



# COMPARATIVE STUDY OF COMPRESSIVE STRENGTH OF CONCRETE CURED WITH SALINE AND NORMAL WATER

Mr. L.V. Pavan Kumar<sup>1</sup>, B. Vyshnavi<sup>2</sup>, V. Sai Vignesh<sup>3</sup>, K. Naga Srinu<sup>4</sup>, K. Venkata Sathwik<sup>5</sup>, D. Sudhakar<sup>6</sup>

Asst. Professor<sup>1</sup>, Final Year Student<sup>2</sup>, Final Year Student<sup>3</sup>, Final Year Student<sup>4</sup>, Final Year Student<sup>5</sup>, Final Year Student<sup>6</sup>

Department of Civil Engineering,

St. Ann's College of Engineering & Technology: Chirala, Andhra Pradesh, India

**Abstract:** This study investigates the effects of curing concrete using saline water compared to normal water on its compressive strength. Concrete samples were prepared with a standard mix ratio and cured under controlled conditions in both saline and normal water for 7, 14 and 28 days. The saline water used in the experiment was prepared to simulate typical seawater conditions, with a specified salinity level. Compressive strength tests were conducted to evaluate the impact of saline curing on the mechanical properties of the concrete. Curing is a vital process that significantly impacts the strength and durability of concrete structures. This study focuses on the comparative analysis of the compressive strength of M30 grade concrete cured using saline water and normal water. Concrete cubes were cast with a standard M30 mix design and subjected to two different curing conditions one set in normal water and the other in saline water with a controlled salt concentration. Experimental results indicate that saline water affects the hydration process of cement, leading to variations in the compressive strength of concrete. The study evaluates whether saline curing enhances or deteriorates the mechanical properties of M30 concrete, which is crucial for coastal and saline-affected regions where freshwater is scarce.

## 1. INTRODUCTION

Cement concrete is mainly used as the construction material. It is generally related to with Portland cement as the chief component for production of the concrete, Ordinary Portland cement (OPC) is usually used as the primary binder to make Concrete. When OPC is mixed with water, a chemical reaction called hydration take place. The extent to which this effect is completed influences durability and strength of the cement mortar. Freshly mixed cement mortar normally contains extra required for hydration of the cement. Though, extreme loss of water by evaporation can delay or prevent adequate hydration. Curing is the maintenance of satisfactory moisture content and temperature in concrete for a period of time immediately placing and finishing so that the desired properties may develop during hydration. In order to attain good quality cement mortar, a suitable mix must be followed by curing in a suitable environment during the early stages of hardening. Curing must be undertaken for a useful period of time if cement

mortar is to attain its potential strength and durability. Curing is necessary if cement mortar is to attain its potential strength and durability. Curing is necessary if cement mortar is to achieve its intended function over the design life of the structure whereas. Curing can be done in a number of methods while the most suitable means of curing of cement mortar cannot be overemphasized. Proper curing will increase durability, volume stability, strength, water tightness, abrasion resistance, and resistance to freezing and thawing and deciders. Exposed slab surface area particularly sensitive to curing as strength development and of freeze-thaw resistance of the top surface of a slab can be reduced considerably when curing is defective. If temperatures are favorable, hydration is relatively rapid the first few days after cement mortar is placed.

## 2.LITERATURE REVIEW

Amusan and G.Modupeola, He studied about the effect of sea water on compressive strength of concrete .he was observed that concrete cast and cured with seawater increases gradually for all curing days beyond the strength of control cast . The compressive strength of concrete batches agrees with the value of the compressive strength of 1:2:4 mix at 28days, of about 20N/mm<sup>2</sup> .The strength of concrete batches cast with salt water and cured with fresh water (SF) was also observed to have increased even at 28 days and 90days respectively. In practice, the fresh-fresh water situations occur in building constructed on interlards and main lands. The fresh-salt water situations are mainly in structures or building close to lagoon or sea.

Mohamed Anwar, He studied about the improved concrete properties to resist the saline water using environmental by-product. He observed that the test results show that ternary blends of Portland cement, silica fume, and fly ash offer significant advantages over binary blends and plain Portland cement. Also, the combination of silica fume and fly ash is complementary: the silica fume improves the early age performance of concrete with the fly ash continuously refining the properties of the hardened concrete as it matures. Combinations of 5–10% silica fume with 15–25% fly ash show satisfactory performance in both fresh and hardened concrete.

Jorge Admilson, He studied about the Effect of Mixing and curing sea water on concrete The results of the research investigated on four different grades of concrete made with fresh and sea water, cured in fresh water as well sea water over a period of 90 days for compressive strength have been analyzed. The following conclusions are drawn: (1) Sea water affects the gain in strength of concrete when used for mixing and curing. It shows some increases at the early strength but ultimately decrease the strength. (2) Concrete specimens made with fresh water and cured with sea water shows a loss in strength of around 7% whereas concrete specimens made and cured with sea water showed loss.

## 3. EXPERIMENTAL INVESTIGATION

Various experimental investigations are carried out to determine the properties of cement with and without addition of sea water.

#### 4.RESULTS & DISCUSSION

By conducting the extensive laboratory investigation, the following results were obtained and indicated in the following table

The properties of cement were determined by conducting the tests on OPC 53 grade cement.

**Table 1: Properties of Cement**

Property	Values
Normal Consistency	28%
Initial Setting Time	30min
Final Setting Time	600min
Specific Gravity	3.15
Fineness	5.2 %
Compressive strength of cement	28 N/mm <sup>2</sup>

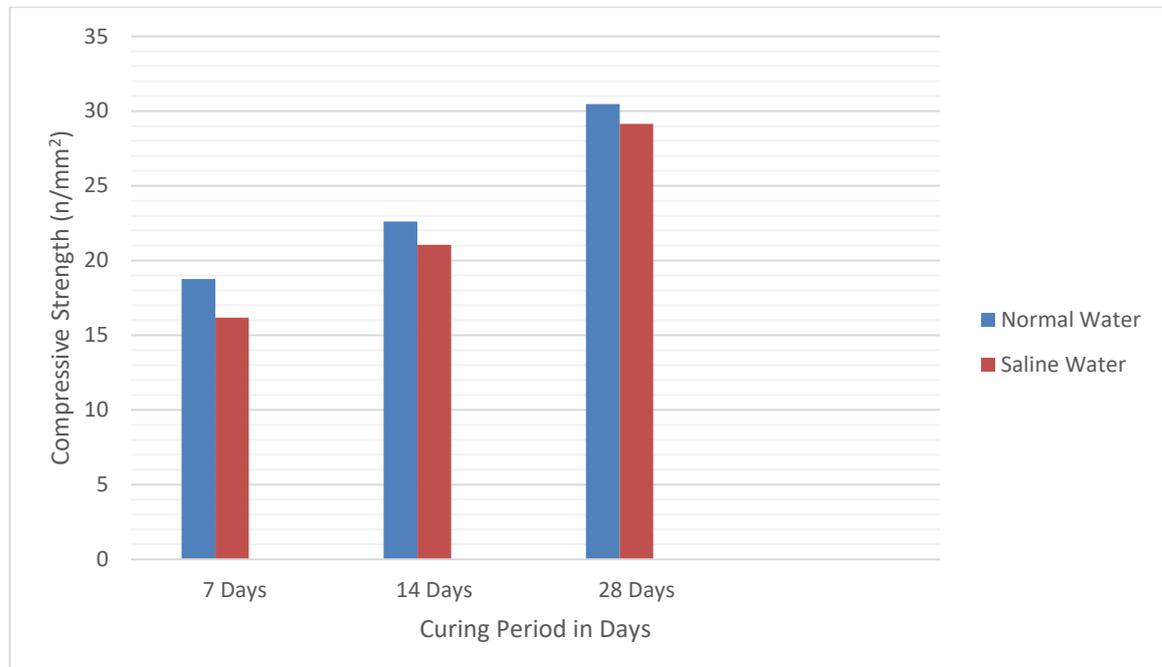
Compressive strength of concrete was determined for different curing periods with normal and saline water

**Table2 : Compressive strength of cement cured in normal water**

S.No	Curing Period in days	Compressive Strength (N/mm <sup>2</sup> )
1	7	18.76
2	14	22.61
3	28	30.46

**Table3 : Compressive strength of cement cured in saline water**

S.No	Curing Period in days	Compressive Strength (N/mm <sup>2</sup> )
1	7	16.18
2	14	21.04
3	28	29.14



**Fig1: Variation of Compressive Strength with different Curing Periods with Normal & Saline Water**

## 5. CONCLUSIONS

Based on the results presented in this study, the following conclusions are drawn:

1. The strength of the concrete cubes cast and cured in Normal water at 7,14 and 28 days for 1st Cube is 18.66 N/mm<sup>2</sup>, 21.33 N/mm<sup>2</sup>, 29.92 N/mm<sup>2</sup> respectively.
2. The strength of the concrete cubes cast and cured in Normal water at 7,14 and 28 days for 2nd Cube is 18.72 N/mm<sup>2</sup>, 22.66 N/mm<sup>2</sup>, 30.37 N/mm<sup>2</sup> respectively.
3. The strength of the concrete cubes cast and cured in Normal water at 7,14 and 28 days for 3rd Cube is 18.90 N/mm<sup>2</sup>, 23.85 N/mm<sup>2</sup>, 31.11 N/mm<sup>2</sup> respectively.
4. The strength of the concrete cubes cast and cured in Saline water at 7,14 and 28 days for 1st Cube is 16.02 N/mm<sup>2</sup>, 19.20 N/mm<sup>2</sup>, 27.36 N/mm<sup>2</sup> respectively.
5. The strength of the concrete cubes cast and cured in Saline water at 7,14 and 28 days for 2nd Cube is 16.20 N/mm<sup>2</sup>, 21.37 N/mm<sup>2</sup>, 29.82 N/mm<sup>2</sup> respectively.
6. The strength of the concrete cubes cast and cured in Saline water at 7,14 and 28 days for 3rd Cube is 16.50 N/mm<sup>2</sup>, 22.56 N/mm<sup>2</sup>, 30.25 N/mm<sup>2</sup> respectively.
7. So, concrete mix and cured Normal water have a higher compressive strength compared to the concrete cured with saline water.

## 6. REFERENCES:

- International journal of emerging technology and advanced engineering by swati Maniyal, Ashutosh Patil (volume 5,issue 3, March 2015).
- International journal for Multidisciplinary Research (IJFMR).
- International journal of Recent in Civil and Mechanical Engineering(IJRCME) vol 5, issue 2, pp(19-25),Month: October 2018- March 2019, Mr.Sakthivel.R, Dr.V.Murugaiyan.

- International Journal of Civil and structural Engineering Research vol 2, issue1, Month: April ,2014-September 2014.
- International Journal of Civil and structural Engineering Research vol.11, issue 1,pp (1- 7) Month: April 2023-September 2023.
- IS 456:2000 code of practice for plain and reinforced concrete.
- IS 10262:2009 Guidelines for concrete mix proportioning.
- A Journal of Effect of mixing and curing sea water by Jorge Admilson TRR 1574, pp.37- 40 (1996).
- IS 516:1959 Method of test for strength of concrete
- A Journal of Improved concrete properties to resist the saline water using environmental by Product by Mahmoud Roushdi ASTM C 1611, 2005.
- A Journal of The Effect of Sea Water on Compressive Strength of Concrete by Olutoge Amusan, G. Modupeola vol.1, no.1, April 2003, pp. 5-15.

