SELF CURING CONCRETE USING SNF AND WOOD POWDER

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ABSTRACT:

Curing is very important for concrete structures. Water scarcity will be a major threat to world, hence a solution for water usage in construction industry is must. An experimental study were carried out to investigate the usage of SNF and wood powder as self-curing agent. Strength properties of self-curing concrete with varying percentages of SNF (0.10\%, 0.20\%, 0.30\%, 0.40\%, 0.50\%, and 0.60\%) are analysed. The test results shows that the optimum strength of self-curing concrete attain at 0.40\% mixture of SNF when compared to conventional concrete.

Keywords: Sodium naphthalene sulfonate formaldehyde (SNF), wood powder, self-curing concrete, compressive strength, Tensile strength.

I. INTRODUCTION

To attain the desired strength a good moisture for a period of 28 days is needed to be maintained\(^{(1)}\). Any laxity in curing will badly affect the strength and durability of concrete. The demand for curing water will leads to early age cracking. The application of self curing admixture is important as the water resource are getting valuable every day\(^{(4)}\). 90\% of efficiency can be achieved through internal curing as compared to normal curing method. In water arid areas the most suitable method is membrane curing compounds as it is widely used in this areas.\(^{(5)}\) Also in areas where fluoride content more in water will reduce the characteristics of concrete. Excessive evaporation of water (internal or external) from fresh concrete should be avoided; otherwise, the degree of cement hydration would get lowered and thereby concrete may develop unsatisfactory properties\(^{(12)}\).

II. OBJECTIVE

- To increase the effectiveness of the water content by using SNF and wood powder in concrete
- To compare the strength properties with conventional mix ratio
- To establish the effectiveness of self curing compounds

III. MATERIAL USED

3.1 Binding material – OPC 53

3.2 Fine aggregate- River sand is used as fine aggregates as per the IS specifications

3.3 Coarse aggregate – The coarse aggregate used for this study is 20mm Crushed stone as per IS specification

3.4 Water – Normal potable water

3.5 Treated wood powder

3.6(SNF)

The super plasticizer used in this study is Naphthalene Sulfonate Formaldehyde (NSF)

Table 3.1 properties of SNF

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No | Description | Range | Outcome
--- | --- | --- | ---
1 | Appearance | Yellow Brown Powder | Meets The Requirement
2 | pH Value | 41829 | 8
3 | Solid Content (%) | 92% Min | 92.6
4 | Net Starch Fluidity (mm) | 240 Min | 249
5 | Content Of Cl-(%) | 0.5 % Max | 0.23
6 | Na₂SO₄ Content (%) | 15 % Max | 12
7 | Surface Tension (n/m) | (71Å±1) X 10-3 | (71Å±1) X 10-3

IV. METHODOLOGY

Collection of initial data required is to be obtained from various journals and also the details about the raw materials used were identified. The raw materials required for the experiment is to be collected. Laboratory test for properties of the materials were conducted that includes specific gravity, sieve analysis, water absorption, slump cone test are to be conducted. The mix design proportion along with water cement ratio used for mixing concrete is to made. Experimental investigations are to be done by casting the specimens with different mix proportions. Various test are to be conducted to check the strength properties on concrete. The test result obtained were tabulated and documented.

V. MIX RATIO

The mix ratio used for the study is as follows

Table 5.1 Mix Ratio for M20

<table>
<thead>
<tr>
<th>WATER</th>
<th>CEMENT</th>
<th>F.A</th>
<th>C.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>191.6</td>
<td>383KG</td>
<td>620KG</td>
<td>1171KG</td>
</tr>
<tr>
<td>0.5</td>
<td>1</td>
<td>1.61</td>
<td>3.05</td>
</tr>
</tbody>
</table>

VI. EXPERIMENTAL INVESTIGATION

6.1 Compressive Strength Test

It is determined by compressive force applied per unit area on the cube specimen. 54 specimens are casted to check the compressive strength test and the results are listed below.

Table 6.1 Compressive strength test

<table>
<thead>
<tr>
<th>% of SNF</th>
<th>% wood Powder</th>
<th>7 days</th>
<th>14 days</th>
<th>28 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.10</td>
<td>13.5</td>
<td>18.2</td>
<td>22.5</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>13.7</td>
<td>18.9</td>
<td>22.9</td>
</tr>
<tr>
<td>0.20</td>
<td>0.10</td>
<td>14.2</td>
<td>19.2</td>
<td>23.3</td>
</tr>
<tr>
<td>0.30</td>
<td>0.10</td>
<td>14.6</td>
<td>19.6</td>
<td>23.7</td>
</tr>
<tr>
<td>0.40</td>
<td>0.10</td>
<td>14.9</td>
<td>20.5</td>
<td>24.5</td>
</tr>
<tr>
<td>0.50</td>
<td>0.10</td>
<td>13.3</td>
<td>18.9</td>
<td>19.8</td>
</tr>
<tr>
<td>0.60</td>
<td>0.10</td>
<td>12.9</td>
<td>18.2</td>
<td>19.2</td>
</tr>
</tbody>
</table>

6.2 Split Tensile Strength

It is determined by tensile force applied per unit area on the cube specimen. 54 specimens are casted to check the split tensile strength test and the results are listed below.

Table 6.2 Split tensile strength

<table>
<thead>
<tr>
<th>% of SNF</th>
<th>% wood Powder</th>
<th>7 days</th>
<th>14 days</th>
<th>28 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.10</td>
<td>1.52</td>
<td>1.59</td>
<td>1.92</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>1.56</td>
<td>1.64</td>
<td>1.95</td>
</tr>
<tr>
<td>0.20</td>
<td>0.10</td>
<td>1.58</td>
<td>1.68</td>
<td>1.98</td>
</tr>
<tr>
<td>0.30</td>
<td>0.10</td>
<td>1.60</td>
<td>1.71</td>
<td>2.01</td>
</tr>
<tr>
<td>0.40</td>
<td>0.10</td>
<td>1.63</td>
<td>1.78</td>
<td>2.05</td>
</tr>
</tbody>
</table>
VII. CONCLUSION AND RECOMMENDATIONS

1. It is found that Optimum compressive strength is attained in 0.40 % of SNF when compared to conventional mix

2. It is found that optimum tensile strength is attained in 0.50 % of SNF when compared to conventional mix.

3. It is recommended that SNF up to 0.40 % is acceptable with 0.10 % of wood powder for achieving better strength.

4. Hence future work can be done for additional percentage of wood powder along with some additives for attaining better strength

REFERENCE

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