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Replacement of Coarse Aggregate With E-Waste Properties In Concrete A Review

Needhidasan Santhanam
Associate professor, department of civil engineering
Saveetha school of engineering, saveetha institute of medical and technical science
PG student: K. Subashini

Abstract: *E-Wasteis a popular, informal name for electronic products nearing the end of their useful life. E-Waste are most of the products produced most harmful components based on the density.E-waste increases by 38 percent in the decade between 2020 and 2030 according to a new united nations (UNU) report. The overall equipment basis analyzing the properties which are required in the certain percentage of e-waste. This analyzing is very useful to reduce the harmful effects to the environmental and human beings. For the global scenario and affordable to safe green concrete production in the e-waste construction department.*
Keywords: *compressive strength, durability strength, e-waste.*

I. Introduction

The worldwide huge amount of e-waste generated and generating. For this issue civil department are researching about the worldwide health issue problem to avoid the harmful effects in e-waste. For this purpose, replacement coarse aggregate & fine aggregate in concrete. In this e-waste consumption in separation of bio-degradable and non-bio-degradable activities noted. Electronic waste consists of computer, television, mobile phones and washing machines, refrigerators, automated radio devices that have come to halt. Probably on the other hand natural resources in fine aggregate and coarse aggregate are now a days produced in less due to highly consumption and popular growth. So that only the e-waste is to be utilizing as coarse aggregate in concrete. The e-waste was crushed in various sizes and sieve through 4.75mm, 10mm, 20mm. The various tests are carried out in it etc.….

THE OVERVIEW OF E-WASTE:

- **E-WASTE ON COMPUTER COMPONENTS:**

1. Circuit boards - these include heavy metals like lead and cadmium
2. Batteries – these include cadmium
3. Cathode ray tube – they contain lead and barium oxide
4. Brominated flame retardant in coated on circuits boards, cables and PVC
5. Copper cables and plastic-coated computers release toxic dioxins and furan when burnt
6. Flat screens contain mercury PCB

It has been estimated that 286,700kg of mercury, about 4kg of lead, 2.87billion kg of plastic and 716.7kg of lead are present in 500billion computers, in the world. These heavy metals like lead contaminate the ground water and when burnt produce harmful effects like the emission of toxic fumes in the atmosphere.

HAZARDS OF E-WASTE IN COMPUTER:

This is present in circuit boards, glass panels, gaskets and computer monitors, solder contain, lead that damage the nervous system, blood system, kidney and also affect the development of brain in children.

TELEVISION E-WASTE COMPONENTS:

By contrast, e-waste contains PBDEs, which are flame retardants that are mixed into plastics and other components. Circuit boards found in most of the electronic devices may contain arsenic (As), cadmium (Cd), lead (Pb), mercury (Hg), and other toxic chemicals.

MOBILE E-WASTE COMPONENTS:

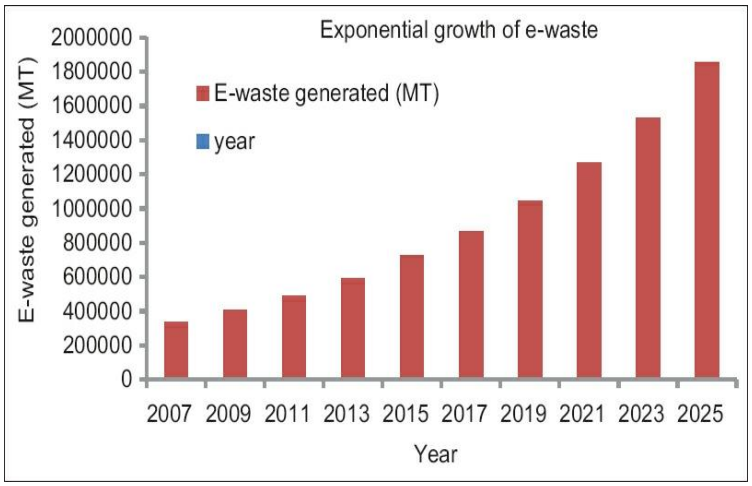
Circuit boards copper, gold, lead, nickel, zinc, beryl-lium, tantalum, and other metals. Liquid crystal display (LCD) various liquid crystalline substance.

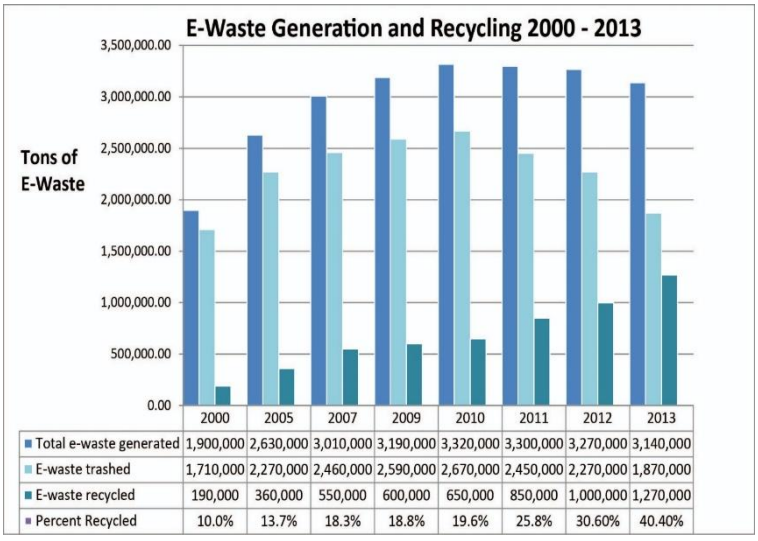
HAZARDOUS COMPONENTS:

- Toxic materials like, zinc nickel, flame retardants, barium and chromium.

Can cause damage to human blood, kidneys as well as central peripheral nervous.

DETERMINE THE VOLUM EOF E-WASTE GENERATION:



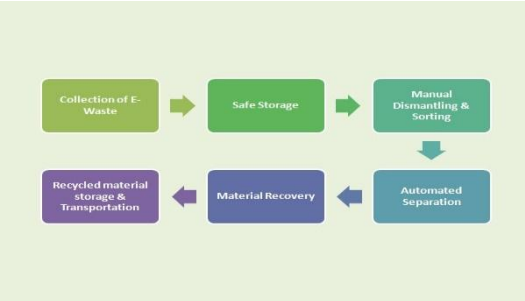


	2000	2005	2007	2009	2010	2011	2012	2013
Total e-waste generated	1,900,000	2,630,000	3,010,000	3,190,000	3,320,000	3,300,000	3,270,000	3,140,000
E-waste trashed	1,710,000	2,270,000	2,460,000	2,590,000	2,670,000	2,450,000	2,270,000	1,870,000
E-waste recycled	190,000	360,000	550,000	600,000	650,000	850,000	1,000,000	1,270,000
Percent Recycled	10.0%	13.7%	18.3%	18.8%	19.6%	25.8%	30.60%	40.40%

RECYCLING PROCESS:

Computer recycling, electronic recycling or e-waste recycling is the disassembly and separation of components and raw materials of e-waste electronics. Recycling is considered environmentally friendly because it prevents hazardous waste, including heavy metals and carcinogens, from entering the atmosphere, landfills or waterways.

RECYCLING METHODS INVOLVED IN E-WASTE:



THE TESTS ARE TAKES PLACE IN E- WASTE CONCRETE IS:

COMPRESSIVE STRENGTH:

Compressive strength is the capacity of a material or structure to withstand loads tending to reduce size, as opposed to which withstands loads tending to elongate. In other words, compressive strength resists being pushed together, whereas tensile strength resists tension.

FLEXURAL STRENGTH:

Flexural strength is one measure of tensile strength of concrete. It is a measure of an un reinforced concrete beam slab to resist failure in bending.

SPLIT TENSILE STRENGTH:

Tensile strength of concrete is the ability of concrete to resist tensile force or stress applied to it. As we know that concrete performance in compression is good, but weak in tension force. For counterbalance, this situation reinforcement has been provided in concrete to prevent crack formation.

II. Lecture Review

PAPER1: Harshvardhan Shukla, Gaurav Awasthi studied about Study of Compressive Strength of Concrete by using E-Wastewhile replacing the coarse aggregate with E-waste by 1 %, 1.5% & 2%, The Strength is continuously increasing in 7days, 14 days and 28 days. The variation is more rapid in "Z" composition when PCE is used as a plasticizer which reduces w/c ratio and hence concrete get more strengthen compared to other composition From the above study it is clear that the utilization of E-waste in the concrete is quite effective and compressive strength is increasing up to 2% replacement. Results are more effective when we used Fly ash and plasticizer.

PAPER 2:BALASUBRAMANIAN, GOPALA KRISHNA AND SARASWATHYstudied aboutInvestigation on Partial Replacement of Coarse Aggregate using E-Waste in ConcreteE-Waste (PCBs) 5%, 10%, 15%, 20%, 25% and 30% by weight of coarse aggregate. Quantity of cement, fine aggregate and coarse aggregate for one cube 1.5kg, 2.25kg and 4.5kg respectively.From the result it is observed that OPC with 15% EWaste has higher compressive strength when compared to the other systems.Beyond the 15% replacement of E-Waste there is a reduction in strength found than the control mix. In split tensile from the results it is observed that OPC with 15% E-Waste has higher tensile strength when compared to the other systems. In general, all the system has higher split tensile strength but beyond 15% replacement of E-Waste the strength gets reduced. And flexural strength in from the result it is observed that OPC with 15% system has higher flexural strength when compared to the other systems.

PAPER 3: Ashwini Manjunath B Tstudied about Partial replacement of E-plastic Waste asCoarse-aggregate in Concrete A concrete mix grade of M20 is aimed; the design mix proportion is obtained by Indian Standard method of mix design. The mix proportion obtained is 1:1.4:2.4:0.5 with w/c ratio 0.5. E-plastic was added in amount of 0%, 10%, 20% and 30% by the weight of cement in mix. In compression test by comparing above results with conventional concrete at 28 days the compressive strength, split tensile strength and flexure strength of concrete is reduced by 52.98% when coarse aggregate is replaced by 20% of E-waste. This provides that the strength of concrete gets reduced when fine aggregate is replaced by E-waste. And flexural and split strength test of waste plastic concrete mixtures tends to decrease below the values for the reference concrete mixture made of 20 % waste plastic has the lowest flexural strength and tensile strength at 28 days of curing ages.

PAPER 4: Sagar R. Raut, Roshni S. Dhapudkar, Mohali G. Mandaokar studied thatExperimental Study on Utilization of E -Waste in Cement Concretee-waste replacement in 5%,10%,15%,20%It is experimentally found that the partial replacement of aggregates by the e-waste is possible up to certain extent. The 15% replacement of aggregates gives the optimum results for compressive strength test. e- Waste can be dispose in concrete as a coarse aggregate. Split tensile strength is maximum up to 15% replacement of coarse aggregate by e-waste. This replacement gives the sustainable approach.

PAPER 5: Sunil Ahiwar and Pratiksha Malviya studied that An Experimental Study on Concrete by using E-Waste as Partial Replacement for Coarse Aggregatee-waste replacement of 0%, 5%, 10%, 15%, and 20% Compressive strength of electronic waste concrete decreases with increase in the percentage of e-waste. It has been observed that when we replace cement by fly ash in concrete along with electronic waste as a coarse aggregate compressive strength increase. Cement replacement of 30% by fly ash along with electronic waste gives best result. Current study concluded that Electronic waste can replace coarse aggregate up to 10% or 20%. Current study also concluded that electronic waste can replace coarse aggregate up to 30% in concrete when 30% fly ash is replaced by cement.

PAPER 6: Sidharthan K., Shameem V., Sayid Noufal P., Mohammed Kunhi M.,Shaiju, Dona Chacko studied that Effective Utilization of E-Waste inConcreteAt 5 %,10 %,15 % replacement of aggregates by E-waste has higher strength than normal conventional concrete.15% is the optimum percentage of addition of E-waste. After 15% the strength starts decreasing in flexural strength 0%, 5%, 10%, 15% replacement of coarse aggregate in e-waste tends to obtain strength but more than 20% is not lead to obtain the strength similar to the split tensile strength occurred.

PAPER 7: Saranya K Muthusamy R. Sathiyaraj Sudarshanstudied about An ExperimentalStudy on Partial Replacement for Coarse Aggregate by E-waste in Concrete.Thereplacement value is 0%, 32%, 34%, 36%, 38% in which compressive, flexural and split tensile strength there is an up and downs changes the strength value they are 0% increases 32% decreases 34% increases 36% decreases 38% decreases. There is more percentage of replacement in coarse aggregate tends to decreases the strength in compressive, flexural and split tensile strength.

PAPER8: Suchithra. s, Manoj Kumar, Indu V.S studied about STUDY ON REPLACEMENT OF COURSE AGGREGATE BY E- WASTE IN CONCRETEthe replacement of e waste is 0%, 5%, 10%, 15% and 20% which occurred in compressive, flexural and split tensile strength increases in up to 15% and more than 20% is decreases in strength. In which 0% and 15% of chloride and sulphide attack test conducted its shows that weight loss and strength loss of in e-waste concrete. It shows that E-waste particles in the concrete are not influenced by chloride and sulphate. This indicates that incorporation of E-waste in concrete could be considered to be reasonable.

III. Conclusion

The hazardous nature of e-waste is one of the rapidly growing environmental problems of the world. One of the major goals to be achieve by recycling e-waste to conserve the ever by this experimental study it looks out the major problems to be solved by step by step for future purpose. Due to the high growth in e-waste to deduct the e waste by recycling of it. After analysing the above studied in paper the replacement of coarse aggregate in e-waste more than 20% leads to the decreases of strength value. In this chloride attack and sulphide attack does not reasonable for e-waste properties. And then adding up the fly ash in e-waste concrete add up the strength value. The proper utilization of e-waste in higher strength occurred which are required to construction field.

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