BM-Advance respirometer for Industria Acqua Siracusana in Italia

BM-Advance Multipurpose Respirometry System

The Industria Acqua Siracusana S.p.A. (IAS) has just passed the order for the acquisition of a laboratory respirometry analyzer model BM-Advance from Surcis S.L.

The Respirometer will be destinated to the laboratory of the wastewater treatment plant IAS

Wastewater treatment plant IAS

The wastewater treatment plant

This biological treatment plant is located in Priolo Gargallo, in the Vecchie Saline district, and covers an area of about 18 hectares.

The wastewater, industrial and civil, is conveyed to the treatment plant through a collector with a total length of approx. 24 km, divided into two sections: North collector, to which the plants of large industrial companies and the municipalities of Priolo and Melilli are connected and South collector, to which small industrial users are connected, the IGCC plant of Lukoil, the hamlets of Città Giardino (Melilli) and Belvedere (SR) and North Syracuse.

The wastewater treatment system must, therefore, meet the treatment needs of a territory of considerable vastness and complexity in terms of size and chemical characteristics of the wastewater conferred by the individual production companies and municipalities.
Large industrial companies carry out suitable pre-treatments before the introduction of wastewater into the consortium collector and are equipped with storage capacity in order to guarantee management flexibility in emergency situations.

In addition, groundwater is currently treated at the plant, deriving from the site's hydraulic barrier activities, based on a series of clusters of pumping wells of the two pseudo-aquifers, surface and intermediate, underlying the area pertaining to IAS, started in 2005 and still in operation.

The wastewater treatment plant has therefore been designed to operate in different conditions, both in terms of flow rate and pollutant load variations, and It uses a abatement system that is articulated on a chemical-physical pre-treatment followed by a biological treatment with aerobic activated sludge.

The plant now treats an average of about 2,000 m3/h of industrial and civil wastewater, compared to a total project capacity of 4,200 m3/h; The production of sludge today stands at around 4,000t / year. The power used by the plant is now 1,400÷1,600 kW.

The treated wastewater is introduced into the sea receptor body off the Magnisi peninsula through a submarine pipeline about long. 1,750 m equipped with a terminal diffuser placed at a depth of 35 m.

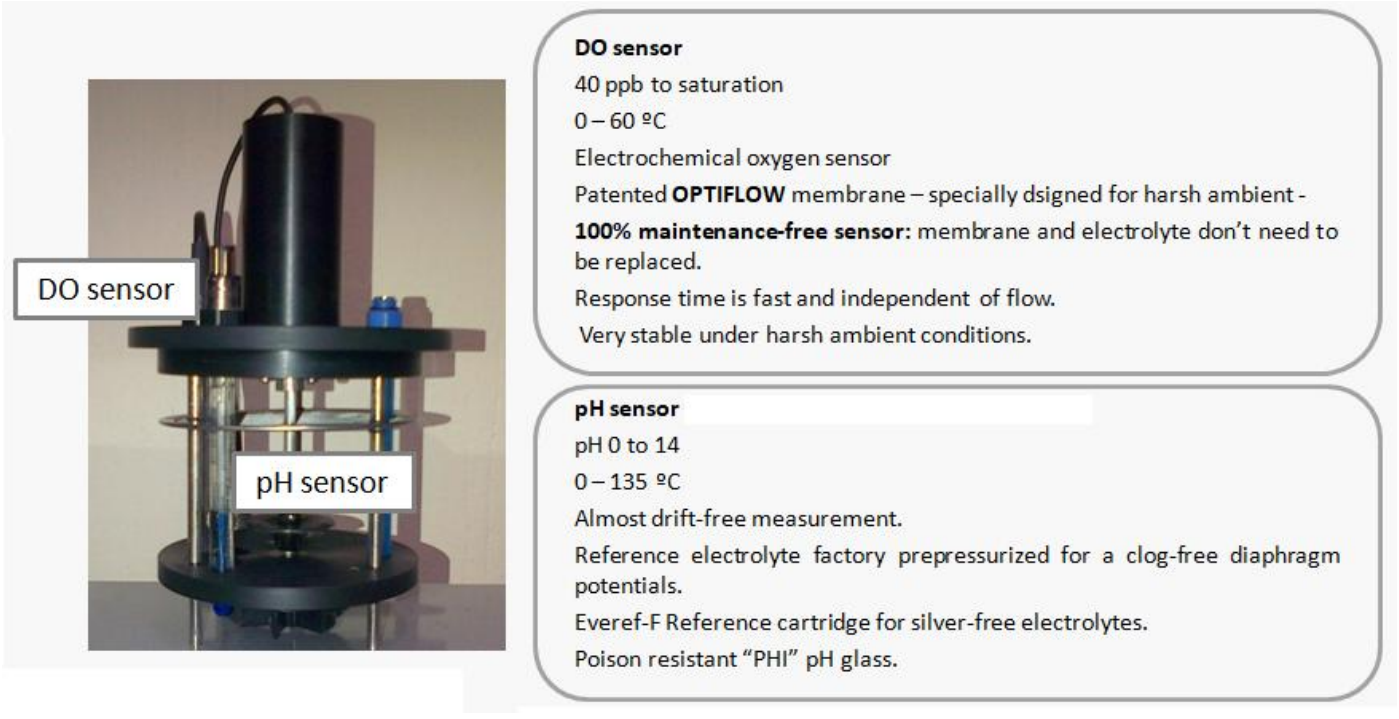
Purpose of the BM-Advance respirometer

The purpose of the acquisition of the BM-Avance will consist mainly of the analysis of the input waters to the biological process in view of the following applications: Take the rapid pulse of the process for a possible early assessment of the performance and possible detection of toxicity; Determination of refractory (nbCOD) and slowly biodegradable COD (sbCOD) of industrial waters together with the COD removal rate; estimation of the Oxygen Demand of the inlet load; Control of Nitrification and Denitrification; among others.

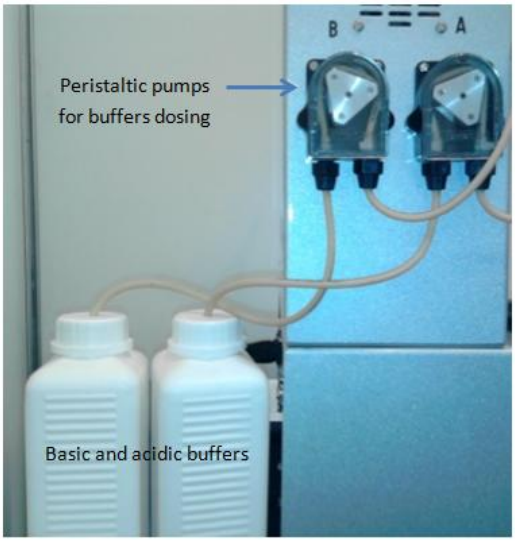
Why the IAS has selected the BM-Advance Pro Respirometry System?

The main reasons can be listed as follows:

1) <u>Maintenance-free oxygen sensor, specially designed for harsh waters.</u>



2) Programmable automatic pH control by BM software



3) Automatic programmable Temperature control by BM software

Reactor is carried to the tempering system

Heating-coolong assembly

4. Important package of automatically determined parameters

BM Respirometry Operation Modes

OUR & Cyclic OUR modes

OUR: **Oxygen Uptake Rate** (mg O_2/l.h)
It measures the oxygen uptake rate for only one measurement or serial o measurements.

SOUR: **Specific OUR** (mg O_2/g VSS.h)
Specific OUR related to MLVSS. SOUR = OUR / MLVSS

R mode

Rs: **Dynamic Respiration Rate** (mg O_2/l.h)
It measures the oxygen uptake rate from the mixture of the activated sludge and certain amount of wastewater sample or compound within a continuous chain of measurements.

Rsp: **Dynamic specific respiration Rate** (mg O_2/g VSS.h)
Specific Rs referred to MLVSS. Rsp = Rs / MLVSS

bCOD: **Biodegradable COD** (mg O_2/l)
Biodegradable or soluble readily biodegradable COD fraction, based on Rs measurements integration from a mixture of activated sludge and biodegradable sample.

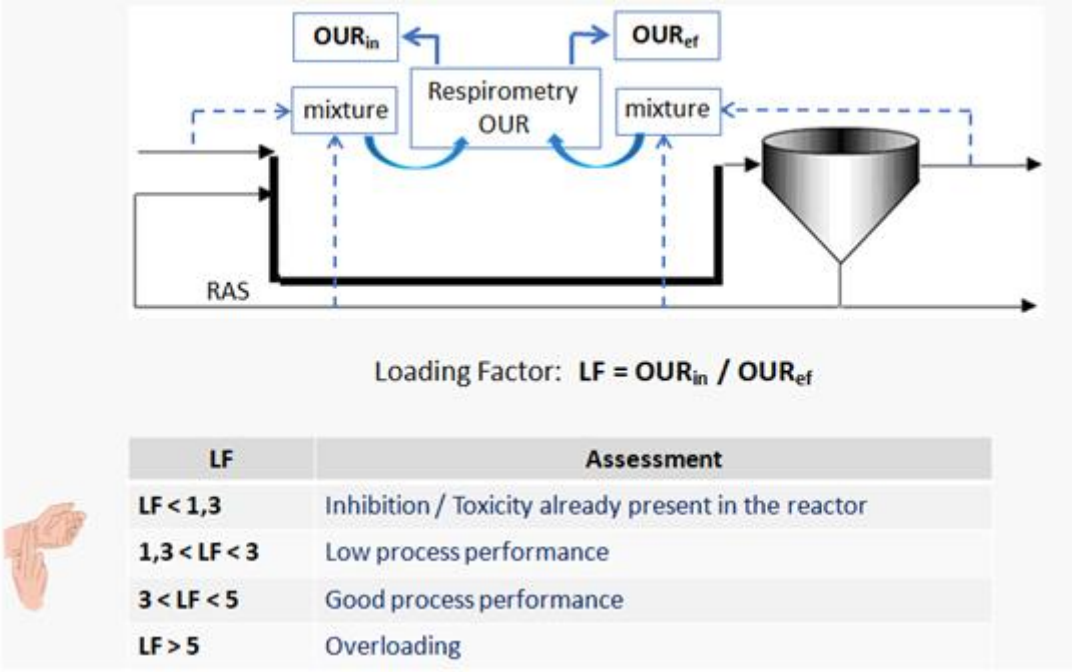
U: **COD removal rate** (mg COD/l,h)
Speed at which the COD is being removed.

q: **Specific COD removal rate** (mg COD/ mg VSS.d)
Specific U referred to MLVSS concentration.

5. Important applicatins for process follow-up and troubleshooting resolutions

- Taking the pulse of the process performance

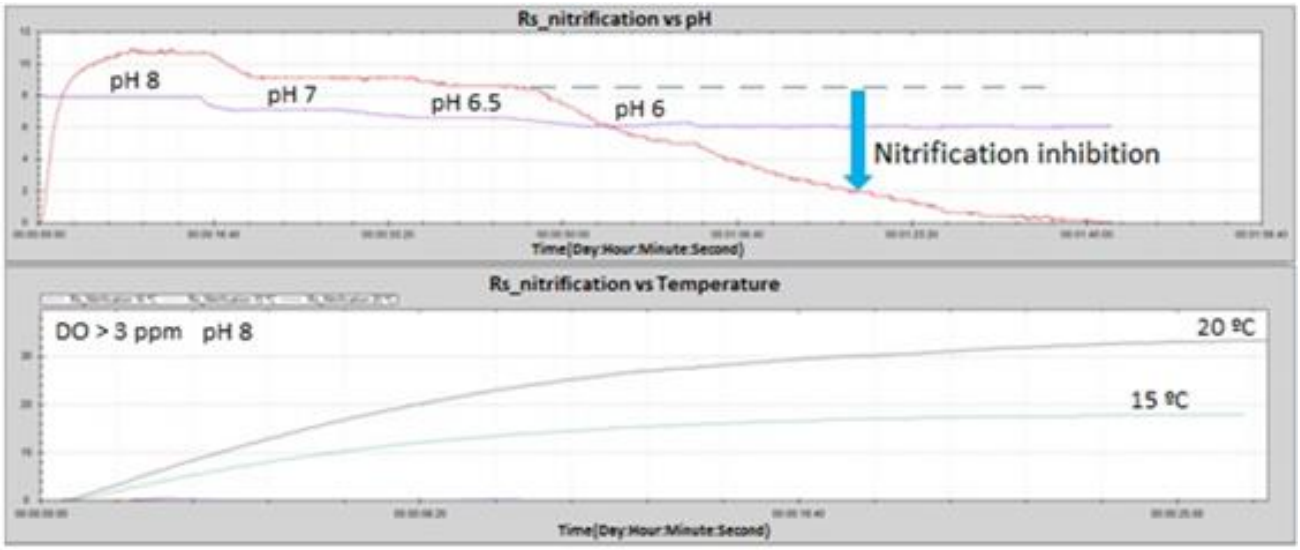
By means of two simple OUR type tests of input and process greeting, the pulse can be taken to its current state.



LF	Assessment
LF < 1,3	Inhibition / Toxicity already present in the reactor
1,3 < LF < 3	Low process performance
3 < LF < 5	Good process performance
LF > 5	Overloading

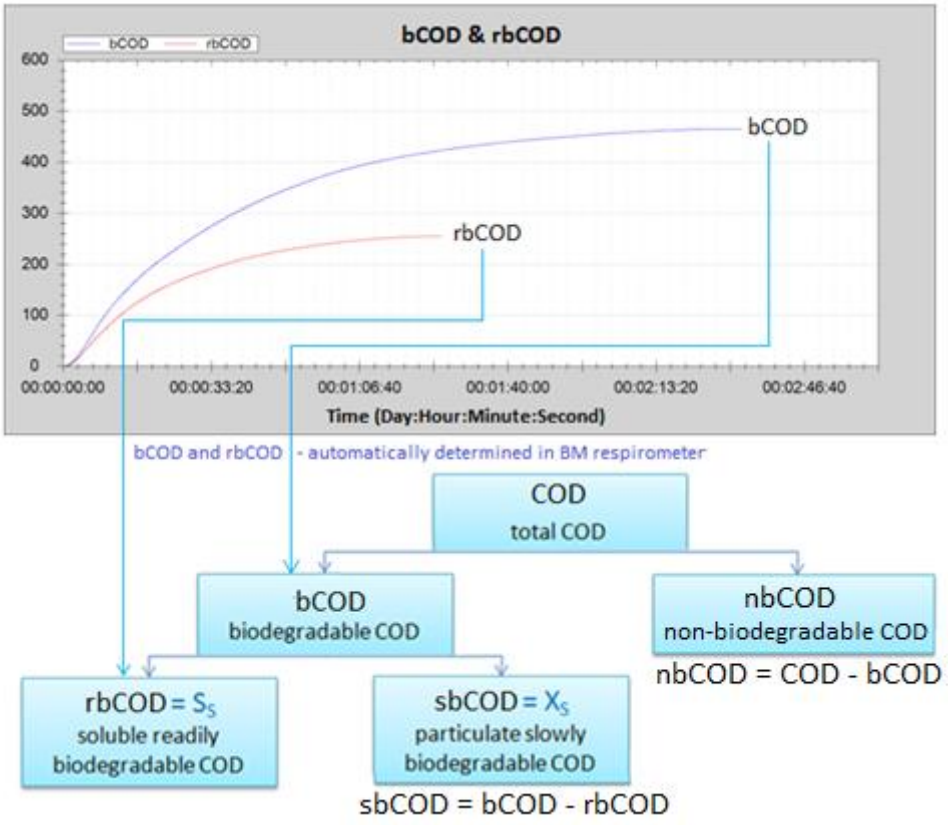
- Infleuence of the temperature and pH on the nitrification process

BM-Advance will be used to address this applications with absolute flexibility to perform the tests under different conditions of pH and Temperatura.



- Determination of the essential COD fractions

With only two R tests - for bCOD and rbCOD (soluble sample) – , together with the total COD value, it can be determined the main COD fractions



6. Many other applicacions

Such as Energy Optimization in the biological reactor aeration, Toxicity (slow and fast) to the actual active sludge, COD fractionation, COD uptake rate, Influence of the Oxygen on the process performance, Actual Oxygen Requirement, Aeration Systems follow-up, Treatment capacity, Bulking Control, Optimal operational parameters determination (MCRT, F/M, ...) Nitrification Rate, Denitrification Rate, Bio-augmentation follow up, Option to cquire a special reactir (biomass-carrier) for MBBR or granular biomass systems, Support for simulation software, etc.,.

BM Respirometry Systems in Italy

This BM-Advance is the seventh BM respirometer in Italy.
Thus, recently the presence of BM Respirometry in this country seems to be progressively and significantly expanding.

With this acquisition, Surcis continues to consolidate its worldwide position as a benchmark in laboratory respirometry systems in Water companies, Universities, Research centers, Water Groups and Industries, with a progressive and important expansion of its references at national and international level.

SURCIS, S.L.