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## TITLE: USE OF E-WASTE IN CIVIL ENGINEERING

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### Abstract

Reuse of Computerized waste material is the incomplete solution to our habitat and in our industries. Recently the Electrical industry is also reprocess the E-waste is used as a construction material. Reused of E waste is not only helpful in construction materials like concrete, , cement, aggregate and sand,but also it minimise the cost of land and price of construction materials . Land filed produces polluted. Leachat which eventually pollute the ground water. Toxic material are obtained from melting computer materials, With the help of E-waste fibres concrete become more sustainable Concrete as well as it has achieve a high strength concrete and its tough, resist, and strong. E-Waste is standard type construction materials to introduce Green Concrete Methodology. Electronics Plastic waste is used as a Partial replacement of Coarse aggregate. With the help of E-waste we can extend the life of material and construction cost of material is also low. The E-waste is reused in construction purpose so it also helpful for human because it not affect the human health as well as we can use E- waste in a concrete as a agent. E-waste is used in a proper proportions with water and cement. Now a days, in a Morden Technique the electrical industries also recycle the E-waste and used as a construction materials E-waste used as a disparate combination of E-waste and recycle coarse aggregate together are used as a substitute of standard aggregate. The natural source of aggregate becomes depleted gradually so use of E-waste in concrete becomes more significant. Compressive strength, Flexural strength, and Tensile strength of concrete with and without E-waste as a aggregate was observed which exhibits a good strength gain.

**Key Words:** E-waste, Construction Materials, Concrete, Aggregates, Compressive Strength ,etc .

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### 1. INTRODUCTION

E-waste is a specific contain or material which is thrown away from the electronic system because of some error or defect occur in that contain, due to that specific contain the whole system is disturbed so, this defected contain called waste contain and such type of waste contain or material called as E-waste. E-waste are classified as Industrial E-waste and Household E-waste in which in Industrial E-waste consist waste from computer, machines,

silicon chips and household E-waste consist waste from mobiles, refrigerator, fans, bulbs, CFL's.

In our Country rapid expansion of technology is occur means a very large amount of E-waste occur in every minute.Approximately 400,000 tonnes of E-waste occur in our country annually. So we can use this E-waste in a our civil engineering construction purpose in many way such as agents in construction materials i.e. Aggregate, Sand, Cement, etc. Due to this way we can achieve high Compressive strength of concrete as well as the cost of concrete is low, from this E-waste is used in a

proper

manner.

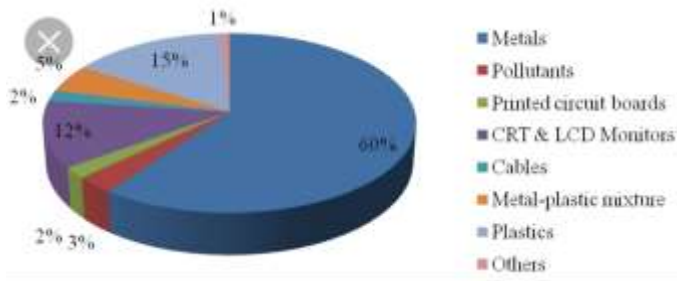


Fig. (a). Pie graph of E-Waste

**1.1 E-plastic**

The E-waste which is obtained from the Computer i.e. E-Plastic is considered as coarse aggregate. E-plastic partially replace the aggregate in which some amount of ratio add. E-plastic is replaced coarse aggregate of different percentage of volume. The size of aggregate based on chemical composition and grain size of E-waste. The workability is inversely proportion to the percentage of E-plastic.



Fig. (b). Aggregates

Table 1: Physical properties of E-waste particle and coarse aggregate

Sr. No	Properties	E-waste Particle	Coarse Aggregate
1	Specific Gravity	1.1	2.8
2	Absorption	<0.2	0.55
3	Colour	White and Dark	Dark
4	Shape	Angular	Angular

**1.2 Silicon chip**

Sand have similar properties of E-waste because of in Computer chips Silicon is present in larger amount. Sand is replaced by silicon chips upto 40% in concrete. The compressive strength of concrete is increased more than actual strength of concrete by 50% with the help of silicon chips. Silicon chips is angular in nature. So the concrete can achieve higher Compressive strength. The silicon chip is obtained from natural semiconductors. Using Silicon chips the life of sand is extend and the availability of sand can be increase by using silicon chips. using silicon chips the cost of sand is low.

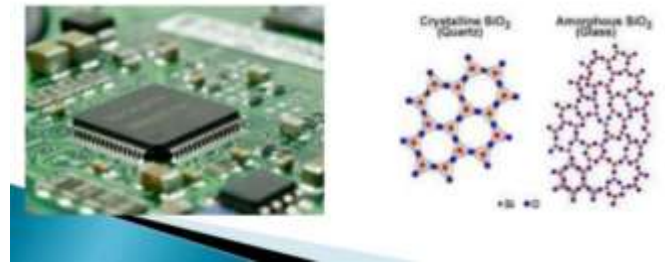


Fig. (C). Silicon Chips

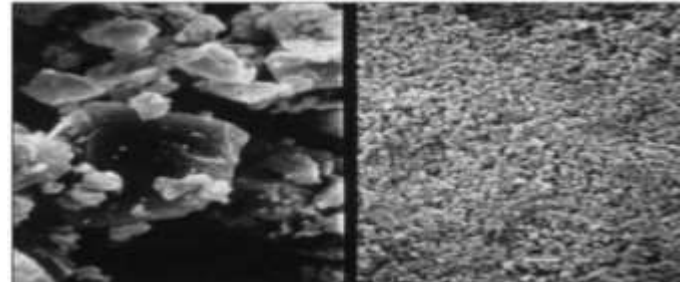


Fig. (d). Cement Grains and silicon fume particles

**1.3 Colour coded resistor**

In PCBs the colour coded resistor are use which is combination nickel coated ceramic material. Like we know tiles are made up of ceramic and we can tiles for floor finishing, so the ceramic can be reused for developing of tiles which is tough, resist, and strong. Sand, brick, glass, cement, concrete, silicon carbide, tungsten carbide etc.



Fig.(e). Colour Coded Resistor

**Application of ceramic**

- Manufacturing of tiles
  - As a cutting tool tip
  - Refractor bricks in lining of furnace
  - Ladders
- Act as a insulators of electric lines
- Lining of cement mixtures

**CFLs and bulbs**

CFLs and bulbs are made up from glass. Glass is amorphous substance, which is the combination of sand, lime, stone and soda ash. The compressive strength of a glass high because the glass is solid and amorphous in nature i.e. 1000MPa. This glasses used in concrete mix in the form of crushed to increase the compressive strength of concrete. Glass is good in compression.

Table No.3.1 Compressive Strength Results in N/mm<sup>2</sup>

Mix specifications	Conventional Mix	X1	X2	X3
Proportion of E waste	0%	10%	20%	30%
7 Days	20.85	23.35	13.3	12.5
14 Days	34.2	26.70	15.4	13.2
28 Days	45.52	29.4	20.8	14.5



### 2.1. E-Concrete

Concrete is extremely important constituent .Concrete helps us to achieve high strength to our structure and it also a durable. Concrete has high sustainable capacity. Now a days, the E-waste is added to a concrete. E-waste concrete is also have a high compressive strength, high tensile strength, and high flexural strength. E-Concrete is durable in nature. And the initial cost of concrete is low. Table.2.Mix Specifications

Mix Specifications	Conventional Mix	X1	X2	X3
Proportion of E-waste	0%	10%	20%	30%

#### Advantages of E-waste in construction materials

- Low cost
- Time consuming
- High strength
- Durable

#### Disadvantages of E-waste in construction materials

- During the process of recycling highly toxic gaseous mix in atmosphere.
- Due to the chemical compositions present in E-waste makes land infertile.

### 3. TESTS

#### 3.1. Compressive Strength

Among various test carried out on concrete this is utmost test which gives idea about various characteristics of concrete.From this we can conclude concreting is done correctly or not.For evaluating the strength development of concrete conaining various E waste contain this test is conducted.

Table No. 3.2.Tensile strength test results in N/mm<sup>2</sup>

Mix Specifications	Conventional Mix	X1	X2	X3
Proportion of E waste	0%	10%	20%	30%
7 Days	3.77	3.3	2.7	1.91
14 Days	3.9	3.5	2.9	2.25
28 Days	4.25	3.7	3.5	2.37



### 4. CONCLUSION

We conclude that the E-waste is very helpful in our construction industries as well as it is beneficial for civil engineering purpose. We observed that replacement of E-waste with the coarse aggregate. using E- waste we can achieve the high strength of concrete. The concrete which can obtain from E- waste is high compressive strength, flexural strength and tensile strength and E- waste is also help to reduce the cost of materials.

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