BOD

Mercury-free determination of biochemical oxygen demand (BOD)

behr
Labor-Technik

Manometric BOD determination – without mercury, of course

The pressure measurement in the manometric BOD determination was originally performed using a mercury manometer.

The use of mercury, which is toxic and environmentally damaging, was accepted as a regrettably unavoidable necessity.

behrotest® manometric BOD systems function without mercury.
The pressure detector module incorporates a high quality piezo-resistive silicon absolute pressure transponder. In contrast to conventional systems, which employ mercury manometers, these modern systems offer much greater security in regard to work-place and environmental health and safety.

The determination involves no more than simply screwing the sensor cap onto the sample bottle; no tubing connections, no scales to read, no daily measurements to note. Just read the display after five days and it's done.

behrotest® manometric BOD systems automatically store the measurements daily in memory. Thus, in contrast to the conventional dilution procedure, all of the data for all five days of the determination are available for evaluation at any time.

The current BOD value, as well as the daily values for each of the preceeding days, can be displayed at any time.

Moreover, error messages are displayed for above and below scale readings, low battery status and memory data loss.

The biochemical oxygen demand

Determination of the BOD_5 is one of the most widely employed criteria for characterization of waste water quality.

The procedure for performing the BOD_5 determination is prescribed in national and international regulations (i.e. ISO 5815).

In addition to the quasi "official" BOD-determination employing the dilution procedure, the oxygen consumption method is widely employed. The oxygen consumption method is principally employed as a voluntary self-check alternative to the BOD procedure.

The manometric O_2-consumption method yields results equivalent to the standard BOD_5 method when:

- optimal conditions for biodegradation are maintained int the sample,
- the temperature during incubation is rigorously maintained at 20 ±1°C,
- the incubation period is five days.

The manometric O_2-consumption method is generally well suited for use in communal waste water treatment plants, which treat predominantly domestic waste water.
Heavily contaminated industrial waste water samples often require dilution with nutrient solution prior to analysis.

Mercury-free behrotest® BOD analytical systems

A Complete BOD analytical system for 6 simultaneous samples consists of:

- **BOD 6-sample stirrer unit, incl. sample vessel holder, 6 bottles of 500 ml volume, 6 manometric BOD sensors (yellow & green), 6 gondolas for NaOH pellets , 6 magnetic stirring bars, 1 fill-to-overflow flask, 432 ml, for the BOD range 0 ... 40 mg/l and 1 fill-to-overflow flask, 164 ml, for the BOD range 0 ... 400 mg/l.**

behrotest® fill-to-overflow volumetric flasks

BOD range mg/l	Sample volume	Factor (*)
0 – 40	432,0 ml	1
0 – 80	365,0 ml	2
0 – 200	250,0 ml	5
0 – 400	164,0 ml	10
0 – 800	97,0 ml	20
0 – 2000	43,5 ml	50
0 – 4000	22,7 ml	100

* ... Multiplicative factor for converting digital sensor reading into mg/l BOD

Technical Data for behrotest® manometric BOD sensors

Principle:	Manometric pressure sensor contained in screw-on cap
Analytical ranges:	From 0 ... 40 to 0 ... 4000 mg/l achieved by varying sample volume and use of volume correction factors
Property measured:	Oxygen consumption according to DIN/DEV 38409 - H 52
Resolution:	±1 Integer (Output range 0-40 in integers)
Display:	2 digit, 7-segment LED, 10 mm high
Operation:	Two waterproof input keys for starting determination, displaying current result and displaying results in memory
Autostart:	Once pressure stabilizes and 20 °C temperature is reached, pressure sensor is auto-zeroed and determintion starts automatically within an interval of 1 - 3 hours
Data collection:	Pressure is measured approx twice per hour and may be read directly. The daily average value is computed from these readings.
Error messages:	Error messages are displayed for results above or below the analytical range or if no daily average exists.
Battery:	Lithium battery with approx. 3 year life. "LO" is displayed when battery should be replaced.
Secure memory:	100% solid state storage, data retained through battery change
Environmental temp.	
– Storage:	– 25 ... + 65 °C
– Operation:	5 ... 40 °C
Protection level:	IP 54 and ABS
Dimensions:	Diameter 70 mm, height 69 mm
Weight:	Approx. 80 g
Safety	
– Class:	3 IEC 1010
– Level:	IP 54 DIN 40050
EMC	
– Interference:	EN 50081 - 1 FCC Class A
– Susceptibility:	EN 50082 – 2, (NAMUR-compliant)
Climatic class:	2, VDI/VDE 3540

External electronic coil driver unit for motorless magnetic stirrers inside cabinet

The external coil driver supports up to either four (MRS 4) or eight (MRS 8) behrotest® BOD stirring modules located within behrotest® thermostat cabinets and insures optimal stirrer rotation rate.

The power supplies/drivers of conventional magnetic stirrers are located within the thermostatted cabinet, where they continually give off heat and burden the temperature control. The behrotest® BOD stirring modules are plugged into a socket strip within the cabinet, but the power supply/driver is located externally. This considerably reduces the cooling requirement.

Thus, the external driver not only saves electricity, but considerably extends the life of the refrigerator compressor.

behrotest® Thermostat Cabinets: A bit different than the others!

behrotest® thermostat cabinets are freon-free and are suited for continuous temperature control in numerous applications, including:

- **20 °C BOD-determination**
- **4 °C storage of waste water samples**
- **25 °C enzymatic activity test (TTC)**
- **37 °C microbial count.**

The thermostat cabinets provide reliable cooling/heating temperature control with a constancy of ± 0.5 °C over the range of 4 to 40 °C.

Construction:	Fully insulated thermal cabinet with temperature controller and 4 electrical power receptacles
Temp. range:	4 ... 40 °C, in 1 degree intervals
Temp. constancy:	± 0,5 °C
Displays:	2 LCDs (actual temp. & desired temp.)
Air circulation:	Radial blower with 320 m³/h capacity.
Electrical power:	230 VAC/50/60 Hz

Stock No.	Item description
80 48 01100	Complete BOD analytical system for 6 simultaneous samples
80 48 01101	BOD kit with 2 manometric sensors (yellow & green), each with gondola for NaOH pellets
80 48 01102	BOD 6-sample stirrer unit, incl. sample vessel holder, w/o power supply/driver; for use in behrotest® externally controlled thermo-cabinets
80 48 01103	BOD 6-sample stirrer unit, incl. sample vessel holder, with power supply/driver 230 VAC/50-60 Hz, 12 V output
80 48 01009	Set of 6 I.D. rings for sample bottles with 12 I.D. stickers
80 48 01030	Fill-to-overflow flask, 22,7 ml, for BOD range 0 ... 4000 mg/l
80 48 01031	Fill-to-overflow flask, 43,5 ml, for BOD range 0 ... 2000 mg/l
80 48 01032	Fill-to-overflow flask, 97 ml, for BOD range 0 ... 800 mg/l
80 48 01037	Fill-to-overflow flask, 164 ml, for BOD range 0 ... 400 mg/l
80 48 01034	Fill-to-overflow flask, 250 ml, for BOD range 0 ... 200 mg/l
80 48 01035	Fill-to-overflow flask, 365 ml, for BOD range 0 ... 80 mg/l
80 48 01038	Fill-to-overflow flask, 432 ml, for BOD range 0 ... 40 mg/l
80 48 70001	BOD Thermo-cabinet TS 2, 180 l vol., for 3 six-sample BOD units
80 48 70004	BOD Thermo-cabinet TS 4, 250 l vol., for 4 six-sample BOD units
80 48 70000	BOD Thermo-cabinet TS 3, 350 l vol., for 8 six-sample BOD units
80 48 01021	MRS 4 external power supply/driver for up to 4 behrotest® BOD stirring units
80 48 01022	MRS 8 external power supply/driver for up to 8 behrotest® BOD stirring units

behr Labor-Technik GmbH • Spangerstraße 8 • D – 40599 Düsseldorf
Tel.: (+49) (0) 211 – 7 48 47 17 • Fax: (+49) (0) 211 – 7 48 47 48