Review Paper on Multifunctional use of Nano Silica in Concrete

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Abstract:
Concrete is most common material used for any construction and cement is one of the binder materials in concrete. This paper shows that the partial replacement of cement by Nano silica powder (1 %, 1.5%, 2%) by the weight of cement. After that replacement to do the comparative study of compressive strength of concrete with addition of Nano silica and without addition of Nano silica. Nano silica is suitable to reduce the environmental pollution by reduction of CO2 emission in atmosphere. This paper also shows that improvement in permeability of concrete.

Key words: - concrete, Nano silica, compressive strength.

1. INTRODUCTION

Now a day’s use different type of blending material to improve the performance of cement concrete and Nano silica powder is one of the blending materials. For the improvement of stability of mixture and it can effectively avoid segregation and secrete water phenomenon, help to improve stress modes of the concrete. So Nano silica mixed with concrete and to improve the bending tensile strength and durability of concrete. Addition of moderate admixture for improvement of a different properties and overcome some of the disadvantages. Nanotechnology has been added to concrete production and has the potential of improving the performance of concrete. On the basis of previous research concrete using Nano silica for improving workability and strength. In concreting or mortar Nano silica is used for replacing small amount of cement without changing its original properties. The size of Nano silica is very small i.e; 1 nanometre is equal to 1 * 10⁻⁹. Nano silica is more effective than other Nano material like silica flume. Silica is mainly used for reinforcing thick and flattering purpose. There are different methods to manufacture Nano silica and some methods are more covenant for manufacturing Nano silica. With the application of Nano silica improvement in the strength properties and durability of concrete. Also reduces the permeability and corrosion to the steel reinforcement in concrete.

2. LITERATURE REVIEW

- Abdul Wahab, B. Dean Kumar, M. Bhaskar, S.Vijaya Kumar, B.L.P. Swami (2013) “Concrete composite with Nano silica condensed silica flume and fly ash – Study of strength properties” –

This paper describes the continuous demand of concrete to meet the various difficult requirements and to carry out the research work in the area of concrete technology. Now a day, Nano technology is used in concrete in the form of Nano material like Nano silica flume etc. and form superior properties.


This paper includes the experimental research is to find out the effect of Nano silica and fly ash on properties specially for strength properties of concrete. They are used as partial replacement of cement and improving the strength properties of concrete.


This paper suggest the improvement in stiffens and toughness of the epoxy by homogeneously distributing Nano particle.


In this paper studied the application of Nano silica in concrete and also its production by using dissolution of olivine. This method is very cheaper than the other commercial methods because cost required for raw material is low and also energy requirement is less. Application of olivine Nano silica in concrete because of its high pozzolanic activity.


This paper shows the production of Nano silica by using wastage of olivine material and not only improving the compressive strength but also reduces the co2 emission.


This paper suggest the application of Nano technology is an influence way for reduction the environmental pollution and improve durability of concrete.

3. AIM AND OBJECTIVE:

3.1 Aim:
The main aim of such project work is to study the multifunctional use of nano silica in concrete and also improve the different strength properties of concrete by using the application of Nano material like Nano silica in concrete. Also reduction of environmental pollution by partial replacement of cements by Nano silica i.e; decreases the co2 emission in environment and make the environment pollution free. Due to
the application of Nano silica makes the concrete durable and economical.

3.2. Objective:

- To study the Effect of Nano silica in strength properties of concrete.
- Because of Nano silica decreasing pores in concrete will increases the compressive strength in concrete.
- Make the comparative study between the properties of concrete with application of Nano silica and without application Nano silica.
- Analysis the permeability of concrete.

4. PROPOSED WORK:

The following work is decided to be carried out:

i) Phase-1
In this phase collect the basic information related to multifunctional use of nano silica in concrete such as their properties, advantages, disadvantages, latest application of Nano silica in construction site economy of the construction by using nano silica etc. By using these raw data time required to complete the project can be estimated by Usable Methodology.

ii) Phase-2
In this phase, carefully analysis the collected data. Select the useable data which improve the properties of concrete and also this data should be economical. Also select the proper mix design with well proportion of ingredient.

iii) Phase-3
In this phase, by using proper mix design forecast the different cubes (i.e. without Nano silica and with varying percentage of Nano silica) with well proportion of ingredients. Taking the different test on that cubes and same time note down the readings. Analysis the result and select proper concrete (i.e. without Nano silica and with Nano silica). The goal of proposed work is to study the different properties of Nano silica and it’s multifunctional use in concrete. Also find well percentage of Nano silica which improves the properties of concrete. Above work will be shown how the methodology can be converted to practice.

5. RESULT TABLE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>W/C ratio</th>
<th>NS replacement in %</th>
<th>Compressive Strength in N/mm²</th>
<th>% increases</th>
<th>Permeability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.42</td>
<td>0</td>
<td>3 days 7 days 28 days</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>37.56 47.88 75.27</td>
<td>10</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>1.5</td>
<td>1.5</td>
<td>39.37 50.22 78.87</td>
<td>14.93</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td>40.65 51.8 81.03</td>
<td>19</td>
<td>39</td>
</tr>
</tbody>
</table>

Result Attained in compressive strength

![Compressive strength graph](image_url)

Result Attained in Permeability
6. CONCLUSION

From the above experiments and results we concluded that

• Nano concrete could reduce the emission of CO\(_2\) in atmosphere by using Nano silica concrete instead of cement concrete.
• The average increases in compressive strength up to 10%, 14.93%, 19% in 3 days, 7 days, and 28 days with application of Nano silica.
• Also improvement in permeability of concrete by the application of Nano silica.

7. REFERENCES


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