

Characteristic Study of Cement Mortar by Addition of Natural Resin

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Abstract: Concrete is the most widely used construction material in the world. The property of concrete is modified by adding any additives, mineral admixtures, chemical admixtures, polymers and fibers. This research aims to investigate and evaluate the performance of concrete using natural resin and chemical curing components. Commonly available natural resin like neem resin is used in this project. To study the characteristic strength, viscous property, durability of modified cement mortar and to find the optimum utilization of neem resin in mortar without modifying its nature. The result showed that the addition of Neem resin to the concrete mixes has a clear effect of concrete.

Keywords: additives, mortar, neem resin, strength, Viscosity, durability

1. INTRODUCTION

Concrete is a man made building material that looks like stone. Combining cement with aggregate and sufficient water makes concrete. Water allows it to set and bind the materials together. Different mixtures are added to meet specific requirements. Aggregates having important influence of Rheological as well as mechanical properties of cement mortars. In fresh state, particle size distribution, specific gravity, shape and surface texture influence properties of mortar. Concrete is normally reinforced with the use of rods or steel mesh before it is poured into moulds.

For the extraction of natural resin, plantation of trees has to be done, by which the surrounding becomes environment friendly. This project is carried out by using neem resin, nurturing of neem trees will purify the surrounding from hazardous diseases. Natural resins are used in cement mortar which increases the viscosity which intern enhances the workability and it is eco friendly.

2. MATERIALS AND METHOD

2.1. Cement

53 grades Ordinary Portland cement is used for this study. It can meet the consumer needs for higher strength concrete and is found very useful for prestressed and of precast concrete construction.

Table 2.1 Properties of Cement

Properties	Observation
Fineness	3%
Standard consistency	33%
Initial Setting time	55 minute
Final setting time	420 minute
Specific gravity	3.16

Physical and chemical properties and found to be conforming to various specifications as per IS: 12269-1987

2.2. Fine aggregate

Fine aggregates can be natural or manufactured. Throughout the work the grading must be uniformm(Table 2.2). The moisture content or absorption characteristics must be closely monitored. Particles smaller than 125 micron size are contribute to the powder content. To avoid segregation minimum amount of fines must be achieved. River sand confirming to IS: 383-1970(2002) is used.

Table 2.2 Properties of fine aggregate

Properties	Observation
Fineness	2.34
Water absorption	1.92
Moisture content	0.657

2.3. Neem resin

Azadirachta indica, commonly known as neem, nimtree or Indian lilac, is a tree in the mahogany family Meliaceae. Neem resins are collected from neem tree, which has many medicinal values. Applications of neem resin in the preparation of polymeric resins have been documented in the recent reports. The synthesis of various alkyd resins from neem resin is reported using a monoglyceride (MG) route and their utilization for the preparation of PU coatings.

The alkyds are prepared from reaction of conventional divalent acid materials like phthalic and maleic anhydrides with MG of neem resin. In other reports, different routes for preparation of polymeric resins from neem resin also are reported.

3. MIX PROCEDURE AND TEST CONDUCTED

3.1. Casting of Specimen

3.1.1. Mortar cubes

Cement mortar was prepared by adding cement, water, natural sand and neem resin at different levels of replacement namely 1%, 2%, 3%. The mortar mix 1:3 were selected for the study of mortars. Moulds of size 70.7mm x 70.7mm x 70.7mm (Fig.3.1) were used which gives cross sectional area of 5000mm². Compressive strength of mortars are obtained after 7days, 14days and 28days curing period.



Figure 3.1 Casted mortar cubes

3.1.2 Prism

Cement mortar was prepared by adding cement, water, natural sand and neem resin at different levels of replacement namely 1%, 2%, 3%. The mortar mix 1:3 were selected for the study of mortars. Moulds of size 75mm x 80mm x 280mm (Fig.3.2) were used which gives cross sectional area of 6000mm². Flexural strength of mortars are obtained after 7days, 14days and 28days curing period.



Fig 3.2 Testing Prism

3.1.3 Cylinder

Cement mortar was prepared by adding cement, water, natural sand and neem resin at different levels of replacement namely 1%, 2%, 3%. The mortar mix 1:3 were selected for the study of mortars. Moulds of size 100mm x 200mm (Fig.3.2) were used which gives cross sectional area of 7850mm². (fig 3.3) Split tensile strength of mortars are obtained after 7days, 14days and 28days curing period.



Fig 3.3 Testing cylinder

3.2. Tests on Hardened Concrete

3.2.1 Compression Test of mortar cubes

The axis of the specimen shall be aligned with the centre of thrust of the spherically seated platen. The load shall be applied at a rate of approximately 14 N/mm²/min and increased continuously until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. Recorded the maximum load applied to the specimen and the appearance of the concrete and any unusual features in the type of failure shall be noted. The measured compressive strength of the specimen shall be calculated by dividing the maximum load applied to the specimen by cross sectional area of the specimen.

3.2.2 Flexural Test of mortar prism

The specimen shall be aligned at 1/3rd distance of its length on a support. The two point loading shall be applied at a rate of approximately 14 N/mm²/min and increased continuously until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. Recorded the maximum load applied to the specimen and the appearance of the concrete and any unusual features in the type of failure shall be noted. The measured compressive strength of the specimen shall be calculated by dividing the maximum load applied to the specimen by cross sectional area of the specimen.

3.2.3 Split Tensile Test of mortar cylinder

The axis of the specimen shall be aligned with the centre of thrust of the spherically seated platen and cardboard sheets has been place on top and bottom of the specimen. The load shall be applied at a rate of approximately 14 N/mm²/min and increased continuously until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. Recorded the maximum load applied to the specimen and the appearance of the concrete and any unusual features in the type of failure shall be noted. The measured compressive strength of the specimen shall be calculated by dividing the maximum load applied to the specimen by cross sectional area of the specimen.

4. RESULTS AND DISCUSSIONS

4.1. Compressive strength of mortars

Specimen	7 days	14 days	28 days
1%	11.80	17.01	18.69
2%	11.96	12.25	13.61
3%	11.99	13.95	15.29

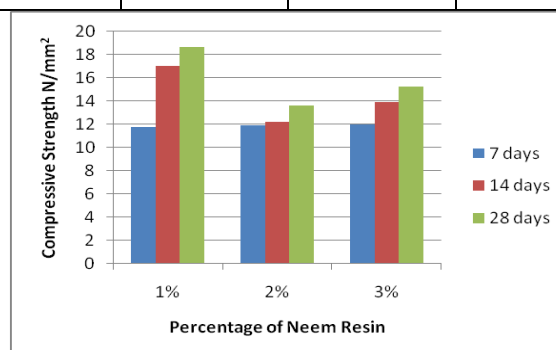


Fig. 4.1. compressive strength of mortars

4.2. Split tensile strength of mortars

Specimen	7 days	14 days	28 days
1%	1.57	2.18	2.86
2%	1.34	2.12	2.55
3%	1.47	1.95	2.76

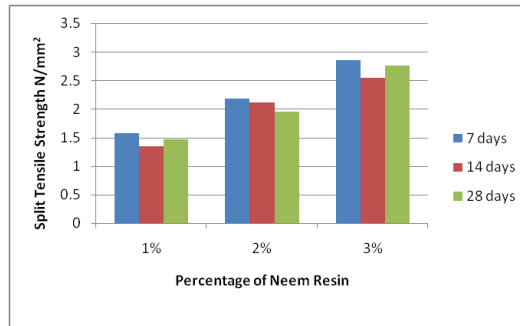


Fig. 4.2. Split Tensile strength of mortars

4.3. Flexural strength of mortars

Specimen	7 days	14 days	28 days
1%	7.87	8.04	11.72
2%	10.45	11.51	11.65
3%	10.36	11.65	13.25

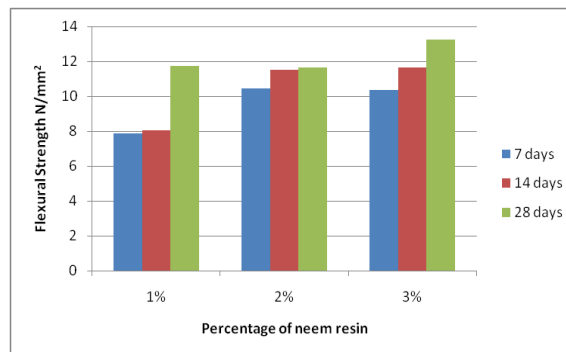


Fig. 4.3. Flexural strength of mortars

5. CONCLUSION

Based on the experimental research and behaviour studies of effect of modified cement mortar for plastering mortar work with mix 1:3, the following conclusions can be drawn.

Based on the experimental research and behavior studies of effect of modified cement mortar for plastering mortar work with mix 1:3, the following conclusions can be drawn.

1. There is no Physical change in the mortar.
2. The use of natural resin in mortar is effective.
3. The percentage increase in strength compared with nominal mix and 1% addition of neem resin to the volume of water for 28th day is 34.8%.
4. The percentage decrease in strength compared with 1% and 3% addition of neem resin for 28th day is 15.70%.
5. The percentage increase in strength compared with nominal mix and 1% addition of neem resin to the volume of water for 28th day is 24.35%.
6. The percentage decrease in strength compared with 1% and 3% addition of neem resin for 28th day is 3.62%.
7. The percentage decrease in strength compared with nominal mix and 1% addition of neem resin to the volume of water for 28th day is 9.33%.

8. The percentage increase in strength compared with 1% and 3% addition of neem resin for 28th day is 21.93%.

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