CHAPTER IV

CALCULATION OF RESULTS

There are two methods for the determination of an overall transfer coefficient (K) under non-steady state aeration of a deoxygenated water, which can be made by:

- 1. the graphical method and
- 2. the method of least squares.

By the graphical method, K_{La} is considered from the slope of atting dissolved oxygen deficit ($C_s - C_1$) against time of aeration in a semi-logarithmic paper as inllustrated in Apendix B.

$$K_{\text{La}} = \frac{\log_{10} \frac{(C_s - C_1)_{\text{tl}}}{(C_s - C_1)_{\text{t2}}}}{\text{t2 - t1}}$$

Fair and Geyer (1954) expressed the computation of $K_{\rm La}$ from the data by the method of least squares as follows:

$$x.A + \Sigma x^2.B = \Sigma xy$$
 ----(2)

where :- n = number of samplestaken

x = elapsed time in minutes

y = log (C_s-C_L)

(C_s-C_L) = dissolved xoygen deficit at any time

B = overall oxygen transfer rate constant

with base 10

Kla = \frac{B}{0.4343} = \text{overall oxygen transfer coefficie}

K_{La} is corrected to standard conditions of 20°C temperature and one stmospheric pressure.

$$K_{La(200C)} = K_{La(T).0}^{(20-T)}$$

The value of 0 verying from 1.016 to 1.047 was found by Jones and his co-worker (1969), and a value of 1.024 was <u>suggested</u>.

In the determination of K_{La} where relationship between $\log(C_s-C_q)$ and time (t) was tested by Pearson (r) value and the significance of Pearson r,

Pearson (r) =
$$\sqrt{\left[n, \Sigma x^2 - (\Sigma x)^2\right] \left[n, \Sigma y^2 - (\Sigma y)^2\right]}$$

The significant of Pearson (r) was tested by using, t equal to $\frac{r}{(1-r)^2} \times (n-2)^{\frac{1}{2}} \text{ with } (n-2) \text{ degree of freedom. Downie and Heath}$

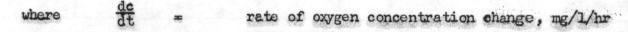
(1970), presented values of (r) for different levels of significance and degrees of freedom to simplify significance test for Pearson (r).

The correction of dissolved oxygen of 0.008 mg/l at 25°C per 100 mg/l chloride in water as suggested by Fair and Geyer (1954) is negligible, this is due to the fact that the present of chloride in tap water is very small.

Determination of oxygen transfer rate.

From $\frac{dc}{dt} = K_{La}(C_s - C_L)$	From	de		Kla () _s -	OL.
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$$\frac{dC}{dt} = K_{Le}(C_s - C_L)V$$



 $\frac{d0}{dt}$ = rate of oxygen concentration change, mg/hr

K_{La} = overall oxygen transfer coefficient, hr⁻¹

V = volume of aerated water, 1.

If hp = power consumption in honse-power

Kw = power consumption in kilo-watt.

Therefore

1b
$$0_2/hr/hp$$
 = 2.2046 $K_{La}(C_s - C_2)V/10^6/hp$

$$Kg O_2/hr/Kw = K_{La}(C_s - C_2)V/10^6/Kw$$