Performance Evalution of Eletricoagulation for removal of hardness from bore well water

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Abstract: In this work, the removal of hardness was studied from tap water taken from Aljdriy a municipal water network-Baghdad. A parallel plate electrochemical cell was constructed using two graphite electrodes as anode, and three aluminum electrodes as cathodes. The electrodes were connected to a power supply that provides direct electrical current to the cell. Results showed that a removal efficiency of 85% can be obtained at pH of 7.5and electrical voltage of 28.5 volt with retention time of 60 minutes. The high efficiency for hardness removal suggested that the electrochemical technique might be used as an alternative technique for hardness removal.

I. INTRODUCTION

II. Water, the precious gift of nature to human being, is going to be pollutedday-by-day with increasing urbanization. Although three-fourth part of earth is being surrounded by water but a little portion of it can be usedfor drinking purpose. In India, around 62.5 million people are suffering from disorder of teeth or bones through fluorosis1, which is due to consumption of fluoride-rich water.

III. Virtually almost all the surface water in India is unfit for direct consumption. In spite of the fact that the municipal water supply in mostof the cities is through treated surface water, due to over contamination, more stringent treatments would be required to make the surface water potable.

IV. The prominent source of surface water pollution is domestic sewage, industrial waste water and agricultural run-off. So, we must turn to our ground water

V. Application of fertilizers, pesticides, manure, lime refuse dumps etc. is the main source of bore well water pollution in many villages. Studies ofphysicochemical parameters of ground water or drinking water various villages of different talukas in Gujarat State have been carried out by various workers2-4. Gandhi Nagar is the capital of Gujarat state. Bore well water is generally using for drinking and irrigation purposes in

VI. Gandhi Nagar Taluka . So, we carried out study of quality of ground water of Gandhi Nagar taluka for drinking and irrigation purposes. The statistical analysis of water quality parameters have also been carriedout.

VII. LITERATURE REVIEW.

VIII. Water is an important resource for the survival of life. The inadequate availability of surface water makes people dependon ground water for fulfilling their needs. However, groundwater is generally too hard to satisfy the requirements fordomestic as well as industrial applications.

IX.

X. Removal of hardness involves various techniques such as lime sodaprocess, ion exchange, reverse osmosis, no no-filtration,

XI. distillation , and, evaporation etc. These techniques have individual problems such as high annual operating cost, sediment formation on membrane, sludge disposal problemetc. Electro coagulation (EC) is being explored as modern andcost-effective technology to cope up with the growing demandof high water quality at consumer end.

XII. This review study focus on various literature that has been dedicatedto utilizing eses lector coagulation for water treatment.

XIII. This review outline the advantages of EC process to broaden its rangeof application.

XIV. PROBLEM ANALYSIS AND LIKELY BENEFITS BASED ON LITERATURE REVIEWS

The procedure followed for the analysis of various quality parameters were as per 'standard methods' for examination of water and wastewater.

pH is measured by a pH meter using a glass electrode which generates a potential varying linearly with the pH of the solution in which it is immersed. A calomel or Ag/AgCl/KCl reference electrode was usually located around the glass electrode stem for sample operation

PROCEDURE:

1. Calibrate the electrode with two standard buffer solutions of pH 4.0and 7.0.
2. The sample temperature is determined at the same time and is enteredinto the meter to allow for a temperature correction.
3. Rinse the electrode thoroughly with de-ionized distilled water andcarefully wipe with a tissue paper.
4. 4. Dip the electrodes into the sample solution, swirl the solution and wait upto one minute for steady reading. A pHmeter reading within ±0.1 pH unit will be adequate for such work. 5. The reading is taken after the indicated value remains constant for about a minute. 5.4.2
5. Total hardness Hardness of water is not a specific constituent but it is variable complex mixture of cat ions. Principle Hardness causing ions are calcium and magnesium. However the iron, strontium, barium and manganese also contribute to Hardness. The degree of Hardness of drinking water has been classified in terms of magnesium and equivalent of $CaCO_3$

concentration as follows. Soft: 0-60 mg/L Medium: 60- 120 mg/L Hard: 120- 180 mg/L Very hard: > 180 mg/L as CaCO3 Magnesium concentrations of less than 50mg/L are desirable in potable waters. Although many public health problems arise if concentration exceeds 50 mg/L. Intact the water is apparently beneficial to the human cardiovascular system.

6. 8 Procedure: 1. Take 25 ml of sample in a conical flask. 2. Add 0.5 ml of buffer solution (ammonia buffer). 3. Add a pinch of Erichrome Black-T indicator and titrate with standard EDTA solution till wine red colour changes to blue note down the reading.

7. 5.4.3 Total dissolved solids The expression, "Total Dissolved Solids (TDS)", refers to the total amount of all inorganic and organic substances – including minerals, salts, metals, cations or anions – that are dispersed within a volume of water. By definition, the solids must be small enough to be filtered through a sieve measuring 2 micrometers. TDS concentrations are used to evaluate the quality of freshwater systems. TDS concentrations are equal to the sum of positively charged ions (cations) and negatively charged ions (anions) in the water. Sources for TDS include agricultural run-off, urban run-off, industrial wastewater, sewage, and natural sources such as leaves, silt, plankton, and rocks. Piping or plumbing may also release metals into the water.

8. Procedure: 1. Take 25 ml of water sample in a beaker. 2. Switch on the digital TDS meter. 9 3. Immerse digital TDS meter into the water sample. 4. Not down reading which appear on digital TDS meter screen.

XV. OBJECTIVES

.The main objective of the present study was to evaluate the feasibility of electrocoagulation for hardness removal from bore well water. Specific objectives are as follows:

.1) To study and understand the fundamentals of electrocoagulation process

.2) To design and construct batch mode electrocoagulation reactor for hardness removal.

.3) To study the effect of operating parameters such as: effects of pH ,effects of current density, effects of voltage, effects of electrolysis duration.

METHODOLOGY USED

I. Literature survey on fundamental of EC process & review of hardness removal by EC
II. Design of laboratory scale batch EC reactor
III. Parameter optimization: pH, Voltage, ET, Current density & Conductivity
IV. Selection of efficient electrode combination
V. EC run to evaluate the parameter
VI. Actual bore well water treatment by EC
VII. Cost analysis based on study area

I. PLACE OF WORK AND FACILITIES AVAILABLE / REQUIRED

We worked on this project in our college laboratories. For the project, we also work at patronized company sites for knowing their demands and changes from time to time. Because of that we fluently get to know about their events and the stories of some events to describe in a website and make some creative content to make the website.

II. FACILITIES REQUIRED

Sr. No	Name of Resource/material	Specification	Remark
1.	Internet	Google, Wikipedia etc	
2.	Journals	IRJET, HBRP etc.	
3.	Reference book	Public Health Engineering	
4.	DC supply	To supply electricity	
5.	Control valve	Pressure control	
6.	Elevated storage container	Water storage tank	
7.	Inlet &outlet pipe	To supply the water	
8.	Aluminum chips	Removing hardness of water	

III. RESULTS AND DISCUSSIONS MEASUREMENT

Parameter	Value
pH	7.9 ± 0.5
Total hardness (TH)	880 ± 200 mg/L
Total dissolve solid (TDS)	1680 ± 100 mg/L
Alkalinity	200 mg/l

IV. CONCLUSION

Based on experimental findings following conclusions were drawn: Electrolysis time to reach acceptable Hardness removal limit increases. At higher current density and voltage removal time was shorter due to due to faster release of coagulant. Results indicated that water softening process is more efficient when pH is kept constant in the range 6-8 and also pH shift post treatment occurs towards alkaline conditions. Groundwater sample collected from Vishrambaug, Miraj Taluk, Sangli District was successfully

treated by EC with an hardness removal efficiency of 90%. Thus based on the results obtained for treatment of groundwater by EC it was clear that EC is a viable method for hardness removal and holds the potential to be implemented as a reliable community water softening system as considerable improvement in water quality

V. REFERENCES

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