Development of a Protocol to Reduce the Total Dissolved Solids in Effluent Treatment Plant Water

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Physico-chemical analyses of effluent treatment plant water of activated carbon manufacturing factory indicate that it has high total dissolved solids. Main reason for this high total dissolved solids is the availability of high amount of sulfate ions in effluent treatment plant water. Therefore, the aims of this study were to develop an effective method to reduce the total dissolved solids level in effluent treatment plant water and to release quality water to the environment after improving the effluent treatment process. The experiment was conducted in five stages. In first stage, 4 g of calcium hydroxide was added to precipitate calcium sulfate. In second stage, 1 g of calcium hydroxide and 1 g of aluminum were added to form ettringite and in third stage, the decant was passed through 500 g of sand filter. In fourth stage, filtrate was passed through 300 g of resin and finally pH was adjusted using carbon dioxide. The addition of lime and aluminum in second stage combines with soluble sulfate and forms calcium-aluminum-sulfate compound known as ettringite. The formation of ettringite can remove other types of heavy metals also. Quality parameters of water were determined by using MYRON L- Ultra meter II- 4P II, Eco Testr pH 2 and nephelometry method of sulfate determination. The results showed that the initial total dissolved solids level of 8900 ppm in effluent treatment plant water could be reduced to 2500 ppm. It can be concluded that this developed treatment process is capable of reducing the initial total dissolved solids in effluent treatment by 70%.

Keywords: Effluent treatment plant water, Ettringite, Five stage treatment process, Total dissolved solids, Water quality