



Reuse of polluted waste water treatment for construction activities

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ABSTRACT:

Water scarcity is the major problem faced by our environment. Water is required for each and every construction activity. Generally it require huge quantity of water for construction purpose. In this project waste Sewage water from residencies is treated and then it is reused for construction activity Water used for construction as some basic properties that should not be disturbed in order to avoid cracks and to extend life time of building. Hard water is harmful for concrete as it contain magnesium chloride, sulphate and hydrogen carbonate. To remove chemicals the water is treated in three stages such as primary, secondary, tertiary stages and the harmful properties are removed during the treatment. The treated water is again tested and verified according to BIS standard of water. Then it is reused for construction activity.

I. INTRODUCTION

The main objective of this project is to treat the sewage water and reusing it for construction activities. Because water plays a major role in construction. Water is required for each and every construction activity such as for laying PCC in foundation, Consolidation of soil, Mixing and laying of Concrete, Curing of concrete.

It has been estimated that about 1.5 % of total project cost has been spent towards water While mixing concrete if the water level is exceed then it will lead to bleeding of concrete .So it is important to study the properties of water used for construction. The properties of water can be easily understand by proceeding some laboratory test such as alkalinity, acidity, turbidity etc. Generally sewage water is treated in three stages such as primary, secondary and tertiary. After treatment again the water is tested in laboratory to understand its characteristics. And so the water can be reused for construction activities. Here the treated water is used for mixing and curing of concrete and the mechanical properties

has been verified by using specimen such as cube, prism and cylinder.

II. BASIC PROPERTIES OF WATER USED FOR CONSTRUCTION

- The pH level of water used for construction should be in neutral level.
- Presence of high iron content in water will develop crack in the concrete surface. So water should be free from high iron content.
- Hard water is harmful for concrete as it contain magnesium chloride, sulphate and hydrogen carbonate.
- So the water used for construction should be free from chemicals.
- Bacteria growth in Sewage water should be terminated.

SEWAGE WATER

Sewage is a water carried waste, in solution or suspension that is intended to be removed from a community. Also known as domestic or municipal waste water, it is characterized by volume or rate flow, physical condition, chemical, toxic constituents.

III. TYPES OF SEWAGE WAETR

GREY WATER:

It consists mostly of waste water from sinks, tubs, showers, dishwashers, and cloth washers.

BLACK WATER:

The water used to flush toilets, combined with the human waste that flushes away, Soaps and detergents and toilet papers.

IV. COLLECTION OF SAMPLES COLLECTION OF SAMPLES

The sample collected for the treatment is of grey water from residential area which contain the waste from sinks, tubs, showers and dishwashers and cloth washers. The physical properties are tested for both pure water and sewage water in laboratory. The result is compared and based on the result treatment process is decided.

V. REASON FOR WATER TREATMENT

There are two main reasons for sewage treatment. The first one is to remove those contaminants that are harmful to concrete & to remove the bad odour and for reusing for construction activities.

VI. TREATMENT PROCESS

Generally the sewage waste water is treated in three different stages. They are

PRIMARY TREATMENT

Primary treatment includes screening, sedimentation, and filtration process

SEDIMENTATION

The removal of solid particles from water by settling induced by gravity. The screen of various size is placed and the sewage water is poured on the screen. Now the water is allowed to flow over the screen. The large suspended matter is allowed to settle by the force of gravity.

FILTRATION

This process is carried to remove the dirt colour and odour. The process of passing sewage water through filtration media which consist of pebble stone, coarse aggregate, fine aggregate and coconut rust.

VIII SECONDARY TREATMENT

AERATION PROCESS

Aeration is a unit process in which air and water are brought into intimate contact. Aeration process is carried for the following reasons

- i) Carbon dioxide reduction
- ii) Oxidation of iron and manganese
- iii) Ammonia and hydrogen sulfide reduction

The method adopted in aeration process is of water fall aerator. Here the water is allowed to fall from large height in rotational manner. So the water is broken up into small droplets or a thin film to enhance countercurrent air contact.

TERTIARY PROCESS

NUTRIENT REMOVAL

Nutrient removal is a process used for nitrogen and phosphorous removal. Since large percentage of the nutrients found in waste water and hence it should be removed. It can be removed by physical, chemical and biological process. Here the method adopted is of chemical process.

LABORATORY TESTS

- Determination of pH turbidity and conductivity
- Determination of hardness
- Determination of alkalinity
- Determination of acidity in sewage water
- Determination of chlorides
- Determination of sulphates
- Determination of fluorides
- Determination of optimum coagulant
- Determination of chlorine
- Determination of total, suspended and dissolved solids
- Determination of dissolved oxygen and BOD
- Determination of COD of sewage water

CASTING OF SPECIMENS

Generally the specimens are laid to understand their mechanical properties: Nominal mix of grade M20 is used for mixing of concrete. Conventional specimen and also specimen are laid by using treated polluted water. Totally 9nos of specimen is made by using treated sewage water.

1. Cubes 3 nos
2. Cylinder 3 nos
3. Prism 3 nos

9. COMPARISION OF RESULTS:

Experiment	BIS standard value	Normal water	Polluted water
pH	06 - 08	7.12	7.82
Turbidity	280	288 NTU	297 NTU
Conductivity	480 mg/l	492.8 mg /l	558.07 mg /l

Hardness	300mg/l	312.5mg/l	367.5mg/l
Alkalinity	250mg/l	240 mg/l	430 mg/l
Acidity	7 mg/l	5mg/l	6mg/l
Chlorides	215-330 mg/l	173.19 mg/l	208.74mg/l
Sulphates	142-233mg/l	137.1 mg/l	164.55 mg/l
Fluorides	0.2mg/l	0.48 mg/l	0.56mg/l
Optimum coagulant	5000-6000mg/l	6000mg/l	5500 mg/l
BOD	40.5mg/l	54mg/l	45mg/l

Hardness	300 mg/l	312.5 mg/l	313.61mg/l
Alkalinity	250mg/l	240 mg/l	220 mg/l
Acidity	7 mg/l	5mg/l	6mg/l
Chlorides	215-330 mg/l	173.19 mg/l	173.85 mg/l
Sulphates	142-233mg/l	137.1 mg/l	137.9 mg/l
Fluorides	0.2mg/l	0.48 mg/l	0.76 mg/l
Optimum coagulant	5000-6000mg/l	6000 mg/l	5060 mg/l
BOD	40.5mg/l	54mg/l	70mg/l

IX.CONCLUSION:

The Test for normal water and waste water are tested and compared by using BIS Standard values. Then the treatments like primary, secondary, tertiary are conducted by tested water and casting of specimen by using treated water. And the curing process had been attained to check the strength in concrete.

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COMPARISON OF RESULTS AFTER TREATMENT

Experiment	BIS standard value	Normal water	Tested water
pH	O6 - O8	7.12	7.3
Turbidity	280	288 NTU	297 NTU
Conductivity	480 mg/l	492.8 mg / l	500.2 mg / l