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Oxygen Utilization Rate (OUR)Evaluation

OUR= Oxygen utilized/Oxygen supplied　　(1)

It is difficult to obtain the data of oxygen utilized. So in most cases people intend to approximate OUR with the following formula:

OUR=Oxygen requirement/Oxygen supplied　　(2)

The result from formula (2) can be appreciated only in the condition where the dissovled oxygen ≤ 2mg/L. Otherwise the OUR will either be underestimated (DO>2mg/L) or over -estimated(DO<2mg/L). This conclusion comes from the formula as below:

$$\mathbf{AOTR=(\alpha\cdot SOTR\cdot\theta/C_{S20})\times(\tau\cdot\Omega\cdot\beta\cdot C_{S20}-C_{OP})} \quad (3)$$

$C_{ST}=\tau\cdot\Omega\cdot\beta\cdot C_{S20}$

Assuming other factors remain the same as designed, the actual oxygen transfer rate(AOTR) depends on the data of C_{S20}-C_{OP}. The bigger the C_{OP}(operational oxygen concentration) is, the smaller the AOTR will be. Manufacturers of the aerators normally set the designed OUR at the point of C_{OP}=2mg/L. So it is not a supprise to see the OUR calculated by the formula (2) deviate from the data given by the manufacturer when the C_{OP} exceed or below the 2mg/L.

To better evaluate the OUR ,it is recommended to proceed three steps:

1. measure and record DO data along with time length
2 . obtain weighted means of DO as $\mathbf{C_{OP}}$
3. Using weighted mean as C_{OP} and formula (3) to correct the date from formula (2)

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OUR^{*}=(Oxygen requirement/Oxygen supplied)*

（$\tau\cdot\Omega\cdot\beta\cdot C_{S20}$-2)/($\tau\cdot\Omega\cdot\beta\cdot C_{S20}-C_{OP}$)

For example:
Assuming τ,Ωandβ=1,C_{S20}=9.08, weighted mean of DO=C_{OP}=3.8, **(Oxygen requirement/Oxygen supplied)=70%**

Then
OUR^{*}＝70%*(9.08-2)/(9.08-3.8)=93.86%
OUR^{*}— real oxygen utilized rate