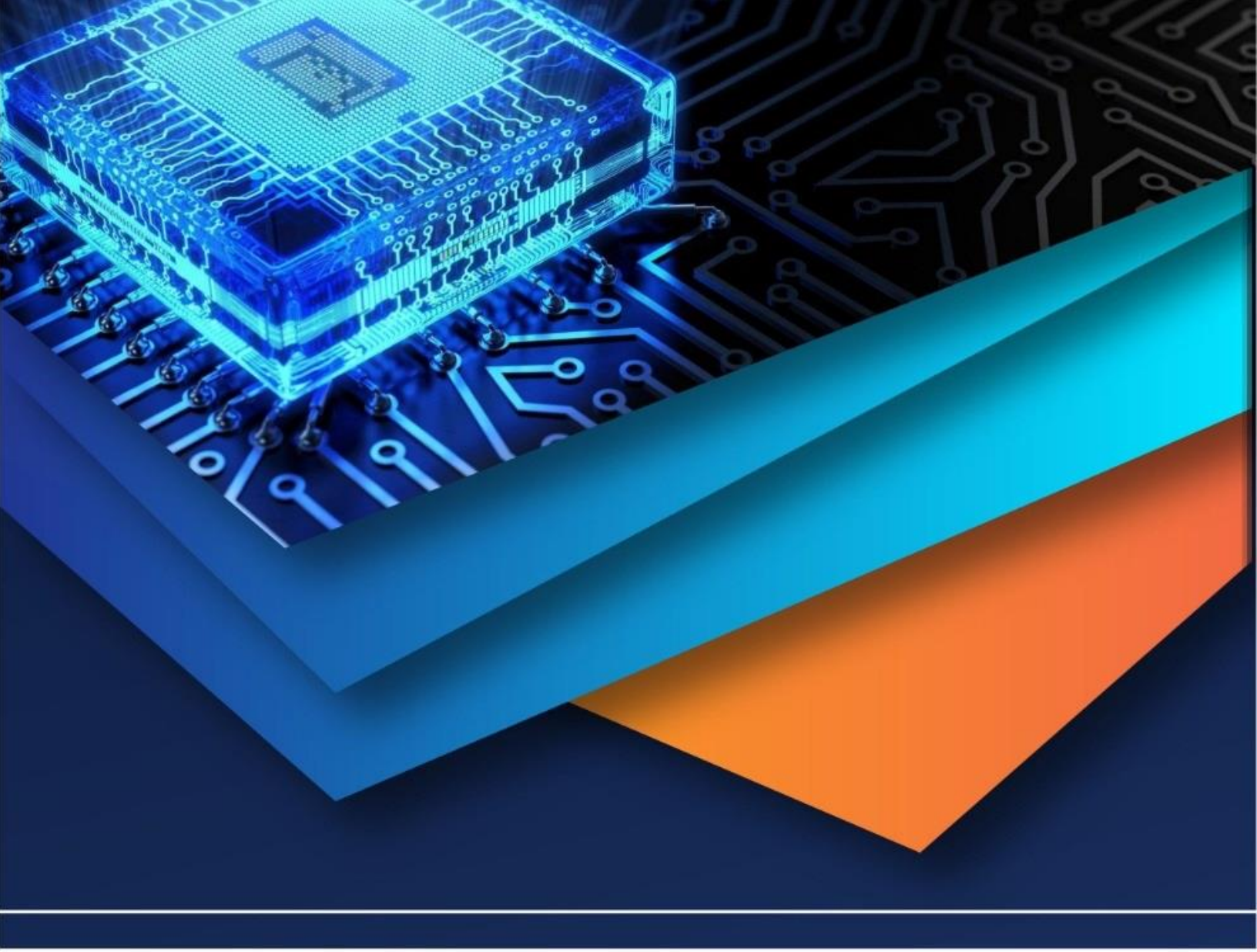
IV. CONCLUSION

With the increase in Borax content, setting time increases.
The difference between Initial Setting and Final Setting time also increases with increase in BORAX content.

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