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Structural Synthesis of Melamine on the Properties of Concrete Different Mix Time Slice

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***Abstract*- The performance of concrete primarily depends upon the sort and quantitative relation of its constituents, compaction, natural conditions and admixtures used throughout the action process. A part of this analysis emphasis to calculate the results on strength of concrete once water-cement quantitative relation is constant and the rise in slump happens with the increase in the quantity of Super plasticizer. The rest of the investigation is dispensed to review the results of Superplasticizer with completely different dosages under completely different action regimes at the associate close field with different temperatures. For this purpose, a concrete combine with silica fume and fly ash with all parameters constant was associate anionic alkali based Superplasticizer with no chlorides. Different percentage of melamine were employed in completely different batches of all 48 specimens and cured under completely different action conditions so tested for compressive and tensile strengths following the water curing testing showed most strength. The highest and lowest values of compressive strength were obtained with the addition of 1.5% to 4.5% Superplasticizer severally. It had been found that while not increasing the W/C quantitative relation, the addition of the Super plasticizer exhibits an increase in strength.**

***Keywords*- Super plasticizer, chlorides, tensile strengths etc.**

I. INTRODUCTION

Due to the availability of different types of admixtures and cement in the market, there is flexibility in choosing the right composition of the concrete according to the desired parameters, keeping in mind the overall economy and environmental safety. Admixtures, especially new Super plasticizer are being developed regularly in the world, which dramatically change the properties of the concrete.

But if there is incompatibility between the cement and the admixtures, it may cause rapid slump loss due to quicker setting of concrete or unacceptable low early strength (slump retention) due to excessive retardation of setting time, in addition to economic loss.

In, India is leading in both cement production and consumption. As per the construction index of November 2018, there were five major cement producing companies in India as indicated.With the entrance of many cement brands and different concrete admixtures in the India n market, there is need to carry out a study on the effect of chemical Superplasticizer on local cement brands.

Three of the six local cement companies have been selected for this research and they include Birla Cement, ultra tech Cement, and J.P Cement Superplasticizer, also known as high range water reducing admixtures, are synthetic, water-soluble organic chemicals that significantly reduce the amount of water needed to achieve a given consistence in fresh concrete. There are four types of Superplasticizer in the India n market. This research evaluates two commonly used Superplasticizer in India which include Master Superplasticizer is a liquid product manufactured by BASF and is described as a high range water reducing and high performance Superplasticizer. It is designed for the production of rheoplastic concrete and is composed of high molecular weight polymers and refined lignosulphonates.

Lignosulphonates, which are commonly used as water reducers, have secondary retarding effects. Super plasticizer is a product manufactured by factory and is described as a high performance Superplasticizer which is liquid and light brown in color.

It is a third generation Superplasticizer for concrete and mortar based on modified polycarboxylate polymer and satisfies the physical and chemical requirements for set retarding/high range water reducing according. Carboxylic acids and their salts present in commonly used as retarders and have secondary water reducing effects. The effect of the Superplasticizer can be summarized in two ways:

Incompatibility occurs when the performance of fresh and hardened concrete is compromised due to the adverse effects as a result of using a certain combination of the cement and superplasticizer.

The adverse effects include flash setting, excessive retardation, rapid slump loss, improper strength gain, high shrinkage cracking etc. These issues ultimately affect the strength and durability of concrete.

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The use of superplasticizers with various brands of cement available in produces different results for each combination. It is therefore not certain that a super plasticizer will manifest all its desired effects with any of the cement brands. Lack of knowledge on compatibility issues causes undue loss to the user when the supply of cement or the superplasticizer is replaced during a project. Most often, compatibility issues are mistaken for problems with the mix design because of the inadequate information on the subject. Therefore, a thorough understanding of the effect and remedies of incompatibility is necessary.

II. LITERATURE REVIEW

Flatt R. J. and Houst Y. F. In this report Portland cement concrete has clearly emerged as the material of choice for the construction of a large number and variety of structures in the world today. This is attributed mainly to low cost of materials and construction for concrete structures as well as low cost of maintenance. Therefore, it is not surprising that much advancement in concrete technology have occurred as a result of two driving forces, namely the speed of construction and the durability of concrete. During the period 1940-1970, the availability of high early strength Portland cements enabled the use of high water content in concrete mixtures that were easy to handle. This approach, however, led to serious problems with durability of structures, especially those subjected to severe environmental exposures. Then Superplasticizer enhances the workability to sufficient extent by lowering the shear and flow resistance. Even in the case of self-consolidating concrete, superlasticizer greatly enhances the workability of fresh and hardened concrete. Normally, the chemicals used for reducing water quantity are liquids and possess less than 0.5% of cement weight. In these chemicals, solid‟s contribution ranges from 30% to 40% of total volume.

In low range water reducers, **Zakka et al.** studied the effect of superplasticizers on the initial and final setting times of Ordinary Portland cements in Texas, U.S.A and found that the addition of superplasticizers delayed both the initial and final setting times. It was noted that the setting time was delayed even further after the second addition of the superplasticizer. The delay in initial and final setting time was generally similar for each addition of the superplasticizer. In general, setting time was related to slump loss, the lower the rate of slump loss, the higher was the delay in setting time. Zakka et al. [9] further noted that the time between the initial and final setting time is reduced at high temperature and that the type of aggregate does not affect the setting time. The study did not consider Portland Pozzolanic cements.

Khan et al. studied the effect of retarding admixtures on the setting time of cement pastes in hot weather. The research focused on the Portland Pozzolanic cements manufactured in. The study showed that the effect of retarding admixture on the Pozzolanic cement was not consistent for all the selected cements. The admixture showed accelerating effects on initial set for one type of cement and therefore it was recommended that caution is necessary when using retarders with Pozzolanic type cements.

The study did not consider the use of superplasticizers instead of retarders in enhancing concrete performance. Therefore, research to provide knowledge on the action of superplasticizers on the Portland Pozzolanic cements manufactured in India is necessary.

III. MIX DESIGN

The mechanism of action of different Superplasticizer on the strength of the concrete depends on the mix time in mixer it should not more and also not less. But due to traffic and other blockage in transportation this time duration extended unto 3-4 hours so the sample are prepare Such that these are mixing at different time like MK60 has taken 60 minutes and for that water reducer Superplasticizer has mix 0.5% of cement taken.

Table 1. Mix Design.

Mix designation	W/C ratio	Cement content (%)	KEM Super-Plasticizer L10 (%)	SF (%)	Fly ash (kg)	F. A. (%)	C.A.(%)
MK01	0.45	100	0.5	0.5	19.12	100	100
MK02	0.45	100	1.1	1.1	19.12	100	100
MK03	0.45	100	1.7	1.7	19.12	100	100
MK04	0.45	100	2.3	2.3	19.12	100	100

Table 2.Mix Design

Mix Design	W/C ratio	Cement content & GGBF (kg)	KEM Super- Plasticizer L10 (lt)	SF (kg)	Fly ash (kg)	F. A. (kg)	C.A. (kg)
MK60	0.45	345.6	0	1.73	19.12	798	1105
MK120	0.45	345.6	3.811	3.811	19.12	798	1105
MK180	0.45	345.6	5.89	5.89	19.12	798	1105
MK240	0.45	345.6	7.96	7.96	19.12	798	1105

Similarly in MK120 has mixed 120 minutes and for that water reducer Superplasticizer has mix 1.1% of cement taken. In MK180 has mixed 180 minutes and for that

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water reducer Superplasticizer has mix 1.7 % of cement taken. In MK240 has mixed 240 minutes and for that water reducer Superplasticizer has mix 2.3% of cement taken.

IV. RESULTS

The most important result of continue mixing is on slump value of concrete. Fresh concrete mixes stiffen with time, particularly if continuously mixed. This stiffening effect is reflected in a reduced slump and accordingly, this phenomenon is reflected as slump loss .

This loss of slump value at continue mixed concrete is caused by a number of reasons. The main reasons are simply that some water from the mix is absorbed by the aggregate if not saturated, some is lost by evaporation and some is removed by initial chemical reactions. The higher water absorption rate of aggregates as a result of longer mixing time is a reason for slump loss of continue mixed we are taking mixing speed 15 RPM concrete.

The grinding effect caused by extra mixing of fresh concrete causes greater amount of fine aggregate than the one determined during design process. This situation results in a decrease in slump value, since increase in finer aggregate increases the water demand for same consistency of concrete.

Table 3.Slump Flow.

S NO.	MIX DESIGN	SLUMP FLOW (In mm)			
		Initial slump flow	Slump flow after 60 minute	Slump flow after 120 minute	Slump flow after 180 minute
1.	MK01	170	92	71	56
2.	MK02	141	110	86	64
3.	MK03	123	129	103	82
4.	MK04	104	147	127	110

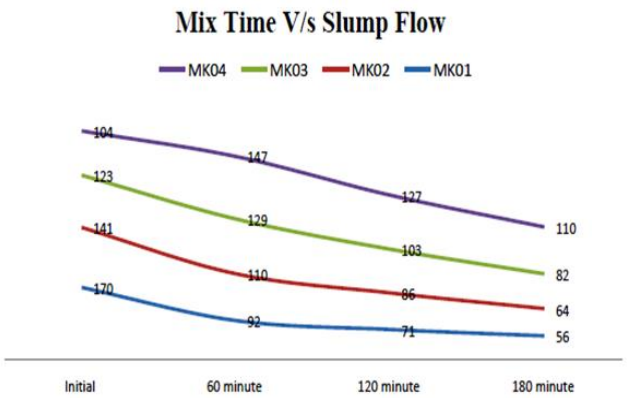

Fig 1. Slump Flow Analysis.

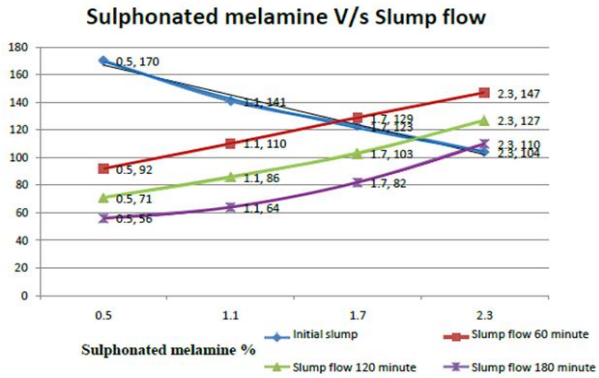

Fig 2. Slump flow on various time.

1. Compressive Strength of Concrete:

The compressive strength of all the mixes was determined by Universal Testing Machine at the ages of 7 and 28 days for the various mixes levels of Superplasticizer and addition of SF and Fly Ash. The values of compressive strength for different replacement levels of KEM Superplasticizer L10 (0.5%, 1.1%, 1.7%, 2.3%) and addition of SF (0.5%, 1.1%, 1.7%, 2.3%) at the end of different curing periods (7 day & 28 days) are given in Table 6.1. These values are plotted in Figures 6.2 to 6.3, which show the variation of compressive strength due to different percentages of KEM Superplasticizer L10 and Silica Fume. MK60 MK120 MK180 and MK240.

Table 4. Compressive Strength in Mpa.

	Mix Design	7 Days				28 Days			
Mixing time (In Minute)		60	120	180	240	60	120	180	240
	Control Concrete					44.12	38.24	35.29	32.67
1	MK01	31.29	30.26	30.16	29.76	41.32	40.06	39.46	39.07
2	MK02	32.19	33.34	33.42	33.51	42.16	41.62	40.06	40.84
3	MK03	34.11	34.26	34.60	34.78	43.25	43.56	45.73	42.18
4	MK04	34.43	33.12	32.92	32.45	45.53	43.02	42.57	41.11

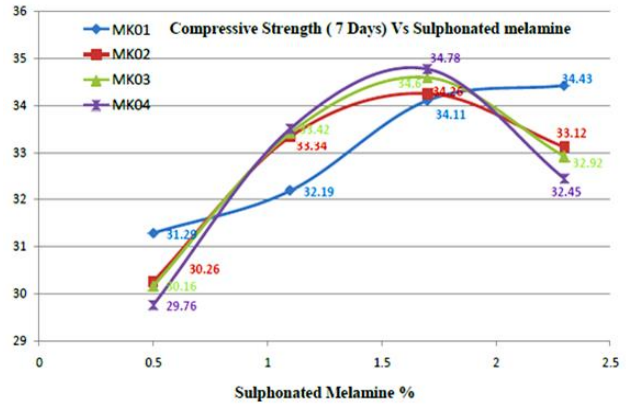

Fig 3. Compresive Strength.

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2. Tensile Strength:

The split tensile strength of all the mixes was determined by Universal Testing Machine at the ages of 28 days for the various replacement levels of Sulphonated Melamine Superplasticizer and addition of SF and Fly Ash. That these are mixing at different time like MK60 has taken 60 minutes and for that water reducer Superplasticizer has mix 0.5% of cement taken.

Similarly in MK120 has mixed 120 minutes and for that water reducer Superplasticizer has mix 1.1% of cement taken.

Table 5. Tensile Strength.

S No.	Mix Design	For 28 Days MPa			
1	MK01	1.45	1.31	1.12	0.93
2	MK02	1.48	1.36	1.24	1.31
3	MK03	2.84	2.21	1.86	1.44
4	MK04	3.27	2.89	1.22	1.31

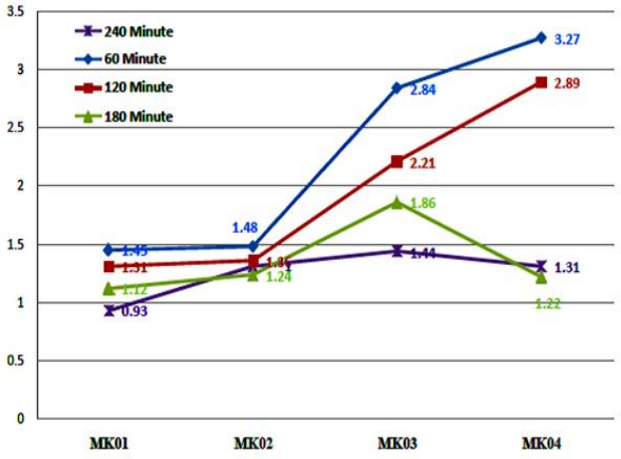

Fig 4. Tensile Strength

In MK180 has mixed 180 minutes and for that water reducer Superplasticizer has mix 1.7 % of cement taken. In MK240 has mixed 240 minutes and for that water reducer Superplasticizer has mix 2.3% of cement taken.

The values of tensile strength for different replacement levels of Sulphonated Melamine Superplasticizer (0.5%, 1.1%, 1.7%, and 2.3%) and addition of SF (0.5%, 1.1%, 1.7%, and 2.3%) at the end of different curing periods (28 days) are given in Table.

These values are plotted in Figures, which show the variation of tensile strength due to different percentages of Melamine and Silica Fume.

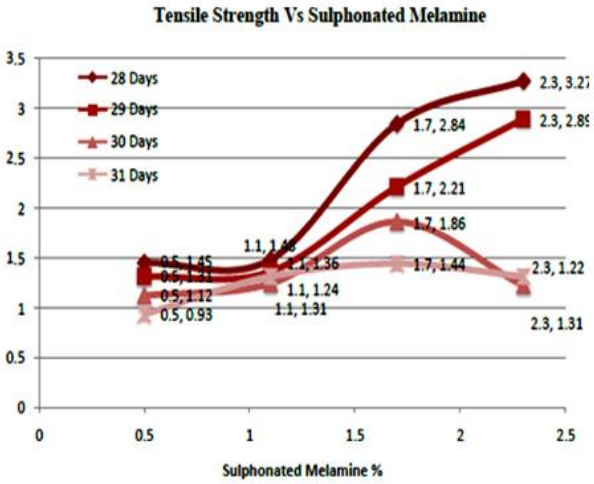

Fig 5. Tensile Strength.

V. CONCLUSION

Present research was carried out to determine the compressive strength of concrete (M30) containing super plasticizer Sulphonated Melamine, Silica fume and fly ash. The objectives of the study were to study the effect of partial replacement of Metakaolin and fly ash with additives as super plasticizers on compressive strength of concrete. Specimens were prepared keeping w/c ratio 0.45 and by varying percentages of Sulphonated Melamine and Silica fume. After curing, the specimens were tested after 7 and 28 days for getting the value of slump test, compressive strength and tensile strength for that these are mixing at different time like MK60 has taken 60 minutes and for that water reducer Superplasticizer has mix 0.5% of cement taken.

Similarly in MK120 has mixed 120 minutes and for that water reducer Superplasticizer has mix 1.1% of cement taken. In MK180 has mixed 180 minutes and for that water reducer Superplasticizer has mix 1.7 % of cement taken. In MK240 the statistical analysis was applied on results of compressive strength test. All the results were found statistically significant.

From the experimental investigations, it can be concluded that the partial replacement of Portland Pozzolana Cement with Sulphonated Melamine and addition SF helps in improving the strength and performance of concrete. Sulphonated Melamine is an effective pozzolana and results in enhanced strength of concrete. When MK replaces cement, its effect on concrete strength starts at early ages and also increase in the strength was observed at later ages. Maximum percentage strength gain is at the age of 7 day i.e. 45.53, 43.25, 42.16 and 41.32 MK04, MK03, MK02 and MK01 and SF improves the performance of concrete at 0.5 % and 2.3 % addition, beyond there is no positive effect on the compressive strength of concrete.

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Sulphonated Melamine and SF in combination gives maximum strength at 1.7% and 1.7% SF i.e. mix MK03 at 180 minute mixture. Results of compressive strength test were statistically analyzed. There is linear relationship between compressive strength and Sulphonated Melamine with silica fumes all the results were found statistically significant.

REFERENCES

[1] TS 11222, Hazır Beton, Türk Standartları Enstitüsü, Ankara, 2000
[2] ASTM C94, Standart Specification for Ready-Mixed Concrete, Annual Book of ASTM Standards, 2001
[3] Entroy, H.C., The Variation of Test Cubes, Cement and Concrete Association Research Report 10, 19603.
[4] Metcalf, J.B., The Specification of Concrete Strength, Part II, Report LR 300, 1970Soroka, I., Ravina, D., Hot Weather Concreting with Admixtures, Cement and Concrete Composites 20, 1998, pp.129-136
[5] Başkoca, A., Özkul, M.H., Artırma, Ş., Effect of Chemical Admixtures on Workability and Strength Properties of Prolonged Agitated Concrete, Cement and Concrete Research, Vol. 28, No. 5, 1998, pp. 737–747.
[6] Erlin, B., Hime, W. G., Concrete Slump Loss and Field Examples of Placement Problems, Concrete International, 1, No. 1, 1979, pp. 48-51.
[7] Lea, F. M., 1971, The Chemistry of Cement and Concrete, 3rd Edition,Chemical Publishing Co., New York, pp. 454-489.
[8] Use Of Superplasticizers In Concrete And Their Compatibility With Cements Alok Verma, M. Shukla And A. K. Sahu International Journal of Civil Engineering and Technology (IJCIET), ISSN 0976 – 6308.
[9] Preparation and Properties of Melamine Urea-Formaldehyde Microcapsules for Self- Healing of Cementitious Materials by Wenting Li, Xujing Zhu, Nan Zhao and Zhengwu Jiang March 2016.
[10] Synthesis and the Effects of New Melamine Superplasticizer on the Properties of Concrete HuqunWang,1 Xiaofeng Yang,1 Weifeng Xiong,1 Xiaobin Liu,1 and Zhimin Zhang2 Hindawi Publishing Corporation ISRN Chemical Engineering Volume 2013, Article ID 708063.
[11] Compatibility Study of Superplasticizers With Cement Partially Replaced With Brick Powder by Thulasi M1, Abin Thomas C e-ISSN: 2395- 0056
[12] Behaviour of Normal Concrete Using Super plasticizer under Different Curing Regimes by S N R Shah, Muhammad Aslam, S A Shah, Raja Oad Vol. 15, July, 2014 p. 87-94.

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