REVIEW ON INVESTIGATION ON UTILIZING WASTEWATER FOR PRODUCTION OF CONCRETE

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ABSTRACT

This study deals with the effect of different type of water samples on properties of strength of concrete such as compressive strength, tensile strength, and workability of concrete. The water samples collected from waste water treatment plant will be tested. Water samples to be used are Potable water sample, Influent water sample, Effluent water sample which will be analyzed for its chemical properties like acidity*, alkalinity, chlorides, sulphates ,inorganic solids . In that use of concrete mix design of M30 or above M30 will be done. The concrete sample which are generated will be tested for Compressive strength, tensile strength and workability on concrete which will be compared with each other. The results will indicate the best water sample suitable for concrete mix design.*

Keywords: *Compressive strength, Tensile strength, Workability of concrete, Potable water, Effluent water*

1. INTRODUCTION:

Concrete is a common construction material made from water, cement, aggregates, and sometimes admixtures. It is widely used in civil engineering projects. Water plays an important role in the chemical process of making concrete, as it accelerates the reaction between cement and aggregates. Water also helps fill the voids in the concrete by producing a gel-like paste. In this study, the effects of different types of water samples, including potable water, and effluent water from a waste water treatment plant, will be analyzed on the properties of concrete strength, such as compressive strength, tensile strength, and workability. The water samples will be tested for chemical properties such as acidity, alkalinity, chlorides, sulphates ,inorganic solids . The concrete mix design used will be for M30 or higher grade.

2. OBJECTIVES:

1. To study used of waste water in concrete mix for M30grade.
2. Testing of effluent water sample.
3. To analysis best performance of water sample inconcrete mix design.
4. To analysis the Compressive, Tensile and Workabilitytest on concrete.

3. LITERATURE SURVEY:

Dr. V. M. Inamdar et al [17]. (2010), The authors concluded that there is little difference in the results between concrete made with potable water and concrete made with treated waste water. Given the increasing scarcity of water nowadays, there is a need to explore alternative water sources for concrete production in construction projects. The authors suggest that treated waste water, which is often discharged into rivers, can be used as a viable option for concrete production.

Tarun.R.Naik et al [10].(2010) The authors concluded that there are no significant differences between mortar cubes made with potable water and sewage treatment plant water. Further research is needed to explore the potential outcomes and contributions of this research.
Some of the possible outcomes and contributions of this research include:

1. Minimizing the need for the use of potable water.
2. Eliminating the need to expand potable water supply for concrete industry.
3. Minimizing the need to construct more water treatment facilities.
4. Saving potable water for drinking purposes.
5. Making sewage treatment plants more economically attractive.

In conclusion, the authors suggest that further research is needed to fully explore the potential outcomes and contributions of using sewage treatment plant water in concrete production, which could have significant economic, environmental, and social benefits, including minimizing the use of potable water, reducing the need for water treatment facilities, and conserving potable water for drinking purposes.

K.S.AL-JABRI ab et al [1]. (2011) Authors concluded that, the chemical composition of wastewater from car washing stations was found to be higher than tap water but within ASTM standard limits. Some substances in the wastewater were found to have high concentrations, which could potentially raise concerns about corrosion and sulfate attack in reinforced concrete structures. However, the compressive strength of the concrete increased with longer curing periods regardless of the percentage of wastewater used. There was no significant difference in the compressive strength among different concrete mixtures after 28 days of curing, and the water absorption rates were similar between wastewater replacement mixes and the control mix. Overall, the use of car wash wastewater had negligible effects on the strength of concrete, but further studies are needed to investigate its impact on concrete durability over prolonged exposure times due to the possibility of harmful substances in the wastewater.

Preeti Tiwari et al [11]. (2014) The authors found that concrete cubes cured with salt water showed a slight increase in strength compared to those cured with fresh water. The rate of strength gain was slower in fresh water cubes, but all cubes continued to gain strength at 28 days. The fresh water cubes reached their maximum strength at 28 days, while the compressive strength of salt water cubes was slightly higher than that of fresh water cubes.

Rakesh A. More et al [5]. (2014) The authors concluded that concrete made with different types of water samples, including ground water, packed drinking water, and waste water, exhibited comparable or at least 90% of the compressive strength of reference specimens made with clean water, except for waste water samples at 7 days. Analysis revealed that concrete made with waste water samples had about 20% less compressive strength at 7 days compared to the reference specimens with a water-cement ratio of 0.5. Concrete made with packed drinking water had 13.5% higher strength compared to tap water, while concrete made with ground water had slightly lower compressive strength at 28 days (5% less compared to reference specimens). The tensile strength to compressive strength ratios varied for different water types. The authors suggest that slightly acidic, alkaline, salty, brackish, colored, or foul-smelling water should not be rejected outright due to water shortage in many areas, and recycled waters from cities, mining, and industrial operations can safely be used as mixing water for concrete. The results indicate that concrete made with different water qualities can achieve acceptable strength levels for M20 grade concrete, with potential benefits for water conservation and recycling.

Dr. S.S. Jamkar et al [4]. (2015) They wrote about the water impurities can react differently with various constituents of cement, affecting properties such as setting time and compressive strength of concrete. However, not all impurities have adverse effects, and some may even improve concrete properties. The type and number of impurities in water can vary depending on location, time, environment, and human activities, making it challenging to draw a general conclusion on the use of water for concrete mixing and curing. Using impure water for concrete mixing may promote early-age strength development, but there may be a reduction in long-term strength. Proper mix design and acceptable tolerance limits of impurities in water can potentially allow for the use of impure water in concrete mixing and curing. However, there is a risk of steel corrosion in reinforced concrete, which is a major concern for research. In conclusion, impurities present in water can react differently with cement constituents, affecting setting time, compressive strength, and concrete surface, and proper consideration and testing are necessary when using impure water in concrete construction.

Cordelia Nnennaya Mamaal et al [2]. (2019) The authors concluded that the type of water used in mixing concrete has a significant impact on the compressive strength of the resulting concrete. Concrete made with potable water showed consistent strength gain over time, indicating reliable long-term strength. In contrast, concrete made with rainwater showed an initial increase in strength at 7 and 14 days, but a drastic reduction in strength at 28 days, indicating that rainwater may not be reliable for long-term strength. The study suggests that potable water is the best choice for concrete production, and in situations where potable water is not readily available, river water could be used as an alternative for mixing concrete.

Nnadi, E.et al [6] (2021) The authors concluded that concrete strength increases with prolonged hydration period, as observed from experimental results, with a higher increment after the initial days of curing due to the rate of formation of cementitious products. Water quality used for mixing and curing of concrete has a significant effect on strength development, setting time, and overall performance. Results indicate a shorter setting time for distilled water (DW) and borehole water (BW) mixture paste samples compared to waste water treatment sources (SWWT) and tap water (TWWT), due to higher chemical oxygen demand concentration in waste water treatment sources resulting in longer setting time properties of concrete. The findings highlight the negative impact of poor water quality on the compressive strength of concrete and emphasize the importance of evaluating the quality of water used in concrete production for engineers and professionals in the construction industry.

4. METHODOLOGY:

1. Studying literature related to utilizing different water in concrete.
2. Visiting the to acquire knowledge of laboratory testing.
3. It is crucial to remember that depending on local laws, the quality of the waste water, and the planned use of the concrete, the use of waste water in the manufacturing of concrete may have certain criteria and constraints. To ensure that the use of waste water in the manufacture of concrete is done safely, effectively, and in conformity with applicable requirements, it is advised to consult with qualified specialists, such as civil engineers, materials scientists, and water treatment experts.

5. CONCLUSION:

After reviewing whole literature using waste water to make concrete can be a practical way to minimize the consumption of potable water, ease the burden on water resources, and support sustainable building techniques. But in order to make sure that the waste water mix in concrete has the appropriate qualities and conforms with local laws, it is essential to thoroughly assess the quality of the waste water, treat it if necessary, and monitor its performance. To optimize the mix proportions, water quality, and efficacy of waste water in the manufacturing of concrete, additional study and testing may be required. Using waste water in the manufacturing of concrete has the potential to have positive effects on the economy, the environment, and society, including water conservation, a decrease in the need for potable water, and less stress on water treatment facilities.

6. **REFERENCES**:

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