

Application report

Respirometric BOD₅ determination of domestic waste water

Foreword

In normal domestic wastewater both the microbiological activity as well as the supply of microorganisms with nutrients in sufficient quantities is ensured so that no further measures for treating the sample must be carried out here. If your wastewater is polluted with toxic or substances that inhibit the biology, the measurement must be carried out in accordance with the application report entitled [Toxins or inhibitors].

If the pH value of the pure wastewater sample lies outside the range of pH 6 to pH 9, it can be assumed that the biology is already damaged to such an extent that any conventional measurement would lead to false results. It is also recommended to carry out the measurement in accordance with the application report [Toxins or inhibitors] in this case.

Measuring method Respirometry

Measuring range 0-4,000 mg/l BOD

Measuring equipment OxiTop® pressure measuring heads

Accessories

General:

- Magnetic stirrer platform
- Thermostatic box (temp. = 20 °C ± 0.5 °C)
- Brown sample bottle with a nominal volume of 510 ml
- Stirring rods with stirring rod remover
- Overflow measuring beaker(s) (depending on the selected measuring range, see table shown below)
- Rubber sleeve

Reagents

- Sodium hydroxide tablets
- N allylthiourea solution NTH 600 ($\beta=5$ g/l)

Procedure

- Use the COD value to estimate the expected BOD value of the wastewater sample in order to select the correct measuring range and associated data in accordance with the table shown below.

If the ratio of COD to BOD is not known for the wastewater to be examined, the assumption can be made that the BOD value corresponds to 80% of the COD value.

Measuring range in mg/l BOD	Sample volume in ml (overflow measuring flask)	Factor for the calculation (not OxiTop®-i)	Amount of NTH 600 in drops per sample bottle
0-40	432	1	9
0-80	365	2	7
0-200	250	5	5
0-400	164	10	3
0-800	97	20	2
0-2000	43.5	50	1
0-4000	22.7	100	1

- Measure the temperature of the wastewater. If the temperature is outside the range of 15 °C – 21 °C, the temperature must be adjusted.

Before filling the sample bottles, the wastewater sample must be homogenized on a magnetic stirrer until all deposited suspended matter is distributed evenly throughout the liquid. Only in this state is the removal of a representative sample for the measurement ensured, which is why this process must be repeated each time before wastewater is removed.

- Use an overflow measuring flask to measure out the sample volume belonging to your measuring range of the wastewater (see table above) and transfer this into the sample bottle.

- Add the number of drops listed in the table of the nitrification inhibitor solution NTH 600 to the sample bottle.

- Insert a magnetic stirring rod into each sample bottle and fit the bottle necks with the rubber sleeves that have been filled beforehand with sodium hydroxide tablets.

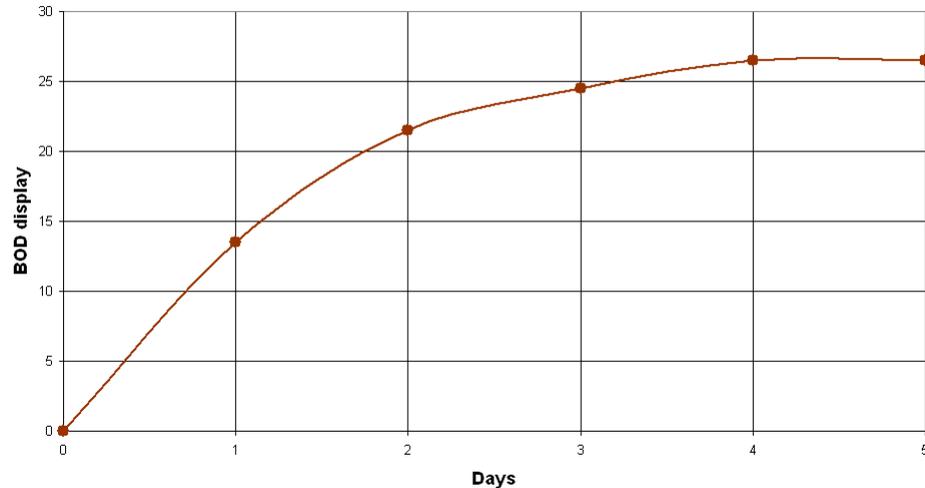
- Tightly screw the pressure measuring heads onto the bottles and start the measurement.

- Place the sample bottle in the incubator thermostatic box on a switched-on stirrer platform and incubate them at 20 °C ± 1 °C for 5 days.

- Then read the measured values from the pressure measuring heads and enter them on a diagram above the days they were measured. A similar curve trend to the graph shown below should

result.

Graphic evaluation of the BOD measurement



If your graph differs greatly from the graph shown here, the application report entitled [System supervision] gives important instructions on how to proceed.

To calculate the BOD₅ value of the wastewater sample (not OxiTop®-i), the value indicated on the measuring head must be multiplied with the factor for the respective sample volume (see table).

Example:

A value in the range of 0-400mg/l BOD was assumed for the BOD₅ value of the wastewater.

According to the table, the sample bottle was filled with 164 ml of the waste water, 10 drops of NTH 600 were added and then duly incubated for 5 days.

After the incubation is complete, the measuring head shows a value of 27 digits.

The factor corresponding to this measuring range is F=10 according to the table.

The general formula for calculating the BOD₅ value is:

$$\text{BOD}_5 = F * \text{measuring head indication}$$

With the measuring head indication of 27 digits specified here and the factor of 10 taken from the table, this results in:

$$\text{BOD}_5 = 10 * 27 \text{ mg/l} = 270 \text{ mg/l BOD}$$

The BOD₅ values for all filling volumes listed in the table can be calculated in this way.

Notes

The water sample must be processed as soon as possible after it has been taken. Every kind of conservation causes a change of the sample.

Some measuring heads offer the user specific functions such as graphical evaluation and automatic calculation of the values after the factor is entered. Refer to the manual of the measuring head to find out how to use these options if necessary.

Bibliography

Principles of Measuring Technique, WTW publishing. DIN EN 1899-2

Note

The information contained in our application reports is only intended as a basic description of how to proceed when using our measurement systems. In isolated instances or if there are special general conditions on the user side, exceptional properties of the respective sample can, however, lead to a change in the execution of the procedure or require supplementary measures and may, in rare cases, lead to a described procedure being unsuitable for the intended application.

In addition, exceptional properties of the respective sample such as special general conditions can also lead to different measurement results.

The application reports have been prepared with the greatest possible care. Nevertheless, no responsibility can be accepted for the correctness of this information.

The current version of our general terms of business applies.

Any further questions? Please contact our Technical Support:

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