The Effect of Salt Water on Mechanical Properties of Concrete By Using Anti-Chloride At Different Ages

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Abstract- *The presently, concrete is most widely used construction material due to its good compressive strength and durability. Construction officials in coastal areas have long been facing the challenge of building and maintaining durable concrete structures in a saltwater environment. Gradual penetration of sea salts and the subsequent formation of expansive and leachable compounds lead to disintegration of structural concrete. As a part of durability study describes the effect of sea water on compressive strength of concrete when used as mixing and curing water. Our project is focused on the salt water to be used for curing purpose. The salt water which is more efficient compared to normalpure water when added the anti-chloride present in the water.*

I. INTRODUCTION

Concrete is the important material in the construction otherthan steel and timber. Its main constituents are cement, fine aggregates and coarse aggregates, and water. As there are several wastes coming from the industries we can use those wastes as the constituents of concrete by replacing or partially replacing the cement, sand or aggregates which makes it economical and also conserves the natural resources. Nowadays many researchers are being carried out to find an alternative that could be used as a partial replacement of sand in concrete and mortar, natural sand causes major environmental concerns. The cost of building construction is increasing daily as a result of increasing in the cost of building materials such as cement, coarse and fine aggregates, etc.

Concrete is the most popular building material in the world construction. From that the water is very important. Here the anti-cholride is used as a bonding agent. The salt water is used as a mixing in concrete; it reduces the environmental degradation, and also reduces the natural fine aggregate lagging. So it is one of the Eco-friendly materials.

This report is based on the idea of replacing the pure water with salt water which is used for the medium of heat insulation in the molding process of metals

II. MATERIALS USED

General:

Ingeneral,concreteisamixtureofcement,fineaggregate, coarseaggregateandwater.Formodifyingthepropertiesofconcrete,admixturesareaddedduringthepreparationofconcrete.Inordertoreducethecostofconcreteandimprovethequalitiesoftheconcrete thefollowingmaterialsare used for this research.

Materials:

- Cement
- Fine Aggregate
- Coarse Aggregate
- Water
- Salt water
- Anti-chloride

Cement:

Cement is a fine, grey powder. It is mixed with water and materials such as sand, gravel, and crushed stone tomakeconcrete.Thecementandwaterformapastethatbindstheothermaterialstogetherastheconcretehardens.InthepresentworkPPCcementof53gradeswasusedforcastingCubesforallconcretemixes.Thecementwasuniformcolori.e.greywithalightgreenishshade andwasfreefromany hard lumps.

Propeties	Value
Type of aggregate	Msand
Size of aggregate	4.75mm
Specific gravity	2.73
Fineness modulus	4.5

Cement

Fine aggregate:

The material which pass through BIS Test sieve no.480 is termed as fine aggregate. Usually natural sand is used as a fine aggregate at places where natural sand is not available crushed stone is used as fine aggregate. The sand used for the experimental works was locally procured and conformed to grading zone II. Sieve Analysis of the fine aggregate was carried out in the laboratory. The sand was first sieved through 4.75 mm sieve to remove any particle greater than 4.75 mm sieve and then was washed to remove the dust.

Coarse Aggregate:

Crushed stone obtained by crushing of hard granite that could pass through 20mmIS sieve and retained on 10mmIS.sieve and contained only so much of fine material as permitted by the specification one could be procured.

Propeties	Value
Type of cement	OPC
Grade of cement used	G53
Specific gravity	3.15
Fineness	96%
Standard consistency	34%
Initial setting time	30min
Final setting time	8hours

Water:

Water is an important ingredient of concrete, as it actively participates in the chemical reactions with cement to form the hydration product, calcium silicate hydrate (C-S-H) gel. A higher water cement ratio(w/c) will decrease the strength, durability, water tightness and other related properties of concrete. Addition of excess water ends up in the formation of undesirable voids(capillary pores) in the hardened cement paste of concrete. The PH value of water lies between 6 to8 and it should be free from organic matters, acids, suspended solids, alkalis and impurities. Locally available portable water confirming to standard specified in IS:456-2000 is used.

Properties	Value
Size of coarse aggregate	20mm
Fineness modulus	6.617
Specific gravity	2.54
Impact value	11.2%

Salt water:

Seawater is water from a sea or ocean. On average, seawater in the world's oceans has a salinity of about 3.5% (35 g/L). This means that every kilogram (roughly one litre by volume) of seawater has approximately 35 grams of dissolved salts (predominantly sodium (Na^+) and chloride (Cl^-) ions). The cubes were prepared using 35g of salts in one litre of water

III. MIXING AND CASTING OF CONCERETE

General:

The material has been collected and the collected materials are properly weighted for the making of concrete.

Mixing of concrete:

Thorough mixing of materials is essential for the production of uniform course. The mixing should ensure that the mass becomes homogeneous, uniform in color and consistency. The mixing was done by hand mixing of coarse aggregate and cement, adding water at appropriate of mixing.

Casting and compaction of concrete:

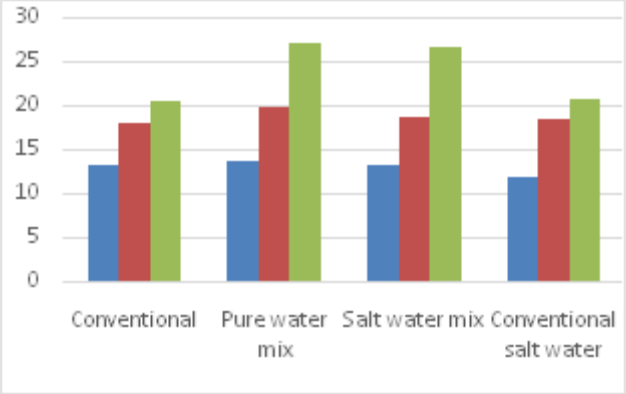
After mixing, the moulds are filled immediately by pouring the concrete inside manually by using trowel with three layers. Compaction of concrete is process adopted for expelling the entrapped air from the concrete. In the process of mixing, transporting and placing of concrete air is likely to get entrapped. Compaction is done here is manually with slump test rod in the way of dispersing the homogeneous mix to

avoid entrapment of air. Not strong blows as for as for strong concrete is given, blows of 10-15 numbers are given for three layer. During compaction the strokes should be distributed in a surface of concrete, and should not forcibly strike the bottom of the mould. After the top layer has been compacted, a strike off bar is used to strike out the excess concrete. The finishing is done with the trowel by tapping the top surface.

IV. RESULT AND DISCUSSION

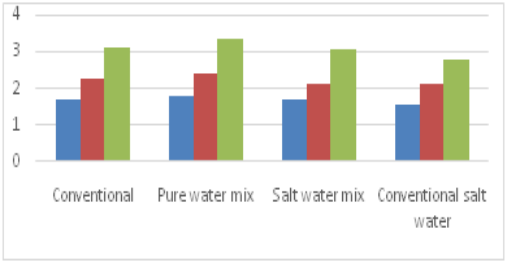
Compressive strength test:

S. No	Mix	Compressive strength		
		7 day	14 day	28 day
1	Conventional Mix	13.17	18.05	20.14
2	Pure water mix	13.71	19.83	26.97
3	Salt water mix	13.08	18.6	26.51
4	Saltwater mix	11.71	18.3	20.70

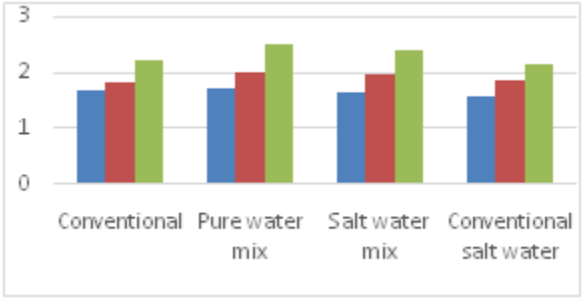


Flexural strength test:

S. NO	Mix	Flexural strength		
		7 day	14 day	28 day
1	Conventional Mix	1.71	2.24	3.10
2	Pure water mix	1.81	2.38	3.35
3	Salt water mix	1.7	2.14	3.05
4	Saltwater mix	1.55	2.10	2.78



Split tensile strength:



V. CONCLUSION

Following are the conclusions drawn based on the analytical investigations carried out to characteristics study on concrete by using anti-chloride, sand, aggregate and cement. Maximum test are carried out to find out the optimum mix. From the results we found the maximum compressive strength of concrete is **26.97 N/ mm²**.The concrete were passed in all the tests. The best mix for making the concrete is MIX II.Concretes mixed at pure water and cured in seawater have higher compressive, tensile, flexural and bond strengths than concretes mixed and cured in fresh water in the early ages at 7 and 14 days. The strengths after 28 and 90 days for concrete mixes mixed and cured in fresh water increase in a gradual manner. There is no remarkable reduction in compressive strength due to mixing of saline water and also mixing and curing of concrete with saline water compared to characteristic target strength. The strength decreases by about 1-6% at28 days.

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