

# Correlating Biochemical and Chemical Oxygen Demand of Effluents – A Case Study of Selected Industries in Kumasi, Ghana

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## Abstract

The study aims at establishing an empirical correlation between biochemical oxygen demand (BOD<sub>5</sub>) and chemical oxygen demand (COD) of effluents from selected industries in the Kumasi Metropolis to facilitate speedy effluent quality assessment or optimal process control. Hourly effluent samples were collected for an 8-h period three times per week for analysis of the principal parameters BOD<sub>5</sub> and COD, using the *Standard Methods for the Examination of Water and Wastewater*. Measured BOD<sub>5</sub> and COD of the effluents were above the required discharged guideline of 50 mg/l and 250 mg/l, respectively, specified by the Environmental Protection Agency, Ghana. These levels of BOD<sub>5</sub> and COD of the wastewaters could pose potential pollution to the waterbodies in which they are discharged since untreated. Results also indicate that the degree of common variation between the two variables COD and BOD<sub>5</sub> is highly positive for the effluents from Ghana Brewery Limited (GBL), Guinness Ghana Limited (GGL) and Coca-Cola Bottling Company of Ghana (Coca-Cola), thus, the variables are correlated. However, the degree of common variation between the variables was low for the effluent from the Kumasi Abattoir. The fitted equations were GBL,  $y = 0.6558x - 270$ ,  $r = 0.93$ ; Coca-Cola,  $y = 0.3536x + 113.6$ ,  $r = 0.81$ ; GGL,  $y = 0.225x + 1343.7$ ,  $r = 0.83$ ; Kumasi Abattoir,  $y = 0.1331x + 54806$ ,  $r = 0.22$  with  $x$  and  $y$  representing COD and BOD<sub>5</sub>, respectively. The BOD<sub>5</sub>/COD ratio for the wastewater from the selected industries can also be approximated to the gradient of their respective fitted equations, i.e. GBL, 0.66; Coca-Cola, 0.35; GGL, 0.23. The fitted equations for GBL, Coca-Cola and GGL can be used to facilitate rapid effluent assessment or optimal process control by these industries once the chemical oxygen demand is measured.