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A Report Comprises of the Consequence of Using Salt Water (Sea Water) Over Normal Water in Concrete Casting

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Abstract: ***In this research work, the effect of saline water on the compressive strength of concrete was investigated. This paper therefore gives a broader view on the result and findings of an experimental research on the effect of salt water on compressive strength of concrete. For this concrete cubes were cast using fresh water and salt water for a design mix of M-30 1:1.7:3.30 by weight of concrete, and 0.45 water- cement ratio. 50% of concrete cubes were cast and cured with fresh water and remaining 50% cubes were cast and cured with salt water. The concrete cubes were cured for 7,14 and 28 days respectively. The result of the average compressive strength of concrete obtained using fresh water ranges from 25.1- 37.3N/mm2 and using salt water ranges from 28.40 – 40.34N/mm2.***
Keywords: concrete cubes, fresh water, salt water, compressive strength.

I. INTRODUCTION

Concrete is major building material used in construction. Concrete is used in large quantities due to its excellent structural performance and durability. Concrete is used for numerous purposes in construction such as construction of buildings, dams, foundations, highways, parking structures, pipes, and poles. Also, the use of concrete offshore drilling platforms and oil storage tanks is already on the increase. Concrete piers, decks, break-water, and retaining walls are widely used in the construction of harbors and docks. Floating offshore platforms made of concrete are also being considered for location of airports, power plants, and waste disposal facilities in order to relieve land from pressures of urban congestion and pollution. It is very tough to find an option for concrete in construction, which is durable and economic.

the durability of concrete is generally regarded as its ability to resist the effects and influences of the environment, while performing its desired function. concrete is a composite material composed mainly of water, aggregate, and cement. water is an important ingredient of concrete as it actively participates in chemical reaction with cement. proper curing of concrete structures is important to meet performance and durability requirements. in conventional curing this is achieved by external curing applied after mixing, placing and finishing.

II. LITERATURE SURVEY

1) *D Wijaya, R A Kusumadewi, A Wijayanti, R Hadisoebroto 2021:* This study tested multilevel distillation to desalinate artificial water, found that Distilled Water Volume can be affected by light intensity, water temperature, and glass temperature. Removal of parameters from desalination process hardness and salinity reaches 100% and Removal for ion Cl electric conductivity, and total dissolved solid about 98% and 99%, removal turbidity between 18.50% until 98.37%. This can be said that high removal.
2) *Jie Ren, Hongfang Sun, Kun Cao, Zhili Ren, Bo Zhou, Wenshen Wu, Feng Xing 2021:* A series of experiments were conducted to investigate the effect of seawater on the properties of alkali-activated slag (AAS) binders to seek further potentiality of these binders in marine environments. The experimental results show that on the one hand, seawater may lead to increased setting time, reduced compressive strength after 3 days and a less compact microstructure. On the other hand, however, it could also slightly improve the early age strength, flexural bending strength (after 28 and 56 days) and fractural toughness, and shows almost no impact on the fluidity of AAS binders. Moreover, with the formation of some new hydration products due to seawater mixing, the water absorption and volume of permeable voids had small decreases while the capillary sorptivity obtained a small increase.

3) *Ahmed I. Ghazal, Mohamed Y. El-Sheikh, Ahmed H. Abd El-Rahim 2021:* In this study another beneficial effect of seawater over tap water was concluded. Setting tests of cement paste mixed with seawater was determined using Vicat apparatus and compared to tap water. Compressive strength tests at the age of 28 days of Portland cement concretes with varied quantity of cement i.e. 300, 350, 400, 450, and 500 kg, and mixed with seawater was also performed and compared to tap water. The results show that seawater affects standard consistency of cement paste and two percent increase was required in order to attain the same

III.RESEARCH GAP

1) Fresh Water scarcity is increasing day by day.
2) Reverse osmosis process is majorly used in desalination industry for desalinating sea water but it is very costly and requires a large framework.
3) Most coastal areas like small islands and beach areas are the area that has a scarcity of freshwater.
4) Concrete made with desalinated water in not been studied.

IV.OBJECTIVE

To study the following properties of concrete using chemical desalinated water as mixing and curing is being studied:

1) Compressive strength of concrete
2) Flexure strength of concrete
3) Durability of concrete

V. MATERIALS

CEMENT

SEA SAND

RIVER SAND

COARSE AGGREGATE

1) Here we have used PPC cement collected from local market.
2) Sea sand is collected from chandrabhagha beach near konark.
3) River sand is collected from Daya river near Dhauli.
4) Coarse aggregate taken from locally available.

Properties of cement.	
Description	Properties of material
Initial Setting Time	31min
Final Setting Time	560 min
Standard Consistency	36.50%
Specific Gravity	3.22
Fineness	3.7%

Properties of Fine Aggregate.		
Description	Properties of material	
	River-Sand	Sea Sand
Specific Gravity (Gs)	2.62	2.73
Fineness Modulus	4.1	3.6
Sieve Analysis	Zone I	Zone I

VI. RESULT & DISCUSSION

Table Compressive Strength of cube cast with normal water

Cube no.	Wt. of cube(kg)	C/S Area of Cube(mm²)	Age	Failure Load(N)	Compressive Strength(Mpa)
1	7.82	150*150	28	665200	29.6
2	8.113	150*150	28	704200	31.2
3	7.98	150*150	28	564500	25
4	8.204	150*150	28	665400	29.5
5	8.117	150*150	28	601000	26.7
Avg. Compressive Strength(Mpa)					**28.4**

The average compressive strength is 28.4MPa. In this compressive test casting was done with normal water and curing also with normal water.

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Table Flexure Strength of cube cast with normal water

Prism no.	Wt. of Prism(kg)	C/S Area of Prism(mm²)	Age	Failure Load(N)	Flexral Strength(Mpa)
1	11.68	100*100*500	28	11680	4.67
2	11.73	100*100*500	28	11730	4.69
3	13.33	100*100*500	28	13330	5.33
Avg. Flexural Strength(Mpa)					**4.897**

The average flexure strength is 4.897MPa. In this compressive test casting was done with normal water and curing also with normal water.

5.2 Concrete cast and cured with saline water

Table Compressive Strength of cube cast with Saline water

Cube no.	Wt. of cube(kg)	C/S Area of Cube(mm²)	Age	Failure Load(N)	Compressive Strength(Mpa)
1	8.168	152*152	28	689300	29.83
2	8.216	152*152	28	771200	33.37
3	8.317	152*152	28	854200	36.97
4	8.244	152*152	28	807400	34.94
5	8.367	152*152	28	608000	22.9
Avg. Compressive Strength(Mpa)					**31.6**

The average compressive strength is 31.6 MPa. In this compressive test casting was done with saline water and curing also with saline water.

Table Flexure Strength of cube cast with saline water

Prism no.	Wt. of Prism(kg)	C/S Area of Prism(mm²)	Age	Failure Load(N)	Flexral Strength(Mpa)
1	12.206	100*100*500	28	15210	6.09
2	12.101	100*100*500	28	13000	5.20
3	12.231	100*100*500	28	13980	5.59
Avg. Flexural Strength(Mpa)					**5.62**

The average flexure strength is 5.62 MPa. In this compressive test casting was done with saline water and curing with saline water.

5.3 Concrete cast with desalinated water and cured with normal water

Table Compressive Strength of cube cast with desalinated water

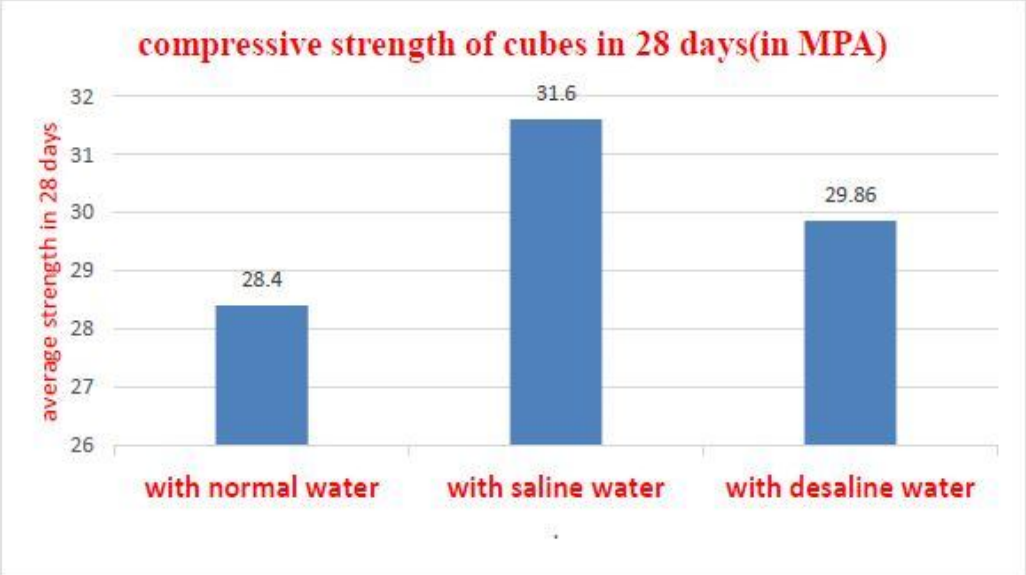
Cube no.	Wt. of cube(kg)	C/S Area of Cube(mm²)	Age	Failure Load(N)	Compressive Strength(Mpa)
1	8.197	150*150	28	651400	28.9
2	8.287	150*150	28	701600	31.1
3	8.184	150*150	28	602300	26.7
4	8.329	150*150	28	686800	30.5
5	8.231	150*150	28	722400	32.1
Avg. Compressive Strength(Mpa)					**29.86**

The average compressive strength is 29.86 MPa. In this compressive test casting was done with desalinated water and curing also with normal water.

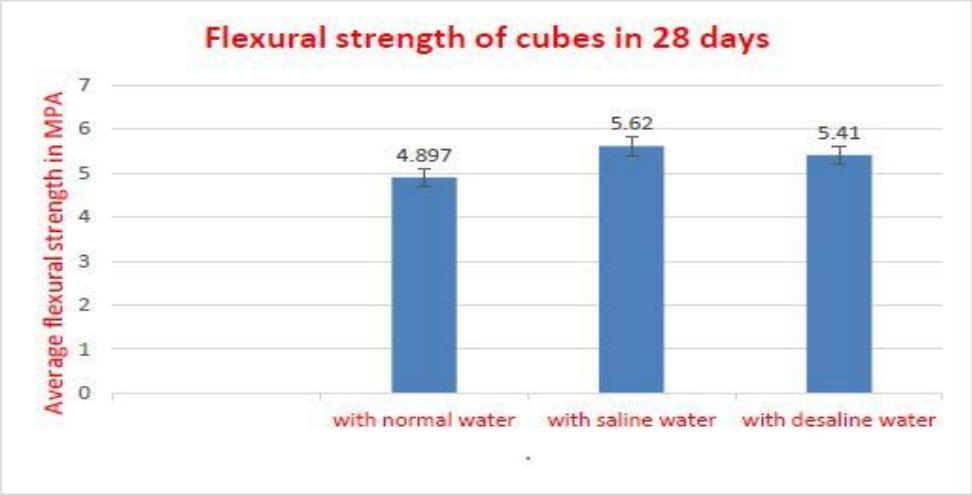
Table Flexure Strength of cube cast with desalinated water

Prism no.	Wt. of Prism(kg)	C/S Area of Prism(mm²)	Age	Failure Load(N)	Flexral Strength(Mpa)
1	12.193	100*100*500	28	16410	5.05
2	12.232	100*100*500	28	13380	6.01
3	12.315	100*100*500	28	13010	5.17
Avg. Flexural Strength(Mpa)					**5.41**

The average flexure strength is 5.41 MPa. In this compressive test casting was done with saline water and curing with saline water.



Graph showing the comparison between compressive strength of concrete with different waters



Graph showing the comparison between flexural strength of concrete with different waters

VII. CONCLUSION

On the basis of the results drawn from the comparative analysis of normal water concrete, salinated concrete and desalinated concrete, some important conclusions can be drawn which can prove helpful in establishing research. . A few of the important points are mentioned below:-

1) The average compressive strength of cubes and flexure strength of prism casted with saline water and cured with saline water is 31.6 MPa and 5.62 MPa

2) The average compressive strength of cubes and flexure strength of prism casted with desalinated water and cured with desalinated water is 29.86 MPa and 5.41MPa

3) 28-day compressive strength of saline water is greater than the 28-day compressive strength of desalinated water.

4) Flexural strength of saline water at 28 day is greater than the flexural strength of desalinated water at 28 day.

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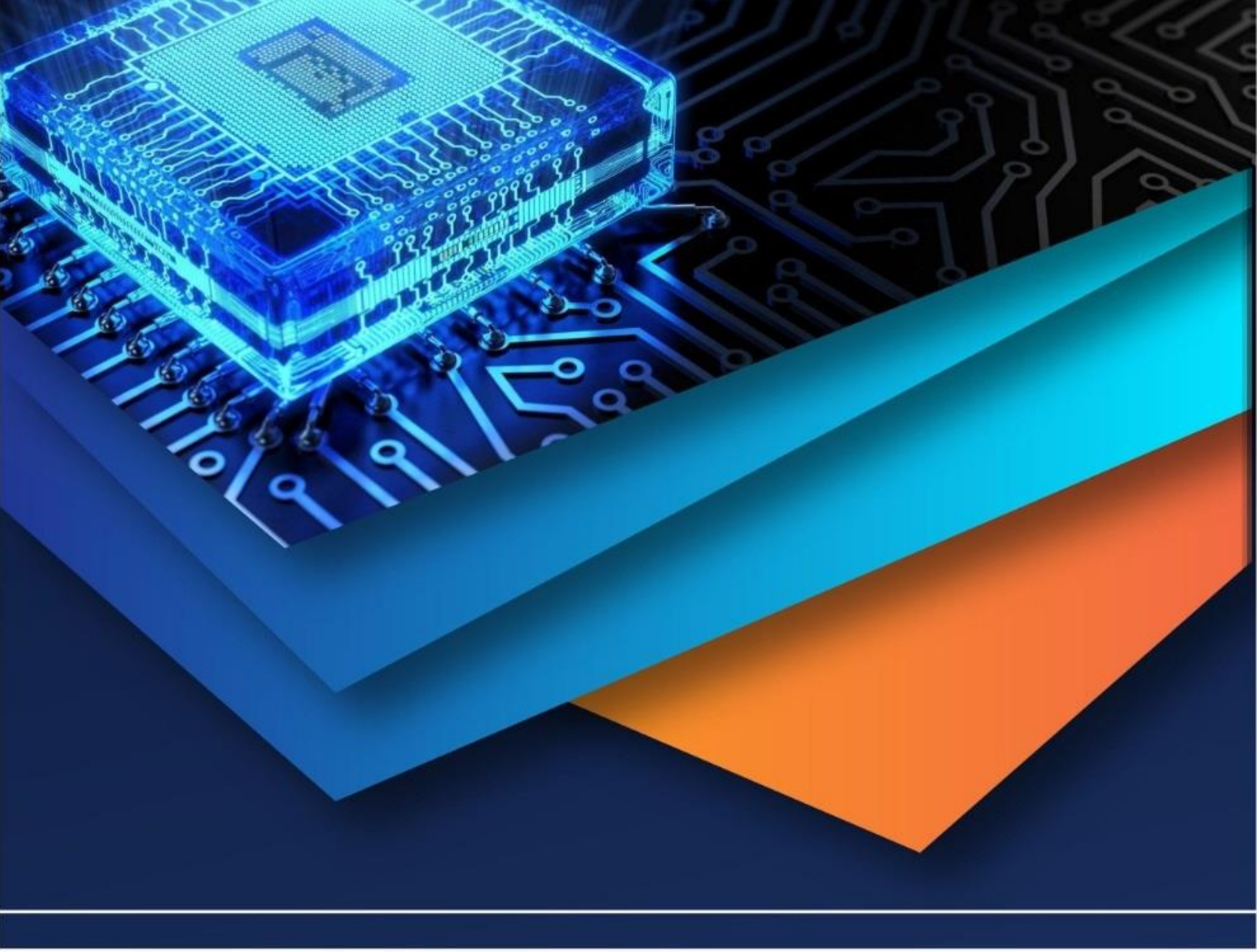

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