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STUDY ON PHYSICO-CHEMICAL ANALYSIS OF TEXTILE EFFLUENTS IN BALOTRA AND PALI, WESTREN RAJASTHAN

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ABSTRACT

Physico-Chemical properties of Textile Effluents is most important to know about the pollution status of effluents and their effect on surrounding water bodies as well as on Soil also. So in this research paper we are selected two different sites that are Pali and Balotra textile industrial effluents. From the observation it was concluded that the effluent had the alkaline as well as showing the high values of biological oxygen demand, salinity due to presences of Chloride which may utilised in different Dyes use by the textile industries for coloration and due to use many chemicals in dyeing and printing.

KEYWORDS: *effluent, textile, water analysis.*

INTRODUCTION:

Textiles are an important economic sector in Rajasthan. Pali and

Balotra cities are in western part of Rajasthan. These are the big clusters of Textiles, dyeing and printing industries. There is various mechanical processes and chemical dyes are used and considerable waste water discharged from these textile units contains about 25% of the dyes, that caused degradation quality of water in this semi-arid region of Rajasthan. These synthetic dyes so used are designed to resist bleaching by UV-light and chemicals to improve the quality of the textiles, are also persistent in the environment and some can be biologically modified into carcino genic compounds. **Tufekci *et al.*, (2007)** most dyeing machines had lint filters and other primary control measures to keep lint out of heat exchangers and off of the cloth; therefore, total suspended solids levels are low in raw textile dyeing wastewater compared to many other industries. On the other hand, biological oxygen demand and chemical oxygen demand are relatively high in slashing, fabric formation and wet processing and therefore are more important pollution prevention targets.

Textile industries are large industrial consumers of waters as well as producers of wastewaters with the increased demand for textile products **Patel *et al.*, (2008).** The rivers and stream are the common recipients of industrial effluent all over the world. The deterioration in water quality has an adverse effect on human beings as well as aquatic ecosystem directly or indirectly **Chinda *et al.*, 2004; Ugochukwo 2004; Emongor *et al.*, 2005.** The current practice of any industrial unit is to discharge wastewater into local environment without any treatment. The untreated or partially treated effluent on entering a water body either gets dissolved or lie suspended on river bed, thereby causing the pollution of water body **Meena and Nama (2017)..**

SITE DESCRIPTION

1.Balotra : Balotra is a town in Barmer district of Rajasthan state. It is situated about 100 km. to the west of Jodhpur.

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The Balotra is famous for its dying and printing process industries. The industrial state which is developed by RIICO at Balotra has been demarcated in three distinct sections. All these sections have approximately 850 industries units. The effluents from these industries consist of mainly dyes, which are directly discharging into the nallah and Luni river. These textile effluents also affect the soil and water of surrounding area.

2.Pali : Pali is situated on the bank of river Bandi. Pali is the district of Rajasthan state and administrative headquarters. The city lies between 25°77' N latitude to 73°33' E longitude. Bandi river is a major tributary of Luni river and flows in almost east to west direction and passes through south of Pali city. Pali is the industrial dying and printing hub of Rajasthan state. At present about 800 textile industries are working.

MATERIAL AND METHODS

Monthly Water sample were collected from two different sampling sites (Pali and Balotra) in the periods of One Year (July 2013 to Jun 2014). Water Temperature analyzed by simple thermometer, pH, Transparency by using Sacchi Disc, Total Hardness as Calcium and Magnesium, DO (Dissolved Oxygen), Free CO_2, Carbonates, Bicarbonates, Chloride, Salinity, Phosphate, Nitrates, Fluoride by using ELICO NEPHELOMETER CL 52D and SPECTROPHOTOMETER 106 SYSTRONIC by using photometric method, BOD, analyzed by Titrometric method with the help of standard method for water analysis **(APHA 1998).**

Fig. 1. Photo shows Textile Effluents at Balotra and Pali.

Textile Effluents at Balotra

Textile Effluents at Balotra

Textile Effluents at Pali

Textile Effluents at Pali

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RESULTS AND DISCUSSION

Temperature is most important parameters of aquatic life during the study periods mean temperature of Pali site was ranges from 33.5 ± 0.2C° and in Balotra it was 34.24167 ± 0.361814 C°. Highest was observed in May while lowest was in December. Textile industries use different dyes for coloration purposes due to that pH value was always observed as alkaline. During the study periods pH value of Pali was 9.86 ± 0.306 and in Balotra 10.09 ± 0.252 it mens that Balotra textile effluents water pH was much alkaline than Pali . while in summer it was up to 10.4. **Islam *et al*., (2011)** studied the affect of Textile industries effluents and their courses mainly, hazards caused by dye effluents, which contain both chemical and organic pollutants **Munnaf *et al*., (2014)**. Excessive use of chemical dyes should be restricted and should be replaced with vegetable dyes studied by **Pathak *et al*., (2012). Tabassum *et al*., (2015)** the huge quantities of wastes and sludge discharged from industries might be responsible for the enrichment of all studied physico-chemical parameters at discharging point.

Transparency of Pali textile effluents was near about 15.51667 ± 0.581 and Balotra was 16.1625 ± 0.912. Dissolved oxygen contain of Pali textile effluents was 0.1975 ± 0.090194mg/l while on Balotra sampling site it was 0.149167 ± 0.010607 mg/l, during the study periods slightly occurrences of DO during the Manson periods because rainwater may be aerated river water. Carbon dioxide was observed during the Manson while in summer it was may converted in to the carbonate as well as bicarbonates. Due to that mean free Carbon dioxide on Pali and Balotra sites observed was 105.45 ± 53.23mg/l, 114.6818 ± 58.83 respectively.

Both the sampling of textile effluents have alkaline pH due to that free Carbon dioxide was converted in to Bicarbonate **Tandale and Dabhade (2014)** and very less is converted in to carbonate hence carbonate values was ranges in between 50.91667 ± 8.4459 mg/l at Pali and somewhat more on Balotra 91 ± 11.32843 mg/l, highest was during the summer while lowest was in manson. High Bicarbonate values recorded during the study periods which was in Pali 883.75 ± 40.312mg/l and Balotra was 878.167 ± 69.54549 mg/l. Total hardness of Pali site was 915.125 ± 84.489mg/l and in Balotra 884.4167 ± 91.999 mg/l Hardness of effluent water it might due to the presence of calcium hence Balotra site have higher hardness than Pali. Chloride ions was observed very high on both sites due to that the water is not suitable for drinking purposes observed values of Pali was ranges 1598.667 ± 43.93mg/l and Balotra 1602.125 ± 97.421mg/l. From the Chloride we also calculated the value of Salinity which was also ranges from 2888.865 ± 78.684mg/l and 2894 ± 185.5033mg/l such high amount of salinity was observed in this textile effluents waste water .

For aquatic ecosystems Nitrates and Phosphate is act as a nutrients for living algae, on the basis of such nutritive substances we measures the nature of aquatic body, hence during the study periods nitrates values of Pali was 131.3358 ± 15.205mg/l and 116.748 ± 20.23mg/l. **Hussain *et al.*, (2013)** studied Surface water was the highest concentration of cations and anions. Phosphates values of Pali and Balotra was ranges between 5.4479 ± 0.68257mg/l , 5.7654 ± 0.61598mg/l hence we predicted that effluent water is unsafe for drinking . In Pali region Fluoride value in water was observed very high above the permissible limit that was ranges 2.8458 ± 0.4079 mg/l, in Balotra it was 3.153 ± 0.44065 mg/l. **Gautam *et al*., (2011)** studied the problems related to fluoride on human being. Due the increasing havey load of dyes on effluent the waste water have high BOD value on both sampling sites, in Pali it was 265.333 ± 16.7137mg/l and Balotra it was 282.583 ± 37.78mg/l.

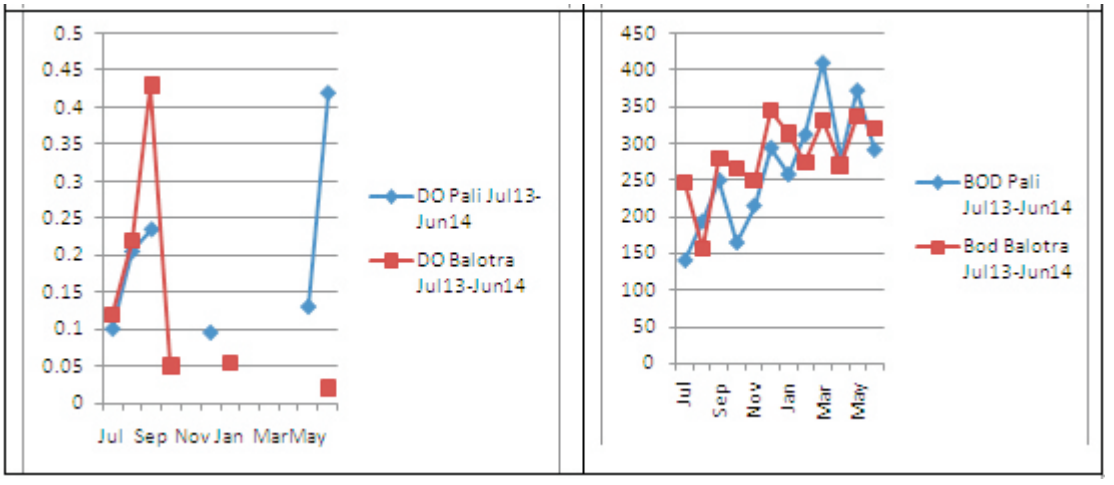
Due to increasing the heavy load of such nutrient in water body their biological oxygen demand also more **Dabhade and Tandale (2016)** hence during the study periods the BOD values was ranges 140mg/l to 411mg/l. **Rathore (2012)** studied the wastewater from industries had a deleterious impact on the water quality of Bandi river. **Varma and Sharma (2011)** told about Wastewater which was not recommended for irrigation in agricultural fields. Water with high sodium content, high TDS, BOD, COD values is unsuitable for irrigation.

The observed values of all physic-chemical parameters are discuses in Table no. 1 and Graph plate no. 1and 2.

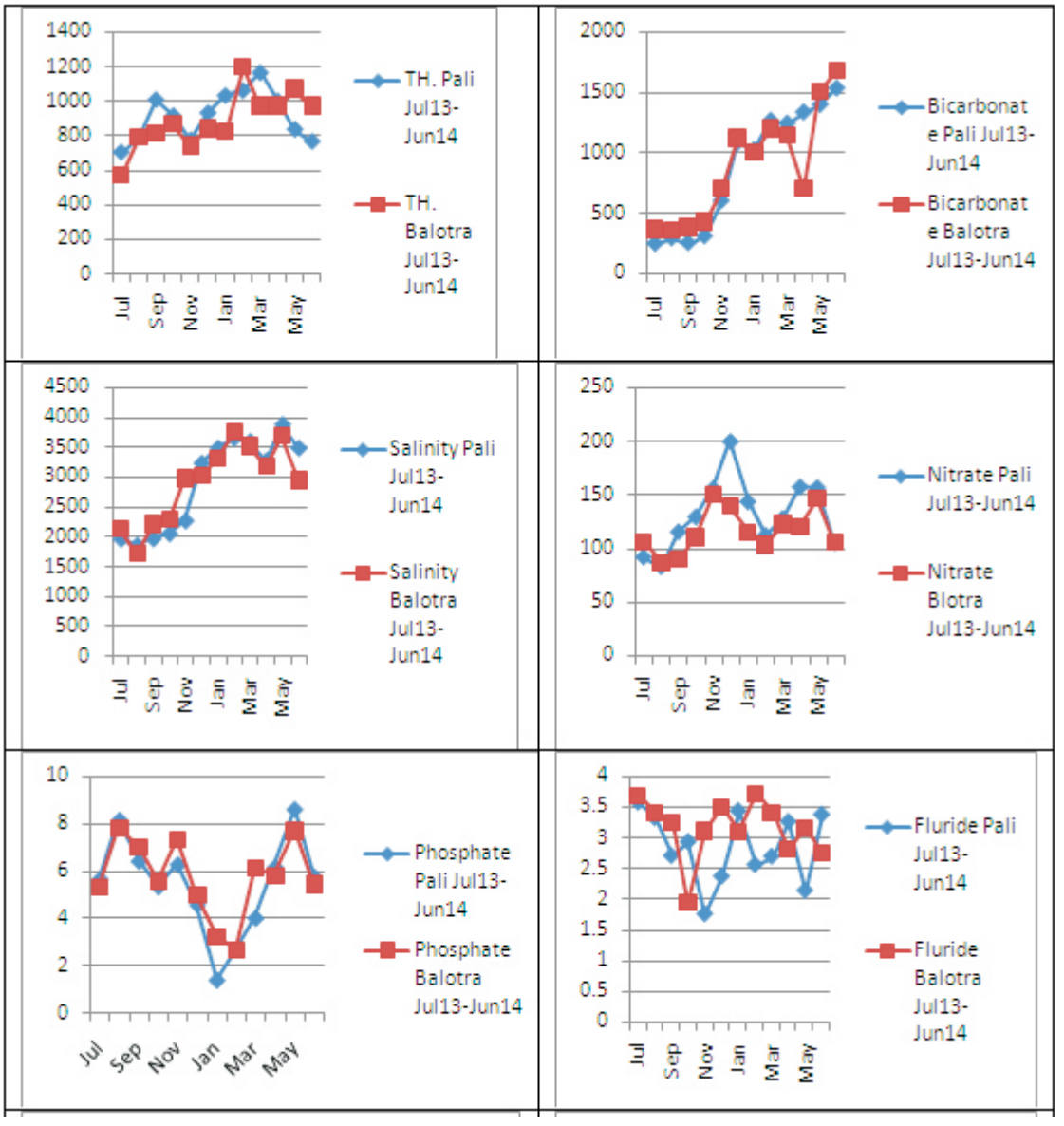
Table No. 1. Shows mean values of Physico-Chemical parameters Jul13-Jun14.

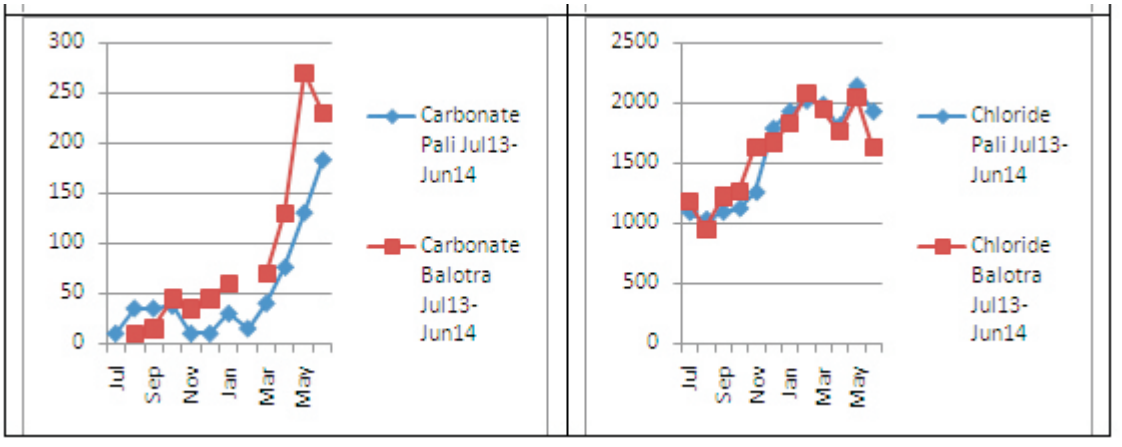
Parameters	Pali Mean SD	Balotra Mean SD
Temperature	33.5 ± 0.2	34.24167 ± 0.361814
pH	9.86 ± 0.306	10.09 ± 0.252
Transparency	15.51667 ± 0.581	16.1625 ± 0.912
DO (Dissolved Oxygen)	0.1975 ± 0.090194	0.149167 ± 0.010607
Free CO2	105.45 ± 53.23	114.6818 ± 58.83
CO3 (Carbonate)	50.91667 ± 8.4459	91 ± 11.32843
HCO3 (Bicarbonate)	883.75 ± 40.312	878.167 ± 69.54549
Total Hardness	915.125 ± 84.489	884.4167 ± 91.999
Chloride	1598.667 ± 43.93	1602.125 ± 97.421
Salinity	2888.865 ± 78.684	2894 ± 185.5033
Nitrate	131.3358 ± 15.205	116.748 ± 20.23
Phosphate	5.4479 ± 0.68257	5.7654 ± 0.61598
BOD (Biological Oxygen Demand)	265.333 ± 16.7137	282.583 ± 37.78
Fluoride	2.8458 ± 0.4079	3.153 ± 0.44065

Graph plate No. 1. Shows variation of Physico-Chemical parameters



Graph plate No. 2. Shows variation of Physico-Chemical parameters





CONCLUSION:

The effluent had the alkaline as well as showing the high values of biological oxygen demand, Total Hardness, salinity due to presences of Chloride which may utilised in different Dyes use by the textile industries for coloration and due to use many chemicals in dyeing and printing. These effluents drained in to the river and hence the river water is affected and does not use in drinking and agricultural irrigation purposes.

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