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REVIEW PAPER ON EFFECT OF ADDITION OF SUGARCANE MOLASSES IN STRUCTURALCONCRETE

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ABSTRACT
The protection of the environment from waste products is currently one of the biggest concerns facing our community, About 8–10 million tonnes of sugarcane trash are generated in India alone. Utilizing extra sugarcane molasses waste and finished concrete together would be a smart solution because of their tremendous potential. The substitution of sugarcane factory molasses for chemical admixtures in structural concrete (water reduction admixtures). Over the past few years, there have been numerous molasses-related scientific papers published.

This study's goal is to evaluate the impacts of structural concrete with sugarcane molasses added based on factors such as strength, durability, stability, and cost. The consistency, setting time, water reduction, and workability impacts of various dosage levels, such as 0.1, 0.2, 0.3, 0.4, 0.5, and 0.6 percent of the molasses by weight of the cement, were examined. By adding dosage levels ranging from 0.1 percent to 0.6 percent, respectively, of the molasses to the design mix M20, M30, and M35 cement for 3 days, 7 days, and 28 days, the tests for workability and compressive strength were conducted.

According to the test results, molasses acts as an accelerate up to 0.5 percent of dose and then as a retarder. The structural concrete's compressive and split tensile strengths after 3 and 7 days with molasses show a loss in strength. Adding 0.5 percent molasses by weight of cement for 28 days increases the compressive strength of structural concrete and mortar. 0.3 percent of molasses by weight of cement is the most beneficial dose level.

1. INTRODUCTION
The using waste products from diverse industries is increasingly being put as reality as a way to reduce the carbon footprint of building. The amount of recyclable or usable waste that was created in 2009 is projected to be close to 16 billion tonnes. An increasing focus has been placed on strong, sturdy structures as a result of urbanization. Water cement ratios are often low for high strength constructions, and such mixes have poor workability. Admixtures are utilized to provide a high degree of workability. In order to provide a high degree of workability without compromising the appropriate strength, mixes are primarily chemical compounds. In some industries, waste products may serve as an alternative to these admixtures. Molasses, a waste substance produced by sugar mills, is one such material that is readily available.

1.1 Molasses Blackstrap
The primary waste product from the processing of raw sugar is molasses. It is a thick, viscous liquid that cannot be further processed into sugar using straightforward methods. Up to 8 gallons of molasses can be made from one tonne of cane. Approximately 50–62% of molasses is made up of sugars, of which 15–16% is sucrose and the remainder is made up of glucose and fructose. Table 1.1 provides molasses general composition.

Table 1.1 Molasses Typical composition (Archaeological survey of India (2000))

Dry matter	82%
$C_{12}H_{22}O_{11}$	50-56%
Table sugar	15-16%
Reducing sugars	32-36%
N	1.8-2.8%
Organic acids	2.5%

The sugar business produces four different types of sugar waste. Two of these are solids, and the other two are liquids. These are what they are:

1. Molasses
2. Bagasse
3. moulded mire
4. Pumping out water that contains muck

We'll talk about molasses later. Solid bagasse, which is used in the paper mill business, has a 3 percent sugar concentration.

Pressed mud poses a disposal issue because it has a 3 percent sugar content. Only the filling of depressed ground is permitted to use it.

Mud and a very small amount of sugar are present in effluent water. The sugar sector faces a similar issue with the disposal of this water.

If the water has a suitable level of mud and molasses, it can be used for construction.

2.1.1 *DEFINITIONS*

(1) Admixtures

Cement, aggregates, and water are the three primary ingredients in concrete. Admixtures are any additional components that are introduced during the concrete mixing process or right before mixing.

(2) Molasses

It is the centrifugal's effluent, which is separated into categories A, B, and C after a massecuite has been spun and purged. Before washing starts, the discharge is referred referred to as heavy molasses and as light molasses when it has been diluted with water. Waste, exhausted, or final molasses refers to the molasses that is ultimately removed from the process.

(3) Degree

Brix is the weight-per-percentage measure of the solids added to a pure sugar solution as sugar. A substance with a specific gravity of 80^{o} has no brix, which is same as a solution with 0% cane sugar. 80 % soluble solids by weight of molasses is what is meant by the term "brix" molasses.

(4). Gravity solids

The specific gravity of the cane sugar solution refers to the solids that are present in the solutions based on the specific gravity. Gravity solids and degree brix have the same numerical formula.

(5). Absolute solid

The amount of solids as calculated after the water has been removed.

(6). Sucrose : It is a carbohydrate, and its molecular structure is $C_{12}H_{22}O_{11}$.

(7) Reducing sugar

The type of carbohydrate is glucose.

Waste Molasses Sampling from Sugar Industry

Instead of the gutter behind the centrifugal pump the output pipe going to the weighing or measuring tanks needs to have a sample taken out of it. Each pan hit should be compared to the samples gathered. Every four hours, a sample from the storage water tank may be manually taken and composited for examination. Every daily sample is weighted out into a little sub- sample of 100 gm, which is then moved to a different collecting vial. These secondary samples are combined and used for the weekly or biweekly total analysis.

Composition and Specifications of Molasses

Since molasses is unmistakably and unmistakably derived from the roman language, etymological dictionaries do not discuss the molasses's past ("Melasse" in German and Dutch).

The ultimate effluent produced during the repeated crystallisation process used to prepare sugar is referred to as "molasses." The quantity and quality of the molasses obtained reveal details about the characteristics of the sugarcane and how it was processed, including the effectiveness of the Clarifying juice, crystallisation during boiling, and separating sugar crystals from inferior massecuite.

Molecular Structure constituents

The purest form of molasses, according to theory, is a mixture of C12H22O11, non-sugars, and H2O in which, under all circumstances, no sucrose crystallizes or technologically ideal circumstances, regardless of time. The production of molasses with the lowest purity feasible is the goal of the sugar industry.

LITERATURE SURVEY

Jumadurdiyev et al. (2004) looked at how molasses from 3 distinct sugar mills and a common water-reducing chemical based on lignosulphonate affected the production of concrete in their study. We looked at the setting time, workability, and bleeding characteristics of fresh concrete. Additionally, the flexural strength and compressive strength were tested. Tests were done for every test sample for every attribute assessed at various ages in order to compare durability features. The test results demonstrated that cement pastes with molasses added exhibit increased setting periods even at 0.2 percent dosage, and that setting times increase with increasing molasses dosage.

Additionally, the molasses obtained from three sugar mills exhibits the same behaviour as the lignosulphonate-based additive with regard to the workability of concrete. The larger air content of the lingnosulphonate concrete, is likely the reason why the bleeding of the molasses concretes was greater than that of the latter. When compared to the lignosulphonate-based admixtures the concretes made with molasses exhibit a modest improvement in σ_C at every stages, with the exception of early age. The lignosulphonate added concrete sorptivity is similar shrinkage behaviour for concrete made with three types of molasses and lignosulphonate. According to figure 3.1, just a little amount of concrete with molasses and lignosulphonate added degraded throughout the course.

Roar Myrdal (2007) He provided a theoretical framework for how molasses and sugars work in concrete in his report. C3H6O with numerous -OH attached, typically one on each C that is not a member of the C3H6O functional group, are what make up molasses, a type of sugar or saccharide that is a carbohydrate. These materials are distinguished by functional groups, such as the -hydroxyl carbonyl group HO-C-C=O, in which O_2 are joined to nearby C.

The most widely used sugar is C12H22O11 a disaccharide made up of the two CH2O fructose (fruit sugar) and glucose. Different sugars have varying degrees of effects on cement hydration. According to their chemical structures, "non-reducing" sugars can either be very effective/ineffective retarders, while so-called "reducing" sugars are moderate retarders. Any sugar that generates an aldehyde or ketone in basic solution is a reducing sugar. As a result, the sugar can function as a reducing agent. Non-reducing sugars are sugars that lack this reducing capacity.

Conclusions

- Sugar makes up between 18 and 22 percent of molasses.
- When used in tiny doses, molasses accelerates the process but when used in high doses, it retards it. As a result, there are noticeable variances in the setting times of cement pastes with

different molasses percentages. Up to a level of 0.5 percent, it acts as an accelerator; at larger percentages, it acts as a retarder.

- Molasses is a water-reducing addition that, when employed at a dose of 0.5 percent by weight of cement, can reduce water by as much as 10%.
- For the same workability, the relationship between the dose level of molasses and the percentage decrease of water is virtually linear in the range of 0 percent to 0.5 percent.
- The rate of water loss differs for each mixture. The ratio is largest for a poor mix and lowest for one with riches.
- The slump value increased when the molasses dose level was raised, indicating that the concrete became more workable.
- When the dosage amount is increased, the 7-day compressive strength of various cement mortar mixes decreases. However, the strength at 28 days is significant and falls between 0 and 0.5 percent of the molasses dosage level.

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