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Electrochemical Method In Textile Industry Wastewater Treatment At Bherugadh Prints, Ujjain

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Abstract – The textile dyeing industry is one of the most polluting industries in past and now a day's too. They release high contaminated liquids of processes like sizing, coloring, de-sizing etc. giving intense water pollution. We in this research are proposing electro-chemical method for waste water treatment. We analyzed the electrochemical behavior of materials with water, this analysis consist of removal of waste from water such as dipin, color, toxicity with reduction in Chemical Oxygen Demand and Biological Oxygen Demand, this disappearance of various pollutants leads to a electrochemically active breakdown product free from pollution.

The site consists of ward number 01 of Ujjain city of Madhya Pradesh state, the name of ward is famous for its prints and Jail i.e. Bherugadh Prints. Various products as Sarees, Dress materials, Shirting's, blankets, bed-sheets, evening gowns, Salwar suits etc are been made up by local people there. It is a cottage industry belt were people in small houses do the various process of a Textile industry i.e. the work from blow room to carding to yarns and this yarn to looms and fabric, the most emphasis of them and us too is on dyeing this yarn or dyeing the fabric and us on water processing techniques.

We analyze various effluents released throughout the journey of the fiber to fabric, especially in dyeing, sizing and printing processes. The waste water from cottage industry has been taken and analyzed on various parameters; some suggestions are also given for the pollution free cottage industries of Bherugadh prints.

Keywords – Textile, dyeing, printing, biological, oxygen, demand, chemical, oxygen, demand, toxicity, electrochemical methods, Bherugadh, localities, loans, caring, sizing, filter, fabric.

Introduction – Ujjain is one of the most famous cities of the world, which still exist. The name of Jen is mentioned clearly in Vedas, Puranas, Ramayana, Mahabharat, etc. all ancient notes. It also exists in Jain, Buddhist, Sikh and Parsi dynasty notes too. It is one of the most important cities of the world as in every 12 years Kumbh Mela, that is the Singhastha has been organized in a at the banks of Shipra River in the Ujjain city itself.

Ujjain also is famous Mahakaleshwer Temple, which is one of the 12 Jyotirlings of Lord Shiva spread throughout the country. City has been divided in six zones out of which each zone and has been divided in nine wards. So there are totally 54 wards in the entire city area. The starting of Ward is done from the ward 1 that is the Bherugadh Ward. This word is famous for two things the first is the Bherugadh Jail which is a district Jail and is a very big in size and the second is the Bherugadh prints that is the cottage textile industry is present in the area. This cottage industry is present in clusters in the area and each cluster is having its own specialty of fabric. Some makes Sarees, some bed sheets, some make clothes etc. etc. The remarkable thing is that only one big sewer is present there so all the waste from these cluster industries flows through that sewer to river Shipra after the Mangalnath Temple.

The textile industry draws a big attention of the world environment people at itself. It is a high consumption of water industry and the various resources and the release of high contaminated effluent leading to a very intense pollution problem of water. There is an existing technology of waste water treatment in Ujjain, but it is inadequate to control the colour problem itself. Rest pollutions are also too big for the existing plants. The levels of the chemical oxygen demand and toxicity are too big to be controlled. So we need to modify these techniques for controlling this problem.

In this paper are discussing the electrochemical methods, these methods does direct/indirect oxidation/reduction of toxic and non-biodegradable materials and break them in the effluent, giving us the water free from pollution. Here we have seen the electrochemical behavior of various cottage industries, analyzed and the result obtained provide the optimum conditions for the running out of the electrolysis treatment. The analysis has been done in terms of peak decrease, current and time relation, Reverse Osmosis, equalization tank treatment, decrease in absorbance, removal of dry colour and reduction of chemical oxygen demand.

Material and Methods – The chemical methods used here are –

i. Potentiomatric techniques
ii. Conductommetry
iii. Voltometry

In the description, we can say that potentiomatric is the volume and the current technique, the Conductometric is the measurement of the conductivity technique, and the Voltometry is the measurement of voltage technique

Comparison of the three –

Method	Measurement	Principle Application
i. Voltometry	Current as a Junction of Voltage at a polarized electrode	Quantitative analysis of electrochemically reducible organic or inorganic material
Potentiometry	Potential current	Quantitative analysis of ions is solution pH
Conductommetry	Resistance /conductance at inert electrodes	Quantification of ionized portion

The Materials – Due to the presence of organic dye's and the pH, the chemical oxygen demand and the TDS are intensely coloured, highly turbid weight and had a large amount of dissolved solids are present in waste water.

The control potential electrolysis of the effluence was carried out on a cyclic Voltammograph in connection with a digital electronic amino graph recorder three electrode systems were used as an electrochemical cell. The working of the electrodes being used for the cell was a platinum foil of the surface area 4×4 cm sq. The reference electrode was a saturated electrode and the counter electrode was a platinum wire. All of the three were dipped directly in the solution which is to be electrolyzed. The pH measure from the pH meter is Digital pH meter and the chemical oxygen demand of the effluent is measured by an open reflex method. Using the chemical oxygen demand, digestion operators, the absorption spectra of these samples were recorded and on a visible spectrum, photo meter 1.0 M solution of KCL was used as a supporting electrolyte for carrying out the chemical oxygen demand studies inference.

Advantages of electrochemical methods –

1. It is easy in operation
2. Use of simple instrumentation
3. Remove colors
4. Remove the chemical oxygen demand
5. Remove the total dissolved solution solvent

The problem with textile processing, waste, water treatment systems, existing are –

1. High volume of the waste water
2. Very Scare space available in plant treatments
3. Complex nature of the waste water with die and auxiliary treatment methods
4. Biological treatment unavailable to handle organic and hydraulic loads
5. Larger treatment plant based on biological systems are not viable form engineering and economic points
6. Manpower is not fully readily available

Comparison of conventional process to electrochemical process –

In conventional process, it includes 4 to 5 treatment steps that is the primary, filtration, secondary, clarification, tertiary. Also in the conventional process, it generates sludge at multiple points and cannot be made automatic. Whereas in the electrochemical process, it is a single stage operation with two stages at maximum it generates sludge at only a single point, the sludge volume is substantially very low, we don't need the additional chemicals to be added and the process can be made completely automatic.

Results and Discussion – Table – 1 – Parameters at Equalization tank to treatment –

Parameters (Mg/L)	Equalization tank	Tube treated	RO Feed	RO permit	RO reject	Nano Brine	Nano Reject
pH	8.3	6.8	6.7	6.7	6.5	7.6	7.0
TSS	865	1704	840	86	1780	10562	720
TDS	9341	9220	9500	300	12200	20400	32321
BOD	305	162	108	-	-	-	-
COD	3580	300	-	-	-	-	-
Chloride	4205	5077	4577	99	20828	13720	13295
Sulphate	556	680	-	-	-	-	-

Bibliography –

1 MVR – Mechanical Vapor Recompression

2 MEE – Multi Effect Evaporator

Table – 2 – Parameters at Modern techniques

Parameters	MVR Concentrate	MVR Condensate	MEE Concentrate	MEE Condensate
pH	7.3	6.8	7.1	7.4
TSS (Mg/L)	3000	-	106300	-
TDS (Mg/L)	52622	520	175180	182
Chloride (Mg/L)	32955	195	60808	82

Table – 3 – Parameters at Raw water and further techniques

Parameters	Raw effluent	Softener	RO Permeate	RO Reject
pH	9.20	8.5	5.20	8.1
TSS (Mg/L)	700	350	-	230
TDS (Mg/L)	10500	12000	200	38608
BOD (Mg/L)	450	80	-	-
COD (Mg/L)	700	185	-	-
Chloride (Mg/L)	2800	2540	65	8560
Sulphate (Mg/L)	2560	3230	45	-

Table – 4 – Parameters at different processes

Parameters	Raw Effluent	Equalization Tank	Secondary clarifier	RO Permeate	RO Reject
pH	8.9	6.5	9.8	5.6	7.02
Conductivity	15450	11630	17470	280	65800
TSS (Mg/L)	180	70	50	10	160
TDS (Mg/L)	13000	8500	10800	210	65050
BOD (Mg/L)	440	310	30	-	-

COD (Mg/L)	650	630	100	-	-
Chloride (Mg/L)	1050	1200	1230	70	6650
Sulphate (Mg/L)	5000	3850	3950	-	-

Conclusion – The effluent which has been selected at the bar cluster cottage industry has been analyzed. The intense colour can successfully electrolyzed for 90 to 95% of the colour removal, the chemical oxygen demand is removed about 70 to 75% and the total dissolve solids removal is about 70% by the lab skill Batch process and using the reverse osmosis process. The effluents do not require any reducing agents or catalyzing agents to reduce the high percentage of organic dye, so the electrode can run a long way before replacing as its combustion do not take place and we do not need the reverse osmosis membrane also to change quickly leading to a high heeled in industry.

References –

1 Dr. Parag Dalal, "Modeling of Screens and Grits for the Big Conduit of Nanakheda in Ujjain", International Journal of Science and Research (IJSR), Volume 12 Issue 5, May 2023, pp. 937-940, https://www.ijsr.net/getabstract.php?paperid=SR23511101814

2 Dr. Parag Dalal "Disambiguation of Municipal solid waste to Syngas in Ujjain District by Plasma Gasification Technique", International Journal of Novel Research and Development (www.ijnrd.org), ISSN:2456-4184, Vol.8, Issue 4, page no.b359-b364, April-2023, Available :http://www.ijnrd.org/papers/IJNRD2304139.pdf

3 Dr. Parag Dalal. "Physico-chemical parameters of municipal solid waste analysis and disposal techniques at Ujjain city", International Journal of Engineering Development and Research (IJEDR), ISSN:2321-9939, Vol.11, Issue 1, pp.67-72, January 2023, URL :http://www.ijedr.org/papers/IJEDR2301009.pdf

4 Dr. Parag Dalal. "Direct Sludge Blanket Treatment of Cluster Industries in a Common Effluent Treatment Plant", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.10, Issue 3, page no.d401-d404, March-2023, Available :http://www.jetir.org/papers/JETIR2303349.pdf

5 Dr. Parag Dalal. "STOP PLASTIC BOTTLE POLLUTION WITH HOMEMADE EDIBLE WATER", International Journal of Current Science (IJCSPUB), ISSN:2250-1770, Vol.12, Issue 4, pp.1-4, October 2022, URL : http://www.ijcspub.org/IJCSP22D1001

6 Dalal P., Pollution Abetment of Holy River Shipra Through Big Conduits of Nanakheda and Neelganga Journal of Indian Water Works Association Vol LIII(3) 2021 206-208 ISSN: 0970- 275X

7 Dalal P., Adsorptive stripping and voltammetric assurance of fabric colors International Journal of Chemical Science Volume 5(4), 2021, pp 04-10 ISSN: 2523-2843

8 Dalal P., Study on Colorant Industry Wastewater Treatment Process by Alum and Charcoal World Journal Of Advance Healthcare Research Vol 5 (2) 2021 223-225 ISSN: 2457 0400

9 Dalal P., Assessment of Water Quality in River Shipra in Scare Water Conditions of 2019 World Journal Of Pharmacy And Pharmaceutical Sciences Volume 8(7), 2019 1017–1027 ISSN 2278 – 4357

10 Dalal P., et. al. A Case Study: Effect of industrial effluent contaminated water disposed in Chambal River on irrigation land International Research Journal of Engineering and Technology (IRJET) Volume: 05(03) 2018 2120–2123 ISSN: 2395–0072

11 Dalal P., Proposal For Live Turbidity Measurement Technique In Flowing Water World Journal Of Pharmacy And Pharmaceutical Sciences Vol – 7(5)2018 1628–1630 ISSN 2278 – 4357

12 Dalal P., et. al. Dye Industry Wastewater Treatment by Coagulation Process: Review Paper Imperial Journal of Interdisciplinary Research (I.J.I.R.) Vol–3(8) 2017 260–267 ISSN: 2454–1362

13 Dalal P., et. al. Drinking Water Purification with Ozone Process of Ujjain City Journal of Applied Science I.J.R.D.O. Vol. 3(06) 201720–24 ISSN: 2455–6653

14 Dalal P., et. al. Study on Dye Industry Wastewater Treatment by Coagulation Process International Journal Of Innovative Research In Technology Volume 4 (6) 2017 45–48 ISSN : 2349 – 6002
15 Dalal P., Vertical Flow Constructed Wetland for Treatment of Nitrogen Under Mesocosm Level Phragmites and Calamus Ecosystem of Gomutra IRA–International Journal of Applied Sciences Vol 5(2), 2016 66–73 ISSN 2455–4499
16 Dalal P., Seasonal Variations in Water Quality of Shipra River in Ujjain, India IRA–International Journal of Technology & Engineering Vol 3(3) 2016 236–246 ISSN 2455–4480
17 Dalal P., Pollution Prevention Management of Holy Sapth Sagars in Ujjain City Journal of Environmental Science, Computer Science and Engineering & Technology Vol. 5(3) 2016 470–481 ISSN: 2278–1790
18 Dalal P., Liquid Bio–Medical Waste Management strategy Environment Conservation Journal Vol. 12(1&2) 2011 87–93 ISSN 0972–3099
19 Dalal P., Studies on Physico–Chemical parameters and development of an Environment Management module for purification of Holy river Shipra in Ujjain Journal on Indian Water Works Association Vol 42 (3) 2010 186–194 ISSN 0970–275X
20 Dalal P., Shipra river conservation by sewage treatment Pollution Research Journal Enviromedia Vol. 28(4) 2009 731–738 ISSN 0257–8050
21 Dalal P., Development of an Environment Management Module for Purification of Holy river Shipra Asian Journal of Chemical and Environmental Research Vol. 1(4) 2008 – 59–64 ISSN 0974–3049