SURCIS S.L.

BM-Advance Pro2

Multi-purpose Respirometer

BM-Respirometer of double reactor specially developed for practical and efficient biological wastewater treatment management, design and research

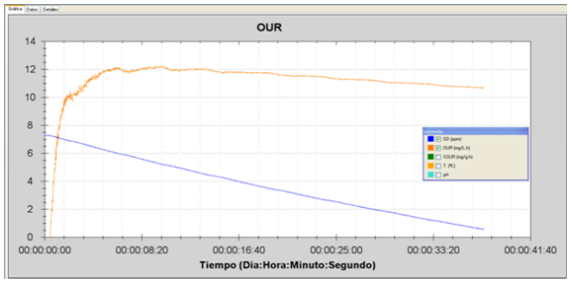
Main features

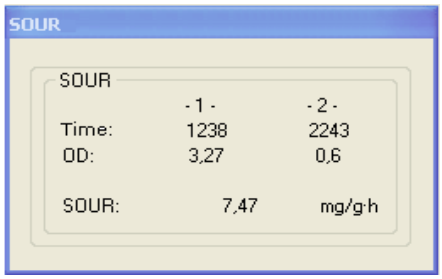
- Compact analyzer with 2 independent reactors with very low maintenance and user friendly operation
- Direct oxygen measurements from a *maintenance-free* oxygen sensor
- No oxygenation restriction during test performance
- Full control and results by means a powerful software already loaded in the PC of the system
- Automatic software update versions from internet
- Capacity for test conditions setting and modify them throughout the test performance.
- Automatic measurements: OUR, SOUR, bCOD, rbCOD, sbCOD, U (COD utilization rate) and q (specific U)
- Last, minimum, maximum and moving average results throughout any moment of the test
- Several results at any time during the test and option to see them simultaneously on tabular or graphic modes
- Option to open several stored tests and compare their results
- Automatic temperature control integrated in the own console for each reactor.
- pH monitoring and automatic control system for each reactor
- ORP monitoring foe aerobic, anaerobic and anoxic systems in each reactor.
- Package of measurements at any moment during test performance
- Capacity for different respirograms on each module and simultaneous overlying
- BM respirometers measure data that can be directly input into modeling – simulating software
- Option for a special reactor assembly for moving beds bio-films (MBBR)

Operation modes

OUR static

From a mixed-liquor of the aeration tank it is determined the OUR & SOUR within the time and section we have selected in the corresponding respirogram.

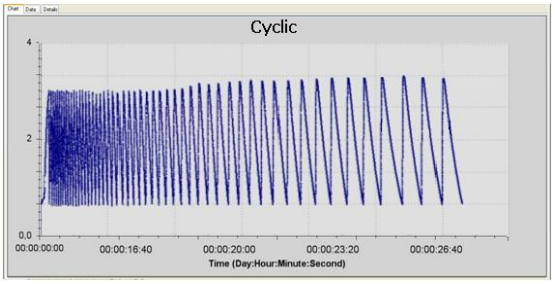




OUR (mg/l.h) Total oxygen uptake rate from mixed-liquor.
SOUR (mg/g.h) Specific OUR

OUR cyclic

On this mode, the analyzer performs a respirogram within a programmed DO threshold and determines the corresponding **OUR** & **SOUR** in base of a continuous sequentially measurements.

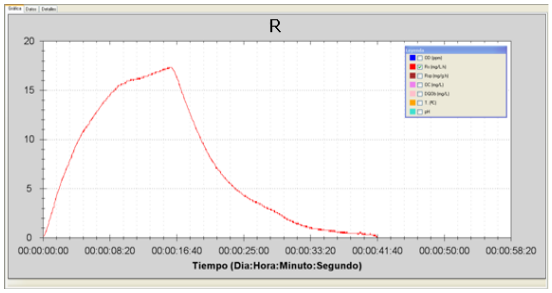


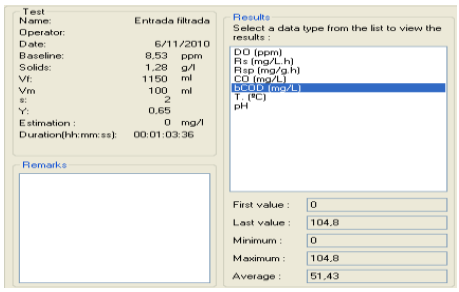
Time	OUR (mg/L.h)	SOUR (mg/g.h)
00:00:53	4,08	2,27
00:00:54	4,67	2,59
00:00:55	4,58	2,54
00:00:56	4,5	2,5
00:00:57	4,42	2,46
00:00:58	4,97	2,76
00:00:59	4,88	2,71
00:01:00	4,8	2,67
00:01:01	4,72	2,62
00:01:02	5,23	2,91
00:01:03	5,14	2,86

R dynamic

A DO base line is fixed from an endogenous respiration activated sludge and then added a certain amount of sample to be analyzed. In the respirogram, continuous measurements of Rs are showed permitting the simultaneous and continuous determination of CO and bCOD. In this way we can track the values evolution along the time as an actual window of the substrate oxidation from activated sludge.

Rs (mg/l.h) Exogenous respiration rate corresponding to the substrate oxidation.
Rsp (mg/g.h) Specific Rs.
CO (mg/l) Consumed oxygen accumulated in the substrate oxidation (BODst)
bCOD (mg/l) Biodegradable fraction of total COD (bCOD) or Readily biodegradable fraction of COD (rbCOD)
U (mg COD/l.h) Substrate utilization rate
q (COD/SS.d) Specific substrate utilization rate





Typical applications

Oxygen requirement and energy optimization

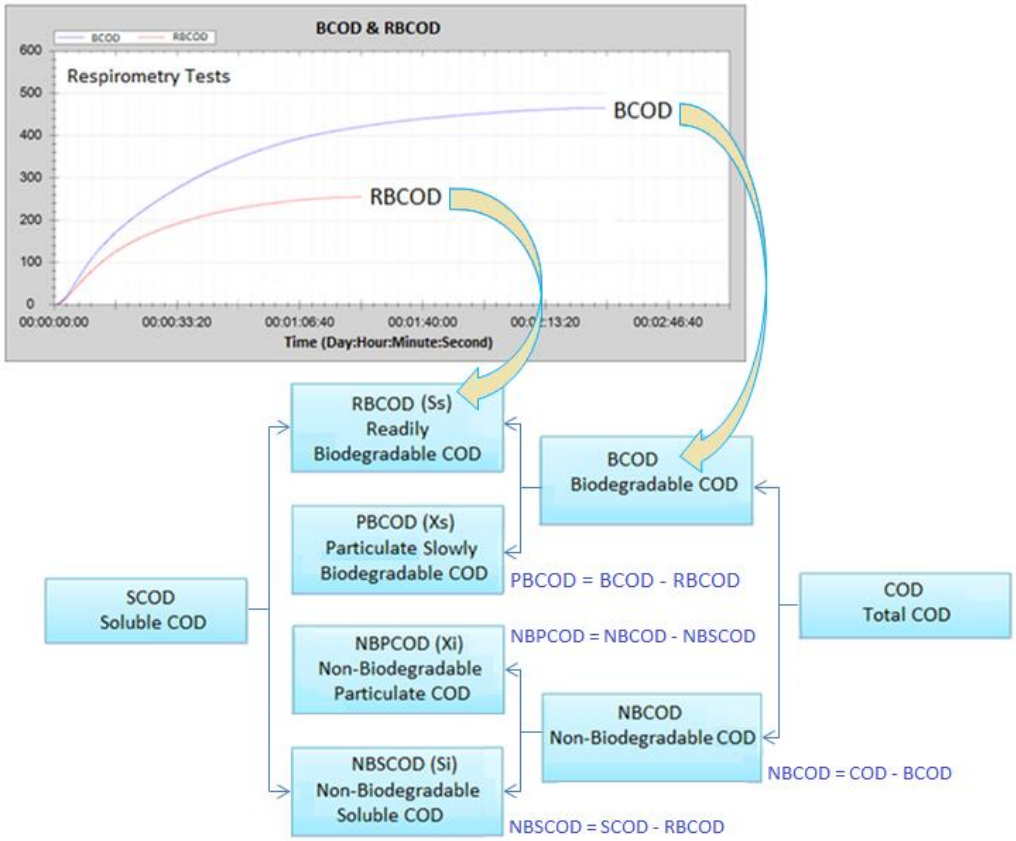
Actual oxygen requirement for any specific process.
Optimal and minimum DO level in the aeration tank, without any detriment of the process efficiency.

Bioaugmentation control and tracking

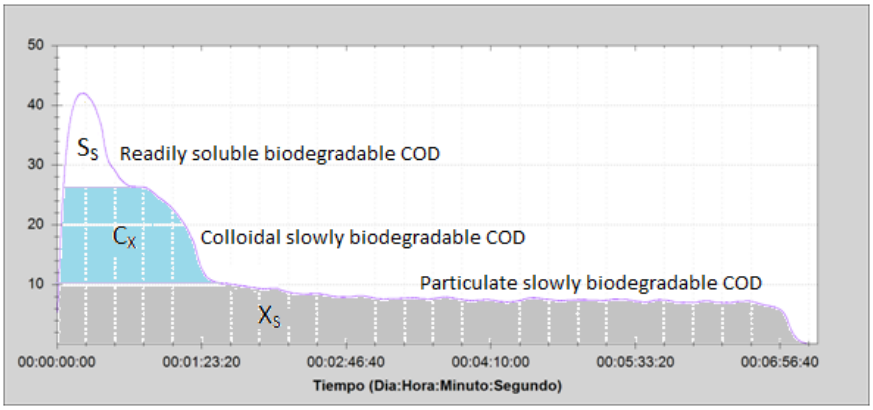
By means the regular respiration rate measurement we can asses the result of the augmentation effect, to know if it is necessary to increase the dose of biomass and when it has reached its maximum effect.

COD fractioning

Automatic calculation of the COD biodegradable fraction (bCOD) or COD readily biodegradable (rbCOD) as the base for the rest of COD fractions calculation

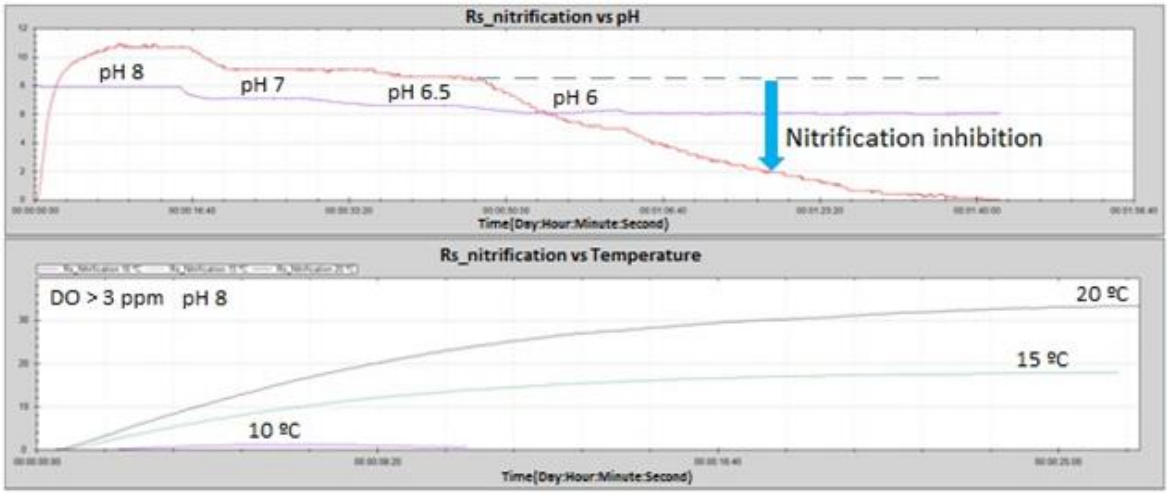


Many times the COD fractions can be determined by a single R test



Influence of the temperature, pH and oxygen and other conditions

Thanks to the capacity to set and modify the test conditions, we can analyze the influence of any of them (or any combination) in the biomass activity and figure out break-points, optimum and minimum working levels.



Operative parameter optimization

Loading rate (F/M), Sludge age (SRT) y Returned sludge rate (RR).

Nitrification

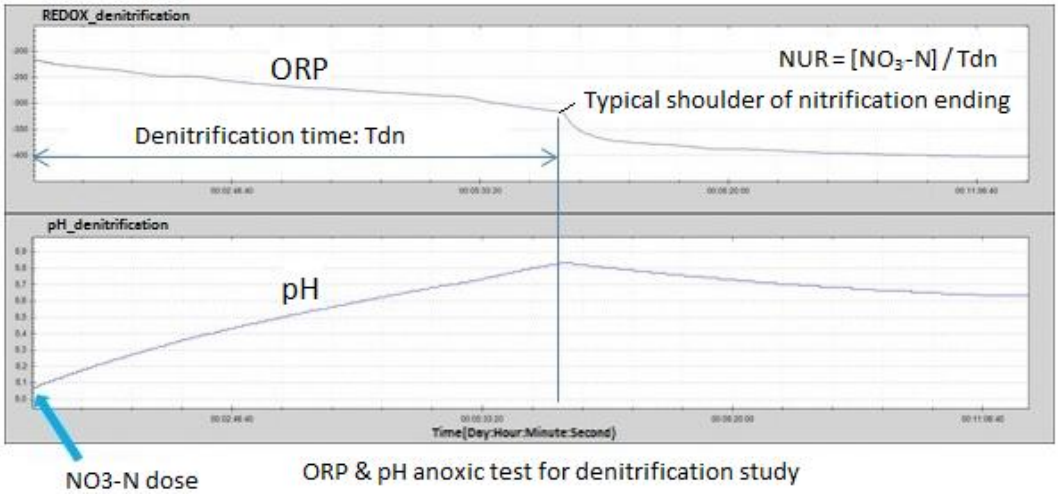
Nitrification rate (AUR), Specific nitrification rate (SAUR, q_N), optimal DO range for nitrification, Necessary hydraulic time for ammonium-nitrogen removal, Nitrification capacity, minimum sludge age for nitrification (SRT_N)

Denitrification

Starting from the actual value of rbCOD, it is possible to determine the actual nitrate concentration that the process is capable to remove.

Starting from the specific respiration rate of the anoxic biomass, it is possible to estimate the corresponding denitrification rate (NUR)

All kind of applications derived from the analysis of the ORP evolution during the denitrification process.



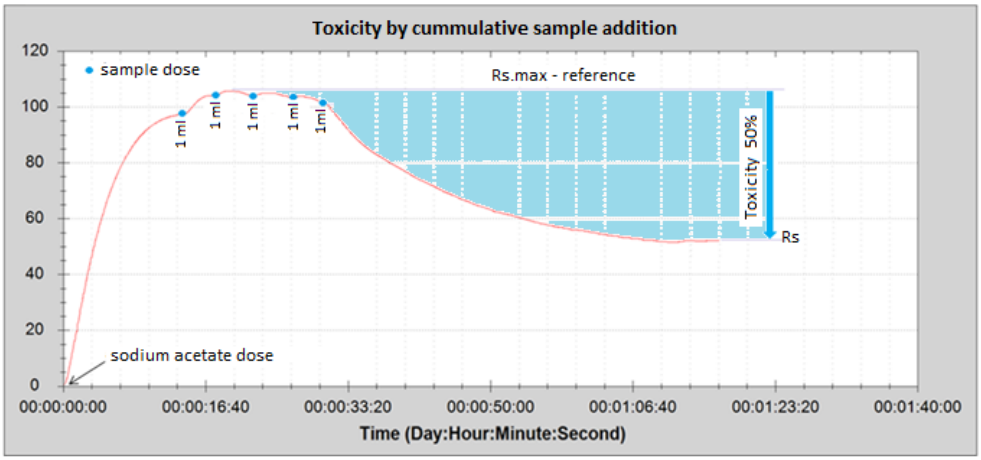
ORP & pH anoxic test for denitrification study

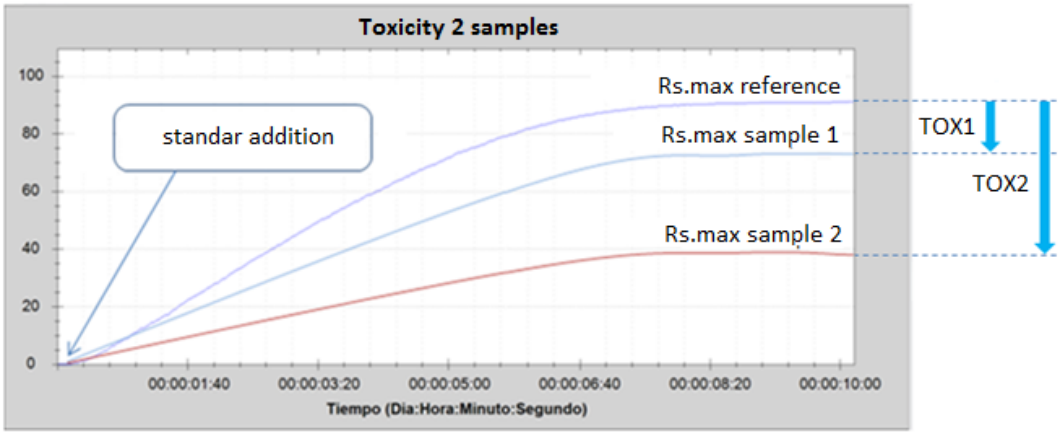
Anaerobic process

All kind of applications derived from the analysis of the ORP evolution during the anaerobic process.

Toxicity

Toxicity to any specific biomass by different procedures to be applied depending of the case..





Kinetic parameters

For heterotrophic and autotrophic biomass.

SBR

Aeration cycle control in SBR systems.

Biomass carrier (MBBR)

Same applications as normal reactor + Amount of oxygen needs to maintain the biomass carriers under optimal conditions.

Support for simulation programs

Such as GPS-X, BioWin, …

Others

BM respirometers are open systems and, as such, support all kinds of combinations to step into an endless number of applications.

www.surcis.com

BM-Advance Pro2 - Technical specifications

Type	Optimized batch with closed recirculation.
Use	Laboratory.
2 x Oxygen sensor	Maintenance free oxygen sensor. It is not necessary to replace neither membrane nor electrolyte
2 x Measurements	Dissolved oxygen (OD), Temperature, pH and ORP. OUR & SOUR, Rs & Rsp, CO (Consumed Oxygen) and bCOD determinations. Calculation of U (Substrate utilization rate) and q (Specific U) Measurements visualization on tabular and graphical modes throughout the time. Overview of the results package at any time. Data acquisition interval setting. During the test, we get the last, minimum, maximum and average values.
2 x pH control	In the test configuration it is possible to set the pH at which it should be performed and change it at any time during the test.
Test files	Automatic generation of a security file just when the test is starting. Possibility to save any test under the own software format and/or Excel.
Operation modes	Static, Cyclic and Dynamic controlled by a specific software loaded in the PC of the system. Automatic respirograms generation thorughout the test. Preset test conditions (T, DO, pH, sample volume,…) and possibility to change them during its performance.
Aeration system	From a small air compressor and a ceramic diffuser. The air flow can be controlled by means the software for different percentages of air supply for a non limited time.
Respirograms	Automatic generation of graphic respiromgrams with the possibility to overlay them for comparison. Zoom application for total or partial periods. Option for the simultaneous visualization of several data displays under tabular and/or graphic modes.
Partial measurements	During the test and to its finalization there is the option to get selective partial measurements from the values table or from any selected period of the respirogram.
Dynamic calibration	Only for R mode the measuring system is calibrated by means the reaction of a chemical standard in distilled water, where the total oxygen demand is already known.
Biomass-carrier reactor	Option for a special reactor for biomass carriers to get all respirometry applications for any MBBR process type.
MBBR reactor	Option for a special reactor assembly for moving beds bio-films (MBBR)
ORP Mesurement	ORP measurement during the test on application for aerobic, anoxic and anaerobic processes.
Temperature	10 to 50º C, by means a peltier & heating system, installed in the analyzer console, controlled by the software
Ouput	RS232 (for console ↔ PC communication)
Display	LCD in sensor controller, LEEDS in front panel and PC screen.
Power	230 ACV or 115 ACV (under demand) 50/60 Hz - 3600 W
Dimensions	700 x 370 x 645 mm (W x D x H)

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