

Effect of Metakaolin and Flyash on Strength of Concrete

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ABSTRACT- The modern day report deals with the effects of mineral admixtures, by partial replacing concrete floor, in conditions of improved upon performance on compressive and split tensile strengths. Trial and error work was performed to investigate the effect of Meta kaolin and Soar ash by partial overtaking cement and keeping same water cement ratio to ordinary concrete & fulfilled kaolin and fly lung burning ash. Through this program we are going to construct dice samples of size 150mmx150mmx150mm several percentages of Traguardo kaolin and Fly lung burning ash with partial replacement of cement casted and analyzed. The concrete mixes got 0%, 5%, 10%, 15%, 20% of Meta Kaolin, replacing cement partially, to be able to determine the best percentage, which was give maximum compressive strength. It discloses that with 10%Meta kaolin and Fly ash each partial replacement of concrete floor were found to be most favorable combinations for casting of concrete flexural members. Using the ideal mix proportion giving the best brings about compressive power of cube testing, cyndrical tube specimens casted and examined for their split tensile strength. The dimensions of every cylinder are 150mm times 300mm. The cylinder was tested to verify their split tensile strength after 7days, 28 days of curing. The results will compare with the light beams of varying flexural power of Plane Cement Cement, Plane Cement Concrete with Meta kaolin & Soar ash.

KEYWORDS- Compressive Strength, Split tensile Strength, Metakaolin, Fly ash.

I. INTRODUCTION

Concrete as well known is heterogenous mix of cement, water and aggregates. The admixtures may be added in concrete in order to enhance some of the properties desired specially. In its simplest form, concrete is admixture of paste and aggregates. Various materials are added such as flyash, metakaolin to obtain concrete of desired property. The character of the concrete is determined by quality of the paste. The key to achieving a strong, durable concrete rests in the careful proportioning, mixing and compacting of the ingredients. In this project, I used metakaolin and flyash as supplementary cementitious materials. This paper deals with the use of Metakaolin which is having good pozzolanic activity and is a good material for the production high strength concrete. which is getting popularity because of its positive effect on various properties of concrete.

A. Role of metakaolin in High Performance Concrete:

The incorporation of metakaolin improves strength of concrete significantly. The research conducted on metakaolin indicated that the optimum level of replacement lies somewhere between 5% and 10%. Research studies have confirmed the partial replacement of cement by metakaolin contributes to the strength of concrete due to the filler effect, and the acceleration of hydration of cement due to its pozzolanic reaction.

B. Role of Fly ash in High Performance Concrete:

Fly ash, a principal by-product of the coal-fired power plants, is well accepted as a pozzolanic material that may be used either as a component of blended portland cements or as a mineral admixture in concrete. In commercial practice, the dosage of fly ash is limited to 15% - 20% by mass of the total cementations material.

II. LITERATURE SURVEY

Patil B.B., Kumbha P.D.(2012) [1] have studied properties namely workability, compressive strength and durability of M60 grade HPC mixes incorporating different percentages of high reactivity metakaolin by weight of cement along with some suitable super plasticizer. SrinivasaRao P., Sarvana, Abdul Rahim (2002) [2] The results show that the percentage of weight loss is reduced and compressive strength is increased in the case of 10% metakaolin replaced concrete when compared to normal concrete. Shekarchi M., Bonakdar A., Bakhshi M., Mirdamadi A., Mobasher B. (2009) [3] have studied the durability of concrete improved by using blended cement materials such as fly ash, silica fume, slag, and more recently, metakaolin Jian-Tong Ding and Zongjin Li (2002) [5] Metakaolin-modified concrete showed a better workability than silica fume-modified concrete Erhan G., kasumMermerdas (2007)[6] have presented the results of an investigation on the use of metakaoline (MK) as a supplementary cementing materials to improve the performance of concrete.

III. OBJECTIVE

1.To study the relative strength development with age of (MK+FA)concrete,with control concrete.

150)mm.

300)mm.

IV. EXPERIMENTAL PROGRAM AND SETUP

The main aim of this experimentation is to study the effect of partial replacement of cement by metakaolin and flyash on the properties of concrete.

Experimental program:

- a) Concrete mix design as per IS 10262-2009 for M20 grade of concrete metakaolin, flyash after partial replacement of cement with varying percentages.
- b) Casting of cubes and cylinder
- c) Curing of cubes and cylinder for 7 days and 28 days then testing all cubes and cylinder for compressive strength and split tensile strength.

300)mm for different percentage of metakaolin and flyash in partial replacement of cement casted. The concrete mixes had 0%,5%,10%,15%,20% of metakaolin and flyash with partial replacement of cement. After final setting of cubes, the cube mould and cylinder moulds removed and kept in water tank for curing upto 7 days and 28 days. Average of three cubes and cylinder is taken for compressive strength and average of three cylinders were taken for split tensile strength.

V. RESULTS

Table (1) compressive strength of various percentage of metakaolin and flyash for M20 at 7 days and 28 days

Mix Discription	Compressive strength (<i>Snehal S.Shinde</i>)	
	7 days	28 days
0%	19.19	24.13
5%	21.80	27.18
10%	22.67	28.63
15%	21.07	25.58
20%	18.60	23.11

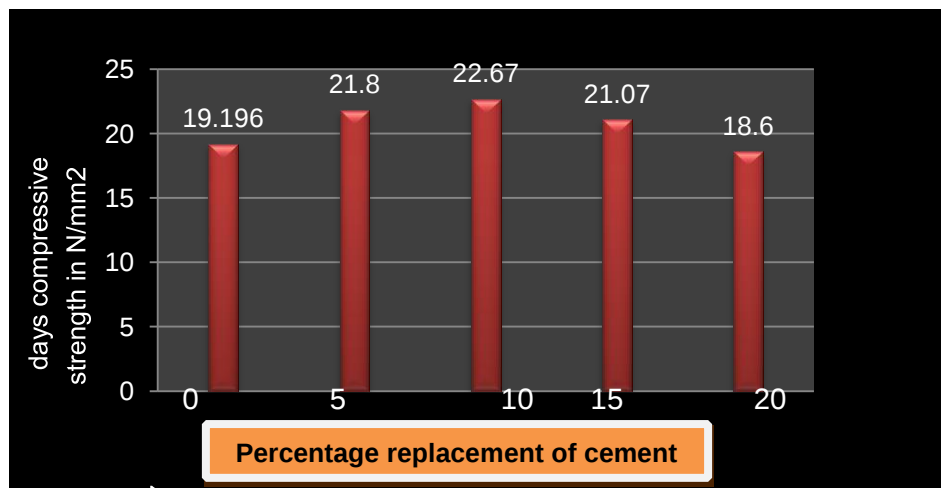


Fig. 7 Days compressive strength

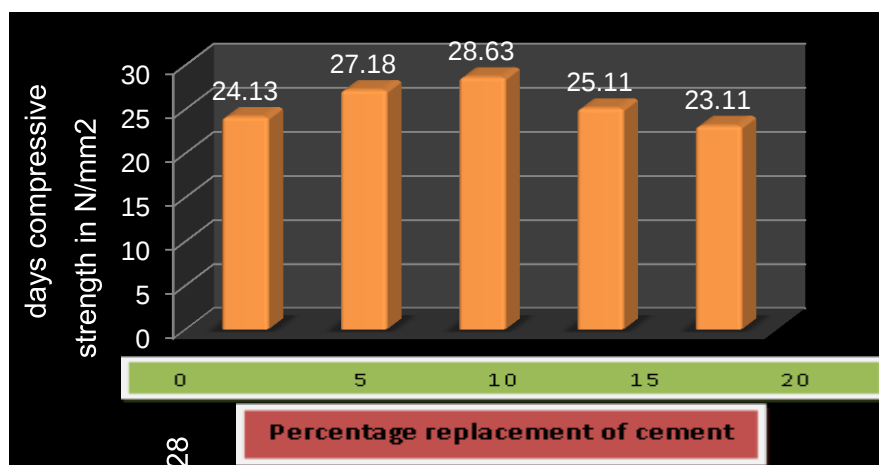


Fig. 28 days compressive strength

The result of compressive strength plotted in table (1) and shown in fig.(a)and(b). Result indicate that if we increase % of metakaolin and flyash upto 10% gives us a good results and help to increase compressive strength of concrete.

Table (2) split tensile strength of various percentage of metakaolin and flyash for M20 at 7 days and 28 days

Mix Discription	Split Tensile Strength (Snehal S.Shinde)	
	7 days	28 days
0%	2.36	2.50
5%	2.45	2.82
10%	2.50	2.86
15%	2.03	2.41
20%	1.76	2.17

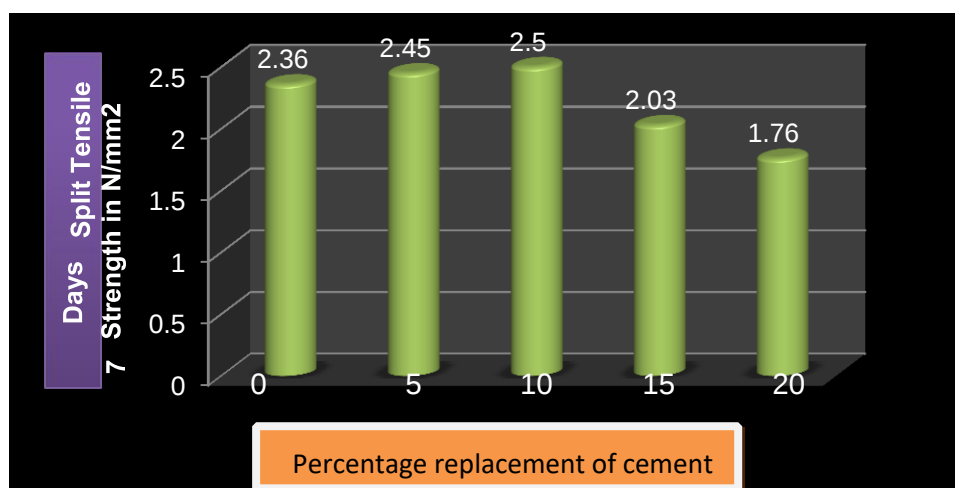


Fig. 7 days split tensile strength

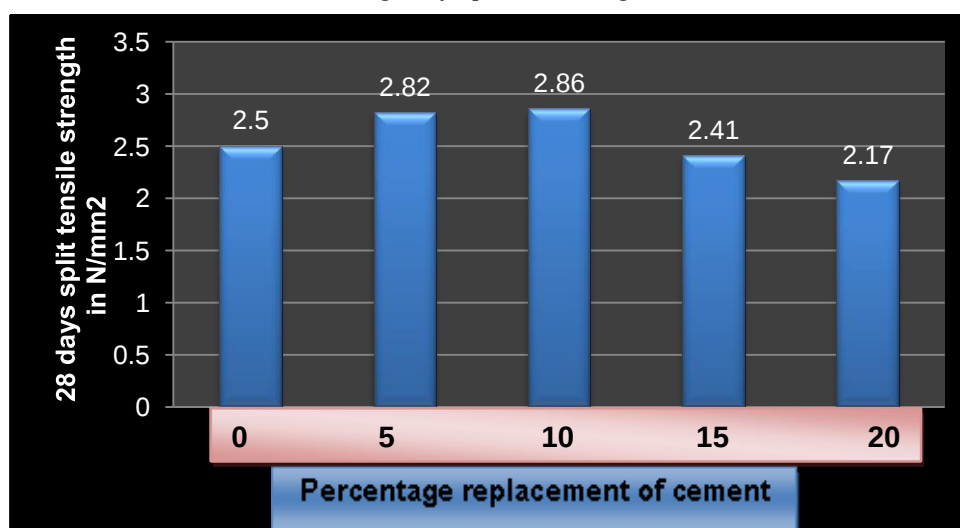


Fig. 28 days split tensile strength

The result of split tensile strength plotted in table (2) and shown in fig.(c) and (d). Result indicate that if we increase % of metakaolin and flyash upto 10% gives us a good results and help to increase split tensile strength of concrete.

VI. CONCLUSION

The main aim of the present investigation to study the effect of metakaolin and flyash on strength of concrete with partial replacement of cement, focused on the use of less energy intensive materials such as Fly ash. Based on the experimental investigations carried out, the following conclusions are taken –

1. It has found that the compressive strength and split tensile strength of concrete at 7 Days and 28 days gives better results when the replacement of cement with both metakaolin and flyash mix up to 10 % (10%FA+10%MK).
2. The 10% addition of metakaolin in concrete is the optimum percentage enhancing the compressive strength at 7 days by 18.09% and 28 days by 18.64% when compare with the control mix specimen.
3. The 10% addition of metakaolin in cement is the optimum percentage enhancing the split tensile strength for 7 days by 5.93% and 28 days by 14.4% when compare with the control mix specimen.
4. The strength and durability of concrete increases.
5. Use of Metakaolin accelerates the initial set time of concrete.

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