605/E2

Relationship between total organic Carbon (TOC) & chemical oxygen demand (COD) in five different waste waters

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The Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) are two important parameters that are used to estimate the degree of organic material in the wastewater. The determination of COD is cumbersome, time consuming and generates toxic chromium waste. The operating cost is also high because of high cost of silver sulfate and consumes more electricity for heating. On the other hand total organic carbon measurement is rapid, easy and does not generate toxic waste.

A repeatable empirical relationship can be established between total organic carbon and chemical oxygen demand, so that total organic carbon can used to estimate the accompanying chemical oxygen demand

The main objective of the study was to determine the relationship between Total Organic Carbon and Chemical Oxygen Demand for five treated effluents from five different factories. Samples were collected weekly for a period of 6 months from the five industries and analysed for COD & TOC. Synthetic samples of tris- hydroxymethyl methylamine were also analysed to determine to correlation. The correlation coefficient (r) determined by regression analysis of tris- hydroxymethyl methylamine was found be 0.90. The correlation coefficient was also obtained for effluent from above industries. viz. 1) Thread dyeing r = 0.97, 2) Ayurvedic Herbal drugs processing r =0.99, 3) Tourist hotel r =0.98, 4) Fruits & Vegetables r =0.98 and 5) Garment washing r = 0.93.

The TOC and COD values varied with time in all five industrial effluents that were studied. However, the ratio (COD/TOC) remained the same. The ratios are mentioned below respectively:
1) 3.3±0.4 2) 3.3 ±0.7 3) 4.4± 0.4, 4) 3.2± 0.3, 5) 2.9± 0.7.
The correlation for each type of industry was therefore seen to be reliable. This suggests that TOC can replace COD to estimate the degree of organic pollution in the said industrial wastewaters for non-regulatory purposes such as designing treatment plants and monitoring pollution etc.

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