



## **Use Of Waste Plaster Of Paris In Concrete**

**V.N.Kanthe**

Lecturer in Civil Engineering Department, Guru Gobind Singh Polytechnic,  
Nashik, Maharashtra, India

***Abstract:***

*Water pollution is vary major problem day by day due to lots of things are immersed in river or lake one of the material is POP (Plaster of Paris) in the form of POP Idols. The drawback of POP is it cannot completely dissolved due to this it only settled down in river or lake and hence it affect on water quality. In this paper the study on the effective utilization of waste POP such as used in concrete with different percentage. Result shows that a good result when waste POP used in concrete up to 15 percent.*

***Key words:*** POP, Concrete, Pollution

### **1.Introduction**

Nature has blessed us with supplying water on this earth. As well known, it plays a vital role in human being, without which human cannot live their life. It is equivalent to human respiration. We have to save this great gift by reducing its pollution and its misuse. We are really very much proud to be an Indian and to be Hindu. There are so many festivals in our religion which we enjoys every year such as Diwali, Ganesh Puja, Durga Puja. We celebrate the festival of the Lord Ganesha and the Lord Durga by making their statues by using pop, worshiping them and at the end of the festival, we use to immerse their statue in river, lake and well water. We all know that pop cannot dissolved in water and ultimately we ignore the harmful water pollution and it's dangerous side effect on us. So to avoid the pollution by wastage pop, we have to divert wastage pop in some beneficial use.

### **2.Objectives Of Present Work**

The objectives of present study as,

- Utilization of waste pop.
- Enhancing the strength of concrete.
- Reduce water pollution.
- 

### **3.Scope Of Study**

The Table No.1 shows some approximate annual records of waste pop in the form of Idols in some areas.

Apart from this there are no of idols annually immersed in water in all over India. There is no data available for the exact figure of total weight of wastage pop so from the above table we can imagine the percentage of wastage pop. Concept of use of wastage pop in concrete proportion for construction purpose has been the matter of research for last decade and is still under development.

Sr.No	City	Description	No. of idols immersion per annum
01	Mumbai	Idols of Lord Ganesh & Lord Durga	1.5 lakhs
02	Orissa	Lord Durga	5000 Nos
03	Utter Pradesh	Lord Durga	3000 Nos

*Table 1: Approximate Records Of Waste Pop*

#### **4.Uses Of Waste Plaster Of Paris**

Plaster of Paris is extensively used in ceramic industry for the preparation of models, moulds and plaster of toys. It is also used as a main raw material in the manufacture of toys and statues, chalk crayons, gypsum plaster boards, decorative picture frames, besides a wide range of applications in the interior decoration of buildings and other establishments.

#### **5.Methodology**

##### *5.1.Concrete Mix Design*

In present study M25 grade of concrete mix used. Ingredients of concrete Cement, Fine aggregate, coarse aggregate and waste POP.

##### *5.2.Procurement Of Ingredients*

For cement test result shown in Table No.2. And Fineness modulus of fine aggregate was found 4.6 and coarse aggregate was found that for 12mm size aggregate 9.6 and for 20mm size aggregate 6.79.

Sr. No	Test Type	Readings
01	Initial Setting Time	120 Mints
02	Final Setting Time	290 Mints
03	Standard Consistency	29 %
04	Compressive Strength of Cement	53 N/mm <sup>2</sup>
05	Specific Gravity	3.15

*Table 2: Properties Of Cement.*

### *5.3.Preparation Of Ingredients Proportion*

Sr. No.	Ingredients	Quantity per cube (kg/m <sup>3</sup> )
01.	Cement	1.50
02.	Sand	3.97
03.	Coarse aggregate 12mm	1.45
	20mm	3.4
04.	Water	0.67

*Table 3: Mix Proportions Of Ingredients*

#### 5.4. Casting Of Cubes

The casting was done by using different proportion of cement and waste pop which shown in Table No.4. After procurement of material and preparing proportion of concrete, cast the total 30 number of cubes with different proportion by using IS specified mould. First cement were mixed with fine aggregate without water till it attains uniform color. After that coarse aggregate were mixed with water. And the whole mixture were mixed thoroughly till the resulting concrete attains a uniform color.



Figure 1: Casted of concrete cub

<i>Sn.No.</i>	<i>Wastage POP (%)</i>	<i>No. of Cubes Cast of size 15 cm<sup>3</sup></i>
<b>01</b>	<b>0</b>	<b>6</b>
<b>02</b>	<b>5</b>	<b>6</b>
<b>03</b>	<b>10</b>	<b>6</b>
<b>04</b>	<b>15</b>	<b>6</b>
<b>05</b>	<b>20</b>	<b>6</b>

Table 4: Different Proportion Of Cement & Waste Pop

### 5.5. Curing Of Cube

The quality of concrete in construction work is generally calculated in terms of 28 days strength. This process takes too much time and hence it result in delay in construction work. So to avoid this problem IS: 9013-1978 recommends this method. This method consists of boiled water tank in which water is heated at 100°C. The concrete specimens is immersed in the tank for 3½ hours. After curing in boil water tank, the specimen is removed from the tank and cooled for two hours in atmospheric condition. Ones the specimen complete it's cooling, the specimen is then carried out for compression testing to check its compressive strength. The reading has been noted down by testing the specimen and uses that reading in the equation given by IS: 9013-1978 i.e.

$$R_{28} = 8.09 + 1.64 \times R_a$$

Where  $R_a$  noted reading by testing the specimen  $R_{28}$  compressive strength at 28 days by calculating the above equation with the help of noted reading, we can get the actual compressive strength for 28 days.

### 6. Testing Of Specimens

The specimens are tested in accordance with IS: 516-1959. The casted cubes tested under a compression testing machine.

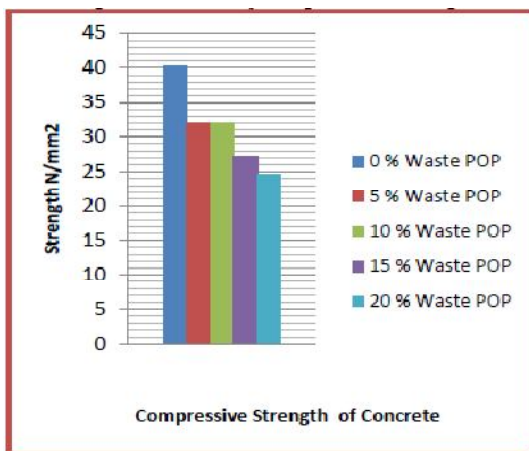


Figure 2: Compression Testing Machine

### 7. Result And Discussion

The test result shown in Fig No.2. The reading shows that the average compressive strength of three concrete cubes (without use of wastage pop) is 40.03 N/mm<sup>2</sup>. The average compressive strength of three cubes with 5 % wastage pop is 32.08 N/mm<sup>2</sup>. The average compressive strength of three cubes with 10 % wastage pop is 32.02 N/mm<sup>2</sup>.

The average compressive strength of three cubes with 15 % wastage pop is 27.26 N/mm<sup>2</sup>. The average compressive strength of three cubes with 20 % wastage pop is 24.72 N/mm<sup>2</sup>. So if we add 5 to 15 % wastage pop in concrete proportion and cured the cubes by accelerating curing method we can achieve 80 % compressive strength.



*Figure 3: Result of compression testing*

### **7. Conclusion**

From the test results it concludes that desire strength of concrete have got by adding 5 to 15 percentage of waste POP. That means it is effectively method of utilization of waste POP and also reduces water pollution cause of it used in concrete.

**8.Reference**

1. Shetty M. S., “Concrete Technology-Theory And Practice”, S.Chand and company, New Delhi, (1982).
2. Gambhir M. L., “Concrete Technology”, Tata McGraw-Hill company, New Delhi(1986).
3. Krishna Raju N., “Design of Concrete Mixes”, Faridabad (1975)
4. Remedios A. P., “Concrete Mix Design-Handbook”, Himalaya Publishing House, New Delhi(2008) ,pp.137-199.
5. “Specification for coarse and fine aggregates from natural sources for concrete”, IS:383-1970, Bureau of Indian Standards, New Delhi.
6. “Specification for accelerated curing”, IS: 9013-1978, Bureau of Indian Standards, New Delhi.