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Research Article

STUDY ON IMPACT OF RED TIDE TO THE DESALINATION PLANT

Shahira Khasib Khalifa AL Bakkari[1], D. Kamalakar[2] and L. Nageswara Rao[1*]

[1]Department of Mechanical and Industrial Engineering,
Caledonian College of Engineering, Sultanate of Oman, Muscat.
[2]RVR & JC College of Engineering, Guntur -522 019, Andhra Pradesh, India.

ABSTRACT

The desalinated water to be changed to un-salted fresh water which is suitable for human intake as well as irrigation. The process produces salt as a by-product. It can be on various seagoing ships as well as submarines. Most of interest in desalination is focused on developing cost-effective treatment methods of providing fresh water for human use in regions where the accessibility or requirement of fresh water is limited. Major desalination naturally uses extremely large scale of energy as well as specialized, infrastructure making it very costly compared to the utilization of freshwater from rivers as well as groundwater. The present study was mainly focusing on impact of red tide before and after the treatment.

Keywords: Turbidity, Biological Oxygen Demand, pH, Chemical Oxygen Demand, conductivity.

1.0 INTRODUCTION

The phenomenon of red tides is organic and vegetarian floating objects on the surface of the sea and form part of the scientist and, like other organisms consume oxygen to live thereby reducing the oxygen ratio, however, their presence was measured normal before has recently become increasingly random due to the high environmental pollution rates, causing an imbalance in environmental installation. The project is a study of the impact of red tide phenomenon on desalination plants from several aspects the impact of this phenomenon on the desalination process at the plant and also its impact on the work and the production of the plant. During this project, there will be a compilation of samples of sea water of different periods of time and will be compared by showing some experiences and trace this phenomenon and control changes that occur in the water.

The main objective of this study is to determine the causes of this phenomenon and to know the components of sea water during the occurrence of this phenomenon in order to find appropriate solutions to the desalination plants to help them overcome this problem without losses. During this study the need, which will require the need to discuss the specialists in this area and learn more about this phenomenon, this study also require field visits to desalination plants in order to gain more experience on this study. Also during this study will need tools that specializes experiences that will work and learn steps experiences and provide samples for examination.

2.0. Methodology, Design and Experimentation

As part of experiment study, the collection of samples of sea water before and after this phenomenon then will examine these samples and specifically will measure the proportion pH in sea water before and after this phenomenon also will measure the chemical oxygen demand because when this phenomenon consume algae large percentage of oxygen than lead to a decrease in the proportion of oxygen in the water and this leads to the suffocation of marine organisms also will measure biological oxygen demand and measure the conductivity and turbidity. After doing these experiments, there will be a comparison between them and clarify the changes that have occurred on the samples before and after this phenomenon and try to find appropriate to reduce this phenomenon and reduce its impact on marine organisms and desalination plants solutions where the stations stop working when this phenomenon occurs.

2.1 Experimental Study

The following experimental studies were conducted as per the tests given below.

2.1.1 Experimental study on Conductivity test-Measuring Electrical Conductivity (EC) of a given seawater sample.

2.1.2 Experimental study on COD test- Measuring Chemical Oxygen Demand (COD) of a given seawater sample.

2.1.3 Experimental study on BOD test- Determining the Biochemical Oxygen Demand "BOD" for a sample of seawater.

2.1.4 Experimental study on pH test- Measuring pH for seawater sample.

2.1.5 Experimental study on Turbidity test- Measuring turbidity for seawater sample.

2.2. MATERIALS AND METHODS

The material used in this test are samples of seawater before and after phenomenon of red tide to know the type of bacteria, and to know the type of living organisms in seawater samples before and after the phenomenon of red tide.

3.0 RESULTS AND DISCUSSION

3.1 Conductivity Test

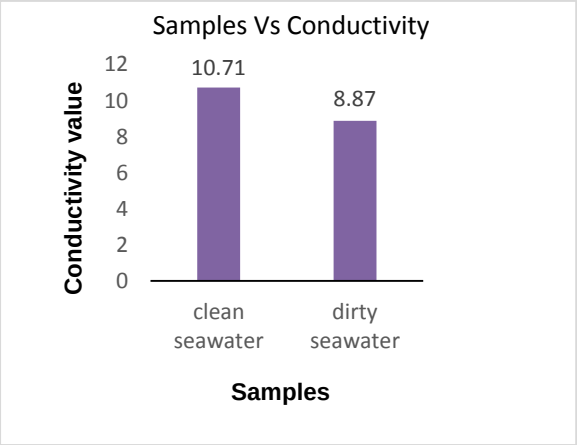

Fig. 3.1: Variation of Conductivity with Samples

From the above figure 3.1 shows that the total dissolved solids are about seventy percent of the conductivity. On conducting the experiment the conductivity when phenomenon of red tide is "10.66m" and the value of conductivity after phenomenon of red tide is "10.7m". That means the number of ionisable salt when phenomenon of red tide is less than the number of ionisable salt after phenomenon of red tide, because the seawater when phenomenon of red tide is contaminant and have bacteria that effect on the content of seawater. Also the ionic strength of seawater sample when phenomenon of red tide is less than the of seawater sample after phenomenon. The measurement of conductivity may lead to the estimation of total dissolved solids.

3.2 COD Test

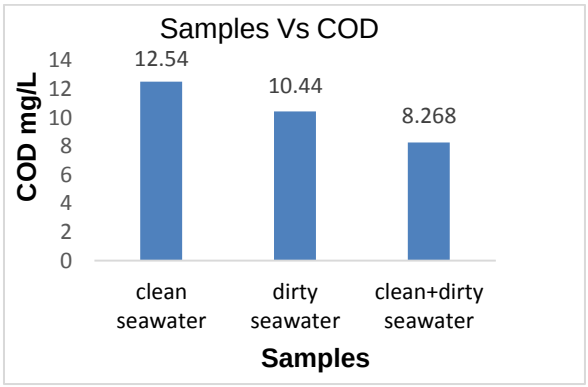

Fig. 3.2: Variation of COD with Samples

The figure 3.2 shows the Chemical Oxygen Demand does not differential between biologically available and inert organic matter. In this experiment the COD is measure of total quantity of oxygen required to oxidize all organic material into carbon dioxide and water. During this experiment, measurement of COD in clean seawater sample, showed a high concentration of CO_2 up to 12.54 mg/l which means that the quantity of CO_2 is very high as a result of low concentration of bacteria in the seawater. But after the phenomenon of red tide the collected dirty seawater showed less amount of O_2 10.44 mg/l which showed a high concentration of bacteria that did consume the CO_2 during its respiration in to CO_2 and water. Mixing clean seawater with dirty seawater the result also showed a high concentration of CO_2 during bacteria respiration with 8.268 mg/l of CO_2.

3.3 DO Test

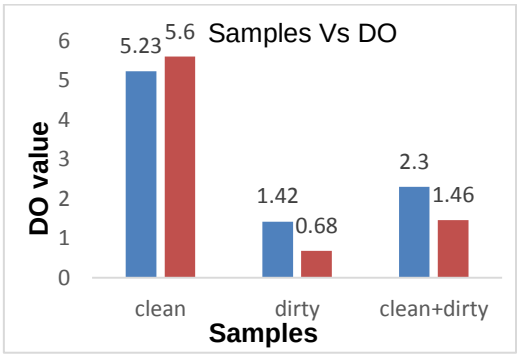

Fig. 3.3: Variation of DO with Samples

From the figure 3.3 shows that BOD detects only the destructible proportion of organic substances. In this experiment two steps are used to measure the value of DO, first step is before 5 days and the second step is after 5 days due to the measuring the water sample to measure the value of DO. In day 0 of the experiment started with measuring of the DO in clean seawater and it was about 5.23 mg/l and after 5 days the second measurement of DO showed an increased to about 6.41 mg/l. This result showed that there are a living organisms in the seawater that make its own food by doing photosynthesis producing O_2 which lead to an increasing in DO after 5 days. In other side, the same experiments were performed to the dirty seawater and the result showed a decreasing in DO from 1.42 mg/L to 0.68 mg/L and also when mixing clean and dirty seawater the result showed a decreasing in DO from 2.30 mg/L to 1.46 mg/L which indicate the presence of organisms that are using O_2 to break the organic compounds producing CO_2 and water, this type of organisms are the algae that causes the red tide (dinofllagelates), and it affects the normal life of green algae and other living organism in seawater.

3.4. pH Test

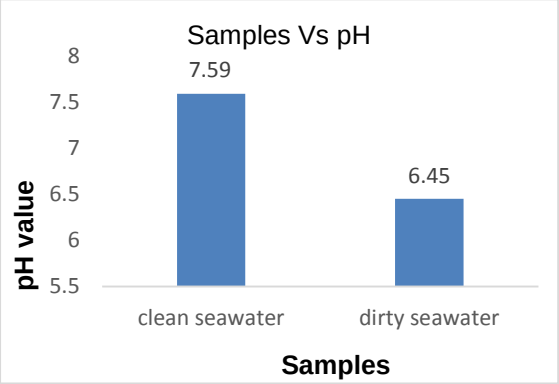

Fig. 3.4 Variation of pH with Samples

From the figure 3.4 shows that the pH provides the needed quantitative information by expressing the degree of activity of an acid or base in terms of hydrogen ion activity. During this experiment when the measurements of pH have been conducted for the clean seawater the result showed 7.59 as this value is greater than 7 that mean this sample is basic, because the [OH-] concentration is greater than [H+]. Also when measuring the pH for dirty seawater the result showed 6.45 as this value is less than 7 which means that this sample is acidic, because the [H+] concentration is greater than [OH-]. pH varies slightly throughout the day during the daylight hours in which more than photosynthesis processes, the carbon dioxide extracted from water which makes the equation moving towards the right, towards hydrogen grab When hydrogen ions extracted the water becomes less acidic. In the evening when photosynthesis stops, but breathing organisms be continuous, the equation is moving towards the right, to clinch the excess carbon dioxide and increase the amount of hydrogen decreased pH, the reverse effect of both photosynthesis and respiration occurs in slightly different pH throughout the day.

3.5. Turbidity Test

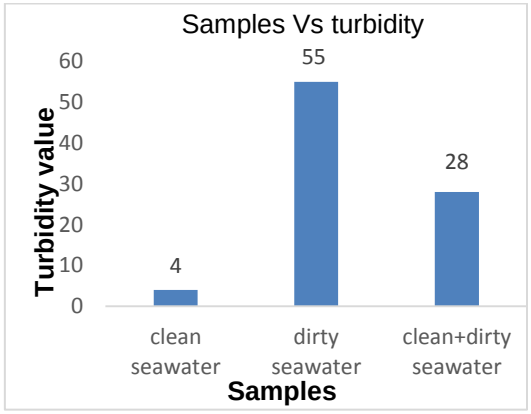

Fig. 3.5: Variation of Turbidity with Samples

From the figure 3.5 shows that the turbidity is measured based on the light scattering properties. The value of turbidity for the seawater samples when phenomenon of red tide is "55 NTU" that means the turbidity is very high, due to a possible bacterial contamination. That means the seawater have problem and need using different or special steps to distill this water. Also the value of turbidity when measure the seawater samples after phenomenon of red tide is "4 NTU" that means the turbidity is very less compared with 55 NTU that means the seawater have less value of contamination. Due to contamination and algal growth the turbidity of these water increases to very high levels. The color of the water sample affects the turbidity. The turbidity affects the aquatic life of sea water. The standard unit of turbidity is considered as that produced by 1ppm of silica in distilled water.

4.0 CONCLUSIONS

The experimental studies will be compared before and after the effect of red tide with different samples. After completion of the experimental study the graphs with variation of different parameter before and after the effect of red tides. After conducting the experimental

study for the seawater sample before and after the red tide the result showed that low amount of DO in water due to decomposing processes that performed to phytoplankton's after their death is the main reason to the death of fish and other living organisms that live in the sea during red tide phenomenon that happened because of a type of algae called "Cochlodinium ploykivikoides".One of the main processing operations by using different methods such as, removing toxic substances, taste and that can be done by performing several new methods better than the old one which includes:

a. Install some barriers which can filter the red tide before it reach to intake area.
b. Intake by beach well instead of direct intake so all algae will filtered.
c. Monitors by satellite image.
d. Sensing system so before the red tide reach the plant, they can take action to prevent any disturb of operation.
e. Using fermentation and filtering process to treat the dirty seawater during the desalination and after.
f. Using KMWH technology to remove the phytoplankton's.
g. Control the reproduction of algae by using Zink paint the activated by sunshine's.

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