

Used Oils in Concrete- A Review

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Abstract:

Concrete as a building material has wide range of admixtures. Of these super plasticizers are becoming inseparable part of modern concrete. Chemical admixtures are not sustainable. Hence used Oils such as used cooking oils and used engine oils are tried by various researchers as sustainable super plasticizers. Used Cooking oils or Used engine oils contain fatty acids which are a concern at higher level of addition. This paper explores the researches done on using these oils

Keywords —used cooking oil, used engine oil, concrete, admixture, superplasticizer

I. INTRODUCTION

Cooking oils are used as admixtures in concrete. The study of oils with concrete started with the use of oils as delaminating agents between formworks and concrete. Sometimes oil from ready mix concrete plant machinery leaked into concrete producing undesirable effects. Hence studies of engine oil and cooking or edible oil on concrete done by various researchers. The effect of oils on concrete varies. The edible oils contains fatty acids[1], hence they are acidic. Cement concrete or lime concrete are alkaline. When set concrete is exposed to large amount of oil. Micro cracks and large fractures get created and concrete gets damaged.

II. REVIEW

By adding just 1.5% [2] of used cooking oil in concrete the slump value of concrete and also increases compressive strength. It can replace superplasticizer as per their study.

Used Engine oil [3] can be effectively used as a superplasticizer and air entraining agent in concrete with 0.3-0.5% by weight of binding material. Used

Engine oils within the range improves the density of concrete. 2% Used Engine oil concrete shows increased compressive strength.

Increased resistance to freezing[4] and thawing was observed in cement in which leaked oil got mixed in the old grinding units. Increased slump and air-entrainment was observed without affecting the strength of hardened concrete.

In concrete with used engine oil [5] Porosity was greatly reduced and compressive strength was not altered.

Increase in slump [6] and air entraining, decrease in setting time were found in concrete with OPC and Used Engine Oil up to 0.6%.

Reduction in long term compressive strength [7] was found in concrete with used engine oil. Used engine oil increases air content and can be used as water reducing admixture or plasticizer.

Waste cooking oil [8] was added to maximum of 1.5% by weight of cement in concrete, organic waste were also added. The temperature or heat of hydration was reduced in concrete cubes with waste cooking oil and organic wastes

Workability [9] was increased when waste engine oil was added to concrete upto 1.2% by weight of cement. Compressive strength was decreased in this study.

Metakaolin and engine oil [10] increases workability and air entrainment and also decreases porosity and sorptivity in cement concrete

Approximately 40% [11] of the used engine oil is illegally disposed of which pollutes rivers and seas. 250,000 gallons of drinking water and 40,730 square feet of soil can be polluted by 1 quart of used engine oil

Animal and vegetable fatty oil are added to improve lubricating oil's performance [12]. These oils can decompose to form fatty acid, these interact with alkaline concrete and disintegrates concrete

The workability of concrete increased but Compressive strength [13] of concrete was decreased with increase of waste engine oil in concrete. Waste Engine oil can be used as superplasticizer.

Workability of concrete [14] containing UCO improved as compared to controlled concrete. The compressive strength, split tensile strength and flexural strength of concrete increased due to addition of UCO.

Porosity [15] of concrete goes on decreasing with increase in engine oil as compared to control sample at 28 days of curing age.

When concrete cubes [16] are soaked in mineral oil for 6 months, the oil aggressively lowers the strength of concrete by about 17% for both low and high strength concretes.

Used Engine oil of 0.5% [17] in concrete decreases the concrete porosity when compared with SuperPlasticizer. The concrete also performed well in Chloride penetration test.

Used Engine oil [18] with 0.3% of cement is the maximum percentage upto which there is no ill effects of reduction in setting time, initial slump and compressive strength. In compatibility between conventional water reducer and used engine oil was

also found. This incompatibility increased the slump loss and viscosity of concrete.

Used Cooking Oil (UCO)[19] increases a workability, improves mechanical properties and decreases air voids size. UCO acts as sustainable admixture or superplasticizer.

III. CONCLUSIONS

The used Engine oil or cooking oil are one of the pollutants that need to be prevented from entering the water bodies and environment. These improve the air entrainment, workability of concrete in small percentages. Strengths of concrete decreases in higher percentage of addition of these oils. Hence if we use these used oils judiciously these oils act as super-plasticizers. we can generate wealth from waste.

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