

Properties of Fly Ash Cement Concrete

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Abstract:- Aim of the study is to analysis the properties of concrete with adding fly ash. so using this waste in road construction can dispose this waste and also beneficial in minimize pollution in environment due to this waste. It saves the cement requirement for the same strength thus saving of raw material. In present study aims preparing concrete by replacement of Ordinary Portland Cement (OPC) with fly ash . A comparison is made between fly ash and cement properties which are used as sub-grade, base in Highway construction.

- 20 mm aggregates taken as coarse aggregates were taken from construction site.
- Use potable quality of water. It should be free from impurities and harmful ingredients. It should be within the tolerable limits specified by BIS

I. INTRODUCTION

Fly ash finely divided residue resulting from the combustion of powdered coal and transported by the flue gases and collected by electrostatic precipitator. Fly ash is the most widely used pozzolanic material all over the world. In India, fly ash was used in Rihand dam construction replacing cement upto about 15 percent. in the recent time, the importance and fly ash in concrete has improve so much that it has almost become a common ingredient in concrete, particularly for making high strength and high performance of concrete.

II. MATERIAL AND METHOD

In this experimental study works are done as following-

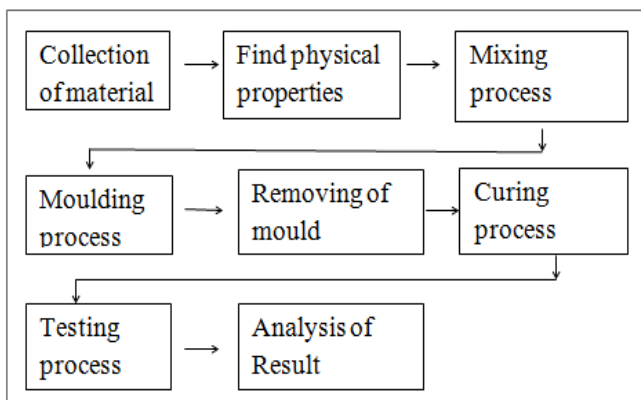


Fig 1:- Working procedure of this study

➤ Material

Following materials are used for preparing of fly ash cement concrete –

- Ordinary Portland cement 43 grade of Indian standard IS 8112:1989
- Fly ash obtained from national thermal power plant uttar Pradesh, Ash collected from near the Mahamaya fly ash Ambikapur, sarguja district of chhattisgarh.

III. TEST AND RESULT

content	Wt. of fly ash (gm)	Wt. of cement (gm)	Consistency%
0%	0	300	33.0
15%	30	270	32.0
25%	60	240	32.0
35%	90	210	31.0
45%	120	180	31.0
55%	150	150	30.0
65%	180	120	30.0

Table 1. Standard consistency of fly ash and cement mix Result-

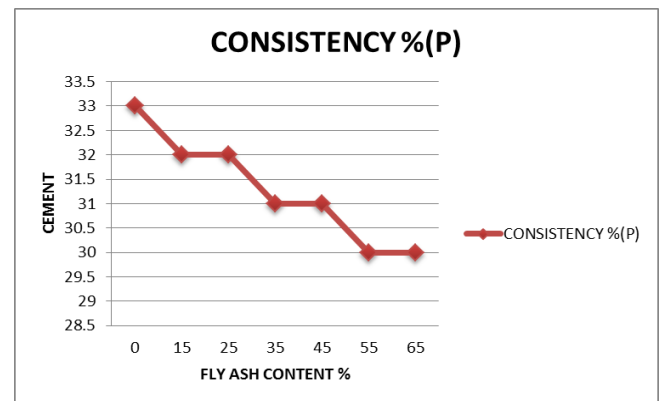


Chart 1. Standard consistency of fly ash and cement mix Result.

We can see as amount of fly ash increased consistency decreased. it required less water as compare to cement.

Fly ash %	Flyash (gm)	Cement (gm)	Initial setting time
0	0	300	43 min
15	30	270	55min
25	60	240	60 min
35	90	210	67min
45	120	180	73 min
55	150	150	78 min
65	180	120	95min

Table 2. Initial setting time of cement concrete Result-

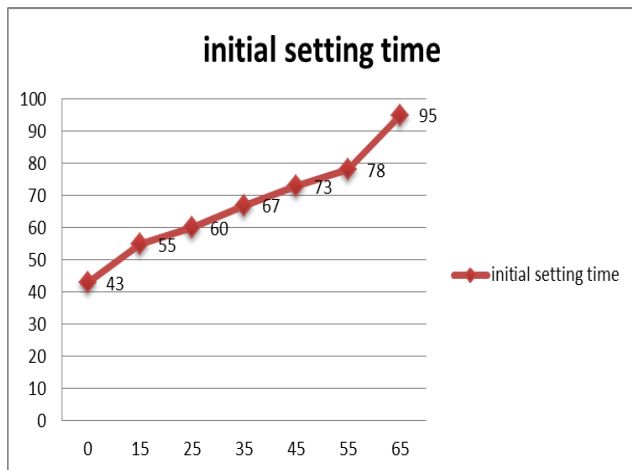


Chart 2. Initial setting time of fly ash and cement concrete Result.

Thus by result it can see that as amount of fly ash increased in cement, initial setting time also increased and it take more time to settle.

Fly ash content	Slump value (mm)
0%	270
15%	290
25%	350
35%	380
45%	480
55%	620
65%	680

Table 3. Slump value of fly ash cement concrete Result-

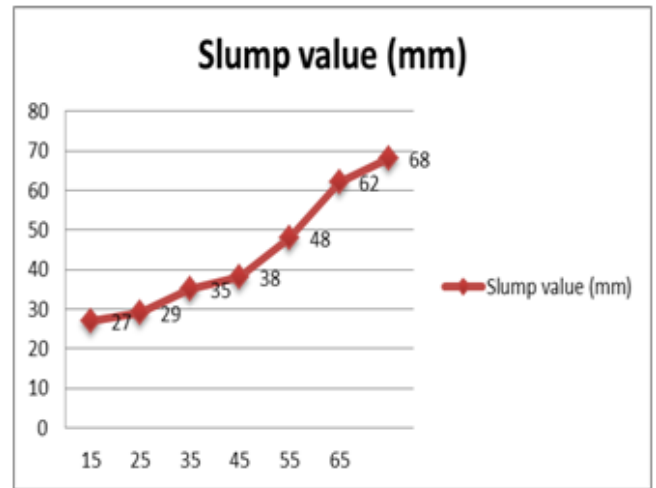


Chart 3. Slump value of fly ash concrete Result.

Fly ash increased slump values increased. Fly ash also has not more binding property so slump values increased.

Concrete Grade	Sample content	Compressive strength 7 days (N/mm ²)	Compressive strength 28 days (N/mm ²)
M25	0%	27	35
	15%	23	30
	25%	21	27
	35%	19	25
	45%	18	24
	55%	16	20
	65%	14	17

Table 4. Compressive strength test Result

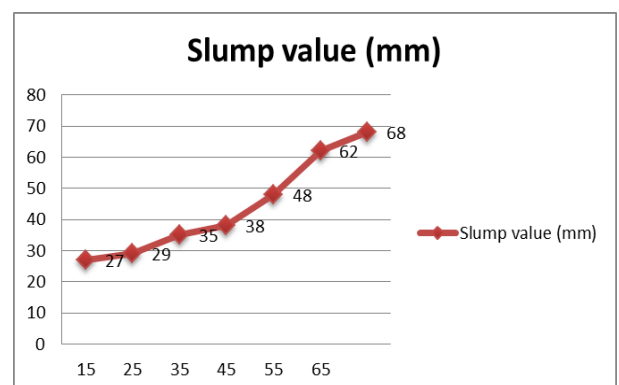


Chart 4. Compressive strength of concrete Result.

IV. CONCLUSION

At all the cement replacement levels of Fly ash, the rate of development of compressive strength up to 7 days is slower as compared with that of concrete in which FA content is zero, while the rate of development of strength gradually increases after 7 days up to 28 days in case of FLY ASH mixed concrete. The compressive strength of concrete having 30% replacement was found to be more than the other levels of replacements. (i.e. 0%, 35% & 45%). The study shows that the compressive strength of concrete is optimal by replacing OPC by 30% of FA keeping total binder content same. For the desired workability and strength, the water content required in case of FLY ASH mixed concrete was more than in normal concrete. This is because FA is finer than cement & the fact is that FA particles being finer it has more surface area and hence water required is comparatively more.

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