



Electrochemical Water Treatment for Drinking Purposes

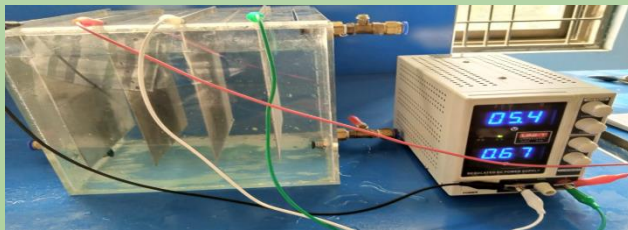
Ufaq Zehra¹, Dr. Zahoor Ahmed^{2*}, Department of Chemistry, University of Engineering and Technology Lahore, 54890, Pakistan

Background:

In this study, a new blend of conventional water treatment process has been proposed in which water can be treated electrochemically for drinking purposes, in a 10 liter batch reactor of aluminum, steel and copper electrodes with out the involvement of toxic chemicals.

Objectives:

- To propose a design of optimum electrochemical reactor for water disinfection.
- To study the effect of design parameters such as electrode material and operational parameters (such as current density, electrode spacing and residence time) on the performance of electrochemical reactor
- To determine the economic viability of the treatment unit by comparing the values of energy consumption and operational cost with alternative technologies.



Experimental: A 10 liter batch reactor of aluminum, steel and copper electrodes was used to treat water electrochemically for drinking purposes. After treating the water through electrochemical reactor, various parameters like pH, conductivity, turbidity, total dissolved solids, total suspended solids, hardness test, chloride tests, sulphate test, energy consumption, operational cost and total bacterial count were observed and compared with WHO standards to determine the quality of treated water.

Results and discussion:

After studying the operational and design parameters the disinfection rate with aluminum electrodes at optimum current density like 0.75 mA/cm² and at variable time interval were observed. E. coli inactivation was achieved after 5 minutes and maximum disinfection were observed at 20 minutes or 30 minutes when 2 log reduction in E. coli were observed. Obtained results revealed that the maximum energy consumption for using the aluminum electrodes is 4.91 KWh/m³, at maximum current density of 1.25 mA/cm² and 30 minutes operating time.

Conclusion

The effect of design and operating parameters on physiochemical parameters were investigated on different polluting parameters of water. After studying these results, we can conclude the optimum parameters like aluminum electrodes, 0.75 mA/cm² current density, 5 cm electrode spacing and 10 minutes operational time for current study. Energy consumption and operational cost was also estimated. This study did not involve toxic chemicals and large amount of electricity. So, it would be new addition in current state of knowledge and considered as cost effective and facile process for water disinfection .

References

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