



EFFECT OF SALT WATER ON COMPRESSIVE STRENGTH OF PLAIN MASS CONCRETE

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ABSTRACT

In this research work, the effect of salt water on the compressive strength of plain mass concrete was investigated. Therefore this paper presents the results and conclusions of an experimental research on the effect of salt water on the compressive strength of concrete. Fifty-four (54) concrete was poured for the cubes; 9 cubes were poured using clean water, 9 cubes were prepared using salt water sample, prepared by adding 10 grams of sodium chloride salt per liter of clean water, 9 cubes were poured using salt, 20 grams of sodium chloride A sample of water was prepared by mixing. There are 9 cubes of salt per liter of clean water. Cast using a water sample prepared by adding 30 grams of sodium chloride salt per liter of clean water, 9 cubes were cast using a salt water sample prepared by adding 35 grams of sodium chloride salt per liter. The experiment was conducted using salt water samples prepared by . Mix 40 grams of clean water and remaining 9 cubes of sodium chloride salt per liter of clean water. For this research work, a design mix of C-25 with mix ratio 1:2.2:2.9 and water-cement ratio of 0.45 was prepared. The concrete cubes were cured separately and cured for 7, 28 and 45 days. i.e. solid cubes cast using clean water were cured in clean water, using salt water samples with concentrations of 10 g, 20 g, 30 g, 35 g and 40 g of sodium chloride salt per liter of clean water. By doing this the solid cube was cured in salt water. Mix sodium chloride salt at 10 grams, 20 grams, 30 grams, 35 grams and 40 grams per liter of clean water respectively.

Key words:- compressive strength, plain mass concrete, cubes, chloride salt, sodium chloride salt , salt water, design mix etc

INTRODUCTION

In this research work, the effect of salt water on the compressive strength of plain mass concrete was investigated. Therefore this paper presents the results and conclusions of an experimental research on the effect of salt water on the compressive strength of concrete. Fifty-four (54) concrete was poured for the cubes; 9 cubes were poured using clean water, 9 cubes were prepared using salt water sample, prepared by adding 10 grams of sodium chloride salt per liter of clean water, 9 cubes were poured using salt, 20 grams of sodium chloride A sample of water was prepared by mixing. There are 9 cubes of salt per liter of clean water. Cast using a water sample prepared by adding 30 grams of sodium chloride salt per liter of clean water, 9 cubes were cast using a salt water sample prepared by adding 35 grams of sodium chloride salt per liter. The experiment was conducted using salt water samples prepared by . Mix 40 grams of clean water and remaining 9 cubes of sodium chloride salt per liter of clean water. For this research work, a design mix of C-25 with mix ratio 1:2.2:2.9 and water-cement ratio of 0.45 was prepared. The concrete cubes were cured separately and cured for 7, 28 and 45 days. i.e. solid cubes cast using clean water were cured in clean water, using salt water samples with concentrations of 10 g, 20 g, 30 g, 35 g and 40 g of sodium chloride salt per liter of clean water. By doing this the solid cube was cured in salt water. Mix sodium chloride salt at 10 grams, 20 grams, 30 grams, 35 grams and 40 grams per liter of clean water respectively.

GENERAL OBJECTIVE

Its general purpose is to investigate the effect of salt water on the compressive strength of plain water mass concrete.

SPECIFIC OBJECTIVE

To determine the percentage increase or decrease in compressive strength between concrete mixed and cured with different concentrations of salt in water. To find out the percentage increase or decrease in compressive strength between concrete mixed and cured with clean water and different

concentrations of salt in water. To compare the rate of gain of compressive strength between two mixed concrete cubes and recovered from different concentrations of salt water and clean water.

MATERIAL

Coarse Aggregates: Crushed granite stone aggregate of confirmed maximum size 20 mm AASHTO M43-88/ASTM C136 was used. The specific gravity was 2.72 for (6-12.5 mm) particle size and 2.70 for (12.5-19.5 mm) particle size, the moisture content for (6-12.5 mm) particle size and (12.5-19.5 mm) particle size, unit weight was found to be 1594 kg/m³ for particles of size (6-12.5 mm) and 1687 kg/m³ for particle size (12.5-19.5 mm) and 0.2% for particle size (12.5-19.5 mm) and particles 0.5% absorption was found for. Size (6-12.5 mm).

METHODOLOGY

The physical properties of mine sand and crushed aggregates were tested. These properties are particle size distribution based on AASHTO M6-93 for fine aggregate and AASHTO M43-88 for coarse aggregate, bulk specific gravity (SSD basis), unit weight, moisture content, absorption and silt for both fine and coarse aggregates. Sand content.

2. Mix design was prepared for C-25. ACI211.1-91 was used to prepare the mix design [4]. After the mix design of 1m³ of C-25 concrete, the required amount of cement, sand, coarse aggregate and water for nine cubes of (150 x 150 x 150 mm³) for each of the six types Compressive strength of concrete 7, Mixing days were set at 28 and 45. Out of nine cubes for each type of mix, the first three cubes are used for 7 days compressive strength of concrete, the other three cubes are used for 28 days compressive strength of concrete, the last three cubes is used for 45 day compressive strength of concrete.

3. Water samples were divided into six fractions (A-F) for mixing purpose. Sample A contained 0 grams of sodium chloride salt per liter of clean water; Sample B contained 10 grams of sodium chloride salt per liter of clean water; Sample C contained 20 grams of sodium chloride salt per liter of clean water; Sample D contained 30 grams of sodium chloride salt per liter of clean water; Sample E contained 35 grams of sodium chloride salt per liter of clean water and Sample F contained 40 grams of sodium chloride salt per liter of natural water.

LITERATURE REVIEW

During the construction of concrete structures, concrete can have such properties as strength, elasticity, water tightness and durability. The strength of concrete includes compressive, tensile and shear strength. Among these, the compressive strength of concrete is prominent. Compressive strength or compressive strength is the ability of a material or structure to withstand a load after reducing its size, as opposed to tensile strength, which withstands a load for a longer period of time. In other words, compressive strength opposes compression (being pushed together).

SOURCE OF WATER USED IN CONCRETE PRODUCTION

In general, water that is suitable for human consumption (potable) is acceptable for use as mixing water. However, non-potable sources of water can also be used as long as the source is not negative. Effect on Concrete Properties Most concrete plants have a municipal water source. Supplies potable water and can be used as mixing water without any qualification testing. Portable plants installed in rural areas, or at project sites, may require the concrete producer to rely on non-renewable materials. Potable sources such as wells, streams or other bodies of water. All concrete manufacturers will also generate process water, also known as wash water, by cleaning mixers and plant components. Additionally, precipitation at a concrete plant site produces stormwater that can collect at the plant.

QUALITY OF WATER FOR MIXING CONCRETE

Water quality plays an important role in preparing concrete. Impurities in water can hinder the setting of cement and adversely affect its strength and durability. The chemical constituents present in water can actively participate in chemical reactions and thus affect the setting, hardening and strength development of concrete. Suitability water can be identified from past service records or tested for settings such as performance limit time and compressive strength and durability. Test limits are specified for water mixed with components such as total alkali, chloride and sulphate. Water testing plays an important role in controlling the quality of cement concrete work. Systematic testing of water helps to obtain greater assurance of high efficiency and performance of cement concrete both with respect to strength and durability. Water is sensitive to changes due to physical, chemical or biological reactions that may occur between the time of sampling and analysis, so it is essential to test water before using it for cement concrete production.

BRIEF DEFINITION OF SALINE WATER

Brackish water (commonly called salt water) is water that contains significant amounts of dissolved salts (primarily NaCl). Salt concentrations are usually expressed in parts per thousand (permil, ‰) or parts per million (ppm). The United States Geological Survey classifies salt water into three salinity categories. Salt content ranges from approximately 1,000 to 3,000 ppm (0.1–0.3%) in slightly saline waters, 3,000 to 10,000 ppm (0.3–1%) in moderately saline waters, and 3,000 ppm (0.3–1%) in extremely saline waters, to 35,000 ppm (1–3.5%). Seawater has a salinity of about 35,000 ppm, which is equivalent to 35 grams of salt per liter (or kilogram) of water.

SALINE AND COMPRESSIVE STRENGTH OF CONCRETE

However, the most commonly recognized valuable property of concrete is its compressive strength. In many practical cases, other properties such as durability, impermeability, volume, and stability may actually be more important. Nevertheless, an overall picture of the quality of concrete is usually provided by its compressive strength. Obviously water used satisfactorily for mixing is also suitable for treatment purposes. The properties of concrete are greatly influenced by the type and proportion of water used. In concrete mix. Compressive strength is the most important of these properties of concrete and is highly influenced by the type and proportion of water used in the concrete mix. Due to this many researches conducted a study on the effect of salt water on the compressive strength of concrete, both directly and indirectly.

EXPERIMENTAL INVESTIGATIONS

MIX DESIGN

Mix design is the proportion of ingredients that will produce a workable concrete mix. Durable and with required strength and at minimum cost. Quality Concrete: Mix design of concrete is very helpful in achieving better strength, durability, homogeneous and impermeable structures by determining the relative proportions of the ingredients, keeping in mind that the fresh concrete is workable. Saving in cement consumption: Due to high cost of cement mix design helps in saving cement quantity and lesser quantity of cement reduces heat of hydration and hence reduces shrinkage cracks.

RESULT AND DISCUSSION

RESULT OF TEST FOR COMPRESSIVE STRENGTH

Results of experiments on compressive strength of concrete with concentration An increase of sodium chloride salt of water from 0g/L to 40g/L is shown for 7, 28 and 45 treatment days Graphs of their respective values in Table 4-2 and in the figures.

Concentration of Salt(g/L)	Samples	Compressivestrength(Mpa)		
		curingtime		
		7	28	45
0	1	23.72	37.85	39.45
	2	26.63	36.96	41.17
	3	26.49	37.56	38.12
	Average	25.61	37.46	39.58
10	1	31.20	38.62	44.82
	2	30.76	36.31	43.38
	3	31.87	42.29	43.35
	Average	31.28	39.07	43.85
20	1	30.12	41.51	45.32
	2	31.54	41.58	42.98
	3	33.94	38.69	43.56
	Average	31.87	40.59	43.95
30	1	32.27	42.16	45.32
	2	32.98	42.73	46.02
	3	31.76	41.20	44.67

	Average	32.34	42.03	45.34
35	1	33.55	40.79	45.16
	2	34.60	42.22	43.53
	3	34.49	43.81	47.89
	Average	34.21	42.27	45.53
40	1	36.23	44.64	42.79
	2	36.13	45.64	44.40
	3	36.41	44.49	43.53
	Average	36.26	44.92	43.57

DISCUSSION

COMPRESSIVE STRENGTH OF CONCRETE

As can be seen from Table 4-2 and Figure 4-1 above, the compressive strength of concrete increases with increasing salt concentration in water for all treated days. Percentage increase in average compressive strength depending on the concentration of salt in concrete, water increases from 0g/L to 10g/L, 0g/L to 20g/L, 0g/L to 30g/L, 0g/L to 35g/L. Is. 22.14%, 24.44%, 26.28%, 33.58% and 41.58% respectively for 0 g/L to 40 g/L for treatment time of 7 days. Percentage As the amount of salt in water increases, the average compressive strength of concrete increases from 0g/L to 10g/L, 0g/L to 20g/L, 0g/L to 30g/L, 0g/L to 35g/L and 0g/L. Increases to. The average compressed salt concentration in water increases from 0g/L to 40g/L as the percentage increase for the treatment time of 28 days is 4.29%, 8.36%, 12.20%, 12.84% and 19.91% respectively, and The strength of concrete increases from 10 g/litre, 0 g/litre to 20 g/litre, 0 g/litre to 30 g/litre, 0 g/litre to 35 g/litre, and 0 g/litre to 40 g/litre. 10.79%, 11.04%, 14.55%, 15.03% and 10.08% respectively for 45 days curing time.

CONCLUSION

Researchers have conflicting views on the effect of salt water on the compressive strength of concrete. In this research work, the effect of salt water on the compressive strength of plain mass concrete was experimentally investigated. The research was carried out by varying the concentration of sodium chloride salt mixture in clean water from 0 g to 10 g, 20 g, 30 g, 35 g and 40 g per liter and for treatment purposes. The 0 g/L water sample was the control group while the other five water samples were the non-control group. For this, fifty-four (54) concrete cubes were poured for six water samples; 9 cubes for each water sample, three cubes for 7, 28 and 45 days compressive strength test.

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