

# Effect of Admixtures on Water Uses in a Concrete: A Review

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**ABSTRACT:** In this paper the main purpose is to analyze and investigate the different effect of admixtures which are been used in concrete different studies of several mineral and chemical admixtures which helps to know the effect of admixtures on the concrete many times. Studies have done to obtain different characteristics of concrete such as workability high performance durability and compressive strength to achieve the requirement of complete structure in modern lifestyle. To improve these quality of concrete there must be addition of different material.

Concrete admixture is defined as material other than aggregate water and hydraulic cement. The ingredient used as used before the mixing to improve and modify the concrete properties. This paper wise give the information of different admixtures and their properties its uses, advantages and disadvantages.

**KEYWORDS:** Concrete, Chemical, Super plasticizer, Accelerators, water reducing, retarders.

## I. INTRODUCTION

world . It has became the effective material for construction because of new improvement in concrete production by using new techniques and materials which improve the properties of fresh as well as hardened Concrete . so for the Purpose of modifying properties of the concrete use of admixtures in concrete is preferred. This concrete technology is improving significantly since 1980, with the invention Of water reducing .chemical admixture, high range, water reducing admixtures as well as air entraining admixtures.

Admixture which is mentioned is substance which is used to improve the properties of fresh and hardened concrete. Admixtures improve the properties of fresh concrete such as strength ,W/C ratio ,slump, durability etc. Admixtures are also used for the workability, setting time (Kate and Kumbhar 2017). There are two main types of admixtures used for concrete a such a chemical Admixture and mineral Admixture. Again this admixtures are divided into its subtypes. The main purpose of use of admixture is to reduce the W/C ratio and increase in workability of concrete.

The main type of admixture used for the building construction aresuperplasticizers, water reducing admixtures, water proofing admixtures.

Superplasticizers added to cement allows to reduce W/C ratio without disturbing the initial workability of Concrete. Superplasticizers can reduce water content requirement of cement 304 about 30% (Kate et al. 2020). The SNF type of admixture can reduce water content by 16-17% by the weight of Cement. Also because of the plasticizing effect their is chance that the cement content will also decrease, without changes in engineering properties of concrete (Kate and Kumbhar 2017. Nowadays the use of admixture have been significantly increased. Admixture are being used in every Component of building. The concrete and mortar are two main materials in building in which admixtures are being used. In china in northwest region which is rich of sulphates in water Admixtures have been used for the pile foundation to make it durable

## II. LITERATURE REVIEW

The possibility of adjusting concrete mixture fluidity by means of super plasticizer SNF

Author: A.KAPELKO (2006) In this paper author A. Kapelko . The tests area carried out on the material in cement by using the super plasticizer SNF, the use of SNF in the amount of 1-1.2% by weight of concrete has reduced the use of water content by 16 to 17% while maintaining consistency of concrete mixture.

Then also triple SNF is high c3A content used during the its first addition. So the repeated addition of workability in first addition and this second amount is adequate to kept fluidity and third amount is added to increase workability

in this upto 2% SNF is used in total in this study the basalt grit and granite aggregate is used along with normal aggregate cement water

2) Statistical analysis of chemical admixtures usage for concrete : A survey of Eskisehir City: turkey

Author: GulcagAlbayrak, Mehmet Canbaz ,ugurAlbayrak (2015)

This study is based survey of personal working is varies construction sector the questionaries' survey is been done questionaries' survey is related to use of various types of admixtures dosage, consciouness of admixture usage advantages its disadvantage effect of personal are building inspection building sites RMC prefabricated concrete component other and participant personal are civil engineering PHD, M.sc ,civil engineering , architect, technician , operator and skilled workman. This study shows that plasticizers and set controlling admixture are mostly used while other types are not as much popular. And reasons to use admixtures are improving durability of concrete , improving strength of concrete. Improving properties of fresh concrete , cost reducing.

3) Admixtures used to enhance placing characteristic of concrete.

Author.M.Collepari

This study is related to used of plasticizers and super plasticizers. Here the composition, action mechanism method so addition of the plasticizers and super plasticizers is SNF and secondary is ingredient is MLS(modified forms)and likewise. Also the effect or disadvantages are given in this paper such that hot weather with transportation times and reactive cement which is affected due to addition to procedure.

4) Studying of effect the high range water reducer/super plasticizer , retarding admixtures on properties of concrete

Author: HanadiAbdulridhaLateef (2016)

In this study the test are conducted on concrete by using the super plasticizer .the properties of fresh as well as hardened concrete are studies . this study shows that the initial setting time, slump and fresh densities are low also proper accurate dosage can increase workability but over dosage can lead to impair cohesiveness of concrete also it shows that over dosage can reduce the compressive strength.

5) New generation of water reducing admixtures of concrete.

Author: Jamal M Khatib, EL-SayedMoussaNegim, TarekUddin Mohammed (2012)

In this study various concrete mix is used and water reducing admixture is used in concrete. In this mixture are used for various water to cement ratio with the dosage of admixture. The tests are performed on the 10 mixes. Here the water cement ratio is reduced for increasing dosage of admixture and then properties of concrete were investigated like workability, density, compressive strength, ultrasonic pulse velocity, dynamic modules of elasticity and drying shrinkage in this all mixes with admixture achieved the strength higher than that of the normal mixes. And it is studied that low water cement ratio can be used for higher dosages.

6)Influence of chemical Admixture on properties of prolonged mixed concrete,

(Authors = TarekuddinMobammeel, TanvirAbmed, Abdul Munim, ShiblyMostaFizApurbo, TabiyAbsarMallict, FarhanShahnd& Mohammad Abdul Aual )(2017)

In this paper effect of different chemical admixture on Fresh & hardened concrete is studied along with their cost effectiveness. In His paper various concrete mixes were prepared using five different type of Chemical admixture (one water reducing based on sulfonated naphthalene, polymer ,polycarboxylic ether, second generation polycorboxylic ether polymer organic

polymers). This study Shows that super plasticizer shows the better performance & also increase workability of concrete also it states the dosage should be in reccomedatory given by manufacture of admixture also the use of chilled water two stage dosage keep concrete workable for long time

7. Chemical Admixture: A Major Role In Modern concrete Material, & Technologies

(Authors: Meet P shah, Dr. JayeshkumarPitroda)(2014)

CME7DARSHAN CHEMICAL ADMIXTURES

In this paper the types of admixture Used are mentioned. The purpose of using admixture is also given in this paper. There are two main types of admixture which are chemical admixture & mineral admixtures are given along with their Subtype. Also the chemical Composition & advantage of admixture is given in this paper. This paper also contain disadvantage of admixture.

8..The effect of water cement ratio and chemical admixture on the workability of concrete

Author: Ali m Mansor , Ruben Paw Borg, Ahmed MM Hamed, Mohammed Gadeem, Mansour.

In this paper the study is done on the concrete by using the various amount of admixture. The aim was to study the effect of the chemical admixture on the W/C ratio of concrete without disturbing its workability.three types of admixture were used in the study. All admixtures are confirming to ASTM C 494/C 494M-04 standards. Admixtures are water reducing admixtures (plasticizer) & water reducing and retarding admixtures (Plasticizers) & High range water reducers(super plasticizers) have been used. Also the comparison between the workability for various WIC ratio with or without admixture have been done.

9. Dosage Limit Determination of superplasticizing admixture and effect evaluation on properties of concrete

Author:I.B.Muhit

In this study the optimum dosage of Admixture used in concrete is obtained. Various dosages of admixture from 400ml/100kg to 1200ml/kg are used. Admixture Sikament R2002 has been used. From this study it is seen that the compressive strength of concrete decreases with over dosage of admixture here 1000mg/100kg(1%) is the maximum dosage that can be used . it shows that superplastisizer can increase workability of concrete.

### III. MATERIALS AND METHOD

Concrete is the prime component of the construction project. And it mainly composites of cement, Fly ash aggregate water and admixtures. And these admixtures is used in concrete to make changes in the properties of the concrete admixture is used during or before the mixing of concrete is been done. Admixtures is an alternative in the critical case to minimize or to prevent failure of the construction process if any severe problem arises (Kate et al. 2018. By adding admixture to the concrete the amount of the building can be reduces or to attained certain quality in the concrete admixtures possess different functions such as-

- reduce the use of water up to 30%
- reduce corrosion of steel in concrete
- reduce setting time of the concrete
- increase strength of the concrete
- improving the hardness and curing of the concrete

Classification of admixture:

- Type A Water reducing admixtures
- Type B Retarding admixture
- Type C Accelerating admixture
- Type D Water reducing and retarding admixture
- Type E Water reducing and acceleration admixture
- Type F Water reducing, high range admixture
- Type G Water reducing , high range and retarding admixture

There are various types of admixtures used to achieve the properties

- Accelerating admixtures
- Retaining admixture
- water reducing and set controlling admixture
- Air –entraining admixture
- super plasticizer admixture
- Admixture for flowing concrete
- Miscellaneous admixture

ACCELERATING ADMIXTURE:- For minimizing the setting time accelerating admixture are used in the concrete And it provide more strength early in cast concrete the time of setting is measured resistance with penetration needle which is forced to cement. and hardening is determined by compressive strength

Major advantages of these Accelerating Admixtures are:

- in winter condition these admixture are good
- for emergency work in repair these admixtures are used
- to remove the formwork at early stage

Disadvantages of Accelerating Admixtures are:

- minimize resistance to sulphate attack
- cost is more
- maximized the drying shrinkage
- not used in reinforces concrete

**WATER-REDUCING AND SET CONTROLLING:** This is the most common admixture used. It is used to gain more strength with minimum use of cement amount. It also helps to improve the properties of the concrete which contains harsh aggregates placed in critical conditions. It reduces the water cement ratio, nearly about 5% of water is reduced and in some condition it can reduce water content of mix to 30% or more

- it does not affect the shrinkage
- durability is more
- no harsh effect on creep

Applications:

- by this admixture the economics of concrete cement is nearly 10% is obtained
- to reduce the water cement ratio of the concrete

**RETARDING CONCRETE ADMIXTURES:** This type of admixture is used to retard the setting time of cement in concrete, because of which if it is to be travelled long distance it can be transported which also maximizes the durability strength of the concrete. Different chemical retarders used are soluble zinc, carbohydrates including acid and soluble borates

Applications:

- to pour the large amount of the concrete
- to travel very long distance
- when it is being placed under high temperature
- when there is sliding formwork

This admixture is used to reduce the time required for setting without any effect on its strength and durability

Advantages:

- increase the durability
- for long distance site construction

Disadvantages:

- water content increase so more chances of shrinkage

**AIR ENTRAINING ADMIXTURE:** Air entraining admixtures are used generally to increase the durability, maximize workability with ease of placing and to have good resistance to frost. They are generally natural wood resins, polyethyleneoxide, sulfonated compound and neutralized in resins.

When there is expansion due to water freezes, the entrained air provides pressure by relief system. It is done by adding liquid admixture using it properly ensures correct spacing amount of the voids and size but by increase in 1% air can drop the compressive strength by 5% so it is of prime concern that air to be controlled closely.

Air entraining mechanism

The structure of hydrocarbon are charged negatively, like  $C_{10}$ ,  $QSO$  &  $SO_3$  which is conveyed to water if they are positively charged then it is active.

Properties.

This are chemical which produce gas

It improves workability of concrete cohesion.

It maximizes the hardness of the concrete

**SUPER PLASTICIZERS:** it is also known as admixture of second generation known as superplasticizers this are made of organic sulphanates of  $RSO_3$ . R is higher molecular complex organic group under careful condition

Most used superplasticizer is-

Sulphonated naphthalene formaldehyde condensate

Sulphonated naphthalene formaldehyde condensate

Modified lingo-sulphonates

Why it is used?

- The workability of admixture increase at given W/C ratio.
- They don't change surface tension if used highly
- There is no need of compaction and there is no excessive segregation.
- It is not affect setting of concrete which having low  $c_3a$  content
- Not influence resistance to freezing shrinkage or modulus of elasticity

Disadvantage- They are of high cost

Application-Rapid placing is necessary

## IV. CONCLUSION

The selection of the concrete admixture should be used wisely as per the specification and recommend by the test or the manufacture. To use these admixture in massive project of concrete the admixture should be tested and mixed with right proportion these tests carries out the behavior of admixture on the concrete like strength durability etc. it should be used as per the work requirement.

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