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# Use of Cigarette Butts in Concrete as Additional Material

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**ABSTRACT:** Mixing cigarette butts into concrete to reduce the urban heat island effect caused by concrete while dealing with cigarette butts waste, the possibility of "one stone catches two birds" provides a new idea for urban environmental protection. The influence of cigarette butts content on the mechanical properties of concrete needs to be studied. The cigarette butts are cleaned and dried, then sealed and hardened by paraffin wax. Cigarette butts are mixed into concrete cubic block according to the content of 0.1%, 0.5%, 1% and 2% respectively. The cubic uniaxial compression test is carried out.

**KEYWORDS:** Cigarette Butts, Urban Heat Island, Compression Test.

## I. INTRODUCTION

There are about 6 billion cigarettes a year in the world, forming 1.2 million tons of cigarette butts rubbish. As the global population increases, cigarette butts will have increased by more than 50% by 2025. You may not see it in your everyday life, but collectively around the world it does add up. Of all this waste, the top littered item is cigarettes. Cigarettes make up for a leading 38% of the litter at a shocking 1.2 trillion tons each year. Its also worth noting that this number is rising as the world population continues to grow. On average, cities spend between \$3M - \$16M each year on cigarette cleanup alone. They do not do this to only clean up the streets, but also because cigarettes are extremely toxic to the environment. Cigarettes are composed of plastic non-biodegradable fibers alongside various dangerous chemicals.

Urban heat island effect refers to the city due to a large number of artificial fever, buildings and roads and other factors such as high heat storage and green space, resulting in the city "high temperature". The city's temperature is significantly higher than the surrounding suburbs. And concrete also has lower sun reflectivity but larger absorption rate than natural bedding. Therefore, the concrete absorbs more than 2000 times the heat of air. During the daytime, the surface temperature of the urban cushion is much higher than air temperature, such as the asphalt pavement and roof temperature can exceed 8°C-17°C. The impact of global warming can be reduced by using poorly thermally conductive paving materials.

So we can reduce the pollution of cigarette butts by reusing them in concrete. If we add cigarette butts in concrete we can solve problems such as reduce the urban heat island effect caused by concrete while dealing with cigarette butts waste. The properties of concrete are also increased like good tensile strength, durability, reduce cracks growth, impact strength, economical, etc.

## II. RELATED WORK

The following are some of the prime objectives of this study:

1. To deal with the waste of cigarette butts.
2. To reduce the urban heat island effect caused by concrete.
3. To increases the properties of concrete.
4. To decrease the impact of cigarette butts on environment.
5. To make concrete economical.



### III. METHODOLOGY

Firstly, We prepared a Concrete Mix Design of M30 Grade of Concrete. Found out what would be the proportion of concrete. Mix Design of M30 Grade Concrete :

Steps involved in Mix Design; Target Strength = 38.58 N/mm<sup>2</sup> Water Cement Ration = 0.4 Water Content = 157.6 kg  
Calculation of Cement Content = 394 kg/m<sup>3</sup>

Aggregate proportion between C.A. and F.A. = 0.549 and 0.451 respectively Mix Calculation = Cement – 394 Kg/m<sup>3</sup>  
Water – 157.6 Kg/m<sup>3</sup>

Fine Aggregate - 0 791 Kg/m<sup>3</sup> Coarse Aggregate – 1068 Kg/m<sup>3</sup> Admixture – 4.334 Kg/m<sup>3</sup> Water Cement Ratio – 0.4

Mix Proportion = 1 : 2 : 2.71 Wt. of Concrete Material for Casting One Cube;

Wt. of Cement = 1.3 kg

Wt. of Fine Aggregate = 2.6 kg Wt. of Coarse Aggregate = 3.6 kg Wt. of Water = 0.5 kg

According to our Mix Design we prepared concrete cube. We added 0.1%, 0.5%, 1% and 2% of cigarette butts in concrete respectively, on the bases of total weight of 1 concrete cube. We casted total 30 no. of cubes i.e. 6 cubes of regular concrete, 6 cubes of 0.1% butts added in concrete, 6 cubes of 0.5% butts added in concrete, 6 cubes of 1% butts added in concrete and 6 cubes of 2% butts added in concrete. We decide to perform compression test on concrete cubes after 14days and 28days respectively.

The compressive strength of the concrete cube test provides an idea about all the characteristics of concrete. By this single test one judge that whether Concreting has been done properly or not. Compressive strength of concrete depends on many factors such as water-cement ratio, cement strength, quality of concrete material, quality control during the production of concrete, etc.



Fig No. 1 Cigarette butts Added in Concrete

### IV. EXPERIMENTAL RESULT

#### Compressive Test on Concrete Cubes

##### 1. 0.1% Cigarette Butts Added in Concrete

Days of Curing	Compressive Strength of Regular Cube	Compressive Strength of 0.1% Cigarette Butts Added In Concrete Cube
14 Days	28 N/mm <sup>2</sup>	20 N/mm <sup>2</sup>
28 Days		



If we add 0.1% of cigarette butts in concrete i.e. 0.008 kg in one concrete cube than the compressive strength we got is 20N/mm<sup>2</sup>. The compressive strength of regular cube we got is 28N/mm<sup>2</sup>. From the above data we can say that the 0.1% concrete cube can't give us better result than the regular concrete but the other properties of concrete is increased.

**2. 0.5% Cigarette Butts Added in Concrete**

Days of Curing	Compressive Strength of Regular Cube	Compressive Strength of 0.1% Cigarette Butts Added In Concrete Cube
14 Days	28 N/mm <sup>2</sup>	25 N/mm <sup>2</sup>
28 Days		

If we add 0.5% of cigarette butts in concrete i.e. 0.01 kg in one concrete cube than the compressive strength we got is 25N/mm<sup>2</sup>. The compressive strength of regular cube we got is 28N/mm<sup>2</sup>. From the above data we can say that the 0.5% concrete cube can't give us better result than the regular concrete but the other properties of concrete is increased.

**3. 1% Cigarette Butts Added in Concrete**

Days of Curing	Compressive Strength of Regular Cube	Compressive Strength of 0.1% Cigarette Butts Added In Concrete Cube
14 Days	28 N/mm <sup>2</sup>	27 N/mm <sup>2</sup>
28 Days		

If we add 1% of cigarette butts in concrete i.e. 0.02 kg in one concrete cube than the compressive strength we got is 27N/mm<sup>2</sup>. The compressive strength of regular cube we got is 28N/mm<sup>2</sup>. From the above data we can say that the 1% concrete cube give us nearly same result like the regular concrete but the other properties of concrete is increased.

**4. 2% Cigarette Butts Added in Concrete**

Days of Curing	Compressive Strength of Regular Cube	Compressive Strength of 0.1% Cigarette Butts Added In Concrete Cube
14 Days	28 N/mm <sup>2</sup>	8 N/mm <sup>2</sup>
28 Days		

If we add 2% of cigarette butts in concrete i.e. 0.6 kg in one concrete cube than the compressive strength we got is 8N/mm<sup>2</sup>. The compressive strength of regular cube we got is 28N/mm<sup>2</sup>. From the above data we can say that the 2% concrete cube give us very poor result than the regular concrete.

**V. CONCLUSION**

1. From the above results we can conclude that if we use 1% of cigarette butts of total weight of concrete we get the best results.



2. If we use 0.1%, 0.5% and 2% of cigarette butts we get the poor results.
3. The properties of concrete like like good tensile strength, durability, reduce cracks growth, impact strength,etc.
4. Reusing the cigarette butts can we very beneficial to our environment.
5. The urban heat island effect caused by concrete can be reduced.
6. Concrete becomes economical.

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