Oxygen Uptake Rate Determination

The Oxygen Uptake Rate (OUR) test is used to determine the oxygen consumption rate of a sample of wastewater.

Material Needed

D.O. meter

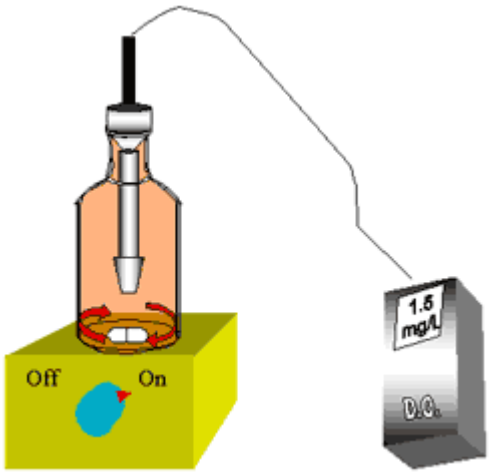
BOD bottles

Oxygen Source

Bubble Diffuser

Thermometer

Timer



Preparation of Sample

Collect a representative sample of the influent wastewater in an open container. Oxygenate the sample using pure oxygen until the sample D.O. is 20 mg/L. This should be done in less than 2 to 3 minutes to minimize oxygenation of sulfides. Transfer the oxygenated water to the BOD bottle filling it completely. Insert the D.O. probe into the BOD bottle, making sure that the probe tightly seals the liquid from the atmosphere. Activate the magnetic stirrer. Note: adequate mixing is essential.

Measure Oxygen Consumption Rate

Record D.O. Readings

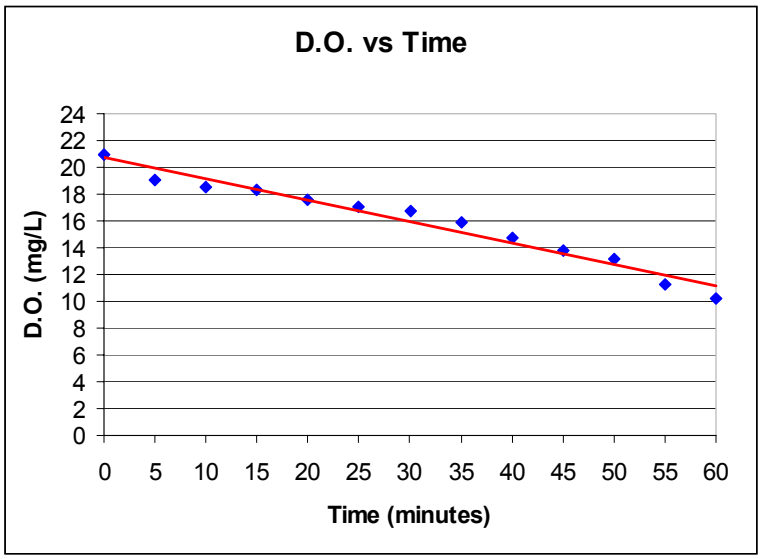
After the meter reading has stabilized, record the initial D.O. reading. Record levels at time intervals of 5 minute. Record data over a 1 hour period or until the D.O. is less zero.

Calculations

Plot the observed readings (D.O. mg/L vs time in minutes) on regular graph paper. Draw a straight line that best fits all points. If using a computer to develop the graph, draw a linear trendline.

Example of data and a graph:

Time minutes	D.O. mg/L
0	20.9
5	19.1
10	18.5
15	18.3
20	17.6
25	17.1
30	16.7
35	15.9
40	14.7
45	13.8
50	13.2
55	11.3
60	10.2



Determining the Slope

Now determine the slope of the line by using the equation $m = \frac{(y - b).}{x}$

where:
y= y intercept
x = x intercept
m = slope
b = where line crosses y axis

Note: To choose x and y, it is best to use a point that intersects the trendline.

The following steps demonstrate how the slope (m) is calculated sample.

$m = \frac{(y - b)}{x}$ $m = \frac{(13.8 - 20.7)}{45}$ m = - 0.15 mg/L/min

The slope represents the oxygen consumption rate in mg/L per minute

Variability Compensation

Variability in the nature and temperature changes of the wastewater will result in variability with performance of the OUR test. Analysis should be conducted immediately. Also, to compensate for variability, it is highly recommended to take the arithmetic mean of at least multiple OUR tests over a 2-3 week period.