

BM Respirometry benefits for activated sludge process management, research and training

A biological process controlled by non-biological measurements?

All treatment plant efficiencies are geared to the waste that they receive. The microorganisms found in the waste need food and oxygen to survive, the food is provided as soluble organic carbon in the waste stream and the oxygen is obtained through the aeration process in the treatment plant.

Once a treatment plant has been built, the factors that will affect the biomass growth rate, such as flow and aeration rate, have already been established and therefore the only changing factor that remains that can affect the process is the incoming waste stream.

It could be formulated the following question: How is it possible to evaluate or predict the effect that can cause an organic or toxic pollution in the activated sludge biological process of a WWTP by means of the lonely chemical or physical parameters measurement? We must have into account that the activated sludge of a treatment plant is an alive process, with its own breathing; therefore, a lack of information on this aspect can cause to serious confusions in the following-up and control of the activated sludge process having serious repercussion in the effluent quality and energy consumption to be applied to the aeration system.

From the arguments above exposed, it exist the logical alternative to carry out the activated sludge process protection and control by means of tests and selective measures of Respirometry based on the oxygen uptake of the genuine microorganisms contained in the own activated sludge as an important complement of the physical-chemical parameters.

¿What is BM Respirometry?

It is a technology in where facets of the traditional and techniques from the most advanced respirometry are gathered in one state of the art analyzer of exclusive Surcis company design. The BM system under a powerful software permits calculations of decisive parameters approached to design, control and protect the activated sludge process of a wastewater treatment plant.

BM Respirometry employ a reaction vessel that in certain mode replicate the actions that occur at a treatment plant and asses the process through fundamental measurements, such as the speed at which the process is consuming oxygen, short term biological oxygen demand, biodegradable fractions of COD, non biodegradable fraction of COD, specific Toxicity for a determined activated sludge process, Nitrification activity, and many others.

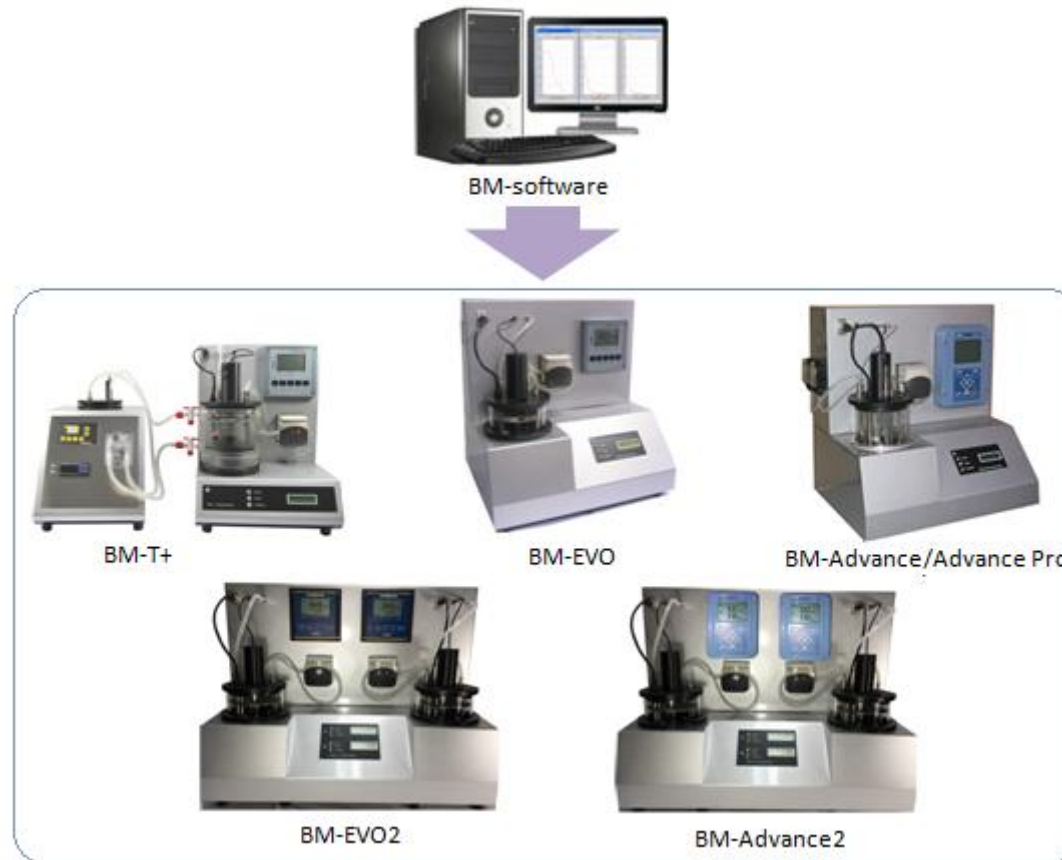
It acquires special importance the determination of the non-biodegradable COD and specific Toxicity, because many times they can explain why some processes are unable to sufficiently remove the COD entering in the plant and give a coherent explanation to the water-agencies or official control organisms.

BM Respirometers for ASP

This is a new concept of laboratory respirometry system, designed and manufactured by Surcis, S.L. in order to carry out a serial of tests and applications approached to the activated sludge process (ASP) of wastewater treatment plants.

From BM Respirometers we can highlight the following common features: Compact - Standard and advanced calculation options - Friendly but powerful software - Simplicity of setup and operation - Automatic graphic Respirograms generation - Small footprint - Very low maintenance

For the activated sludge process SURCIS has developed three Lab. Respirometers:

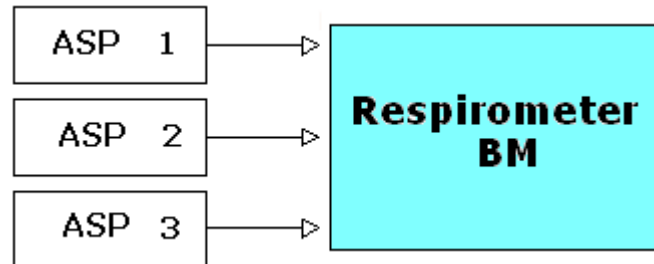


BM Respirometers can be used on different ways

The ways on which that BM Respirometer can be utilized are the following:

As a centralized system for more than one WWTP

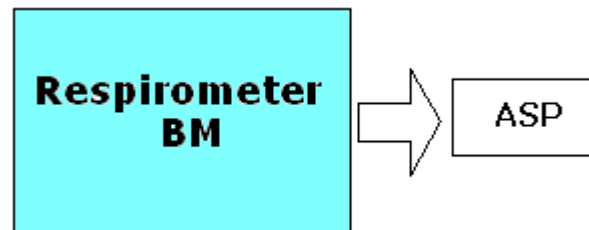
This a profitable way in which BM remains in one **central laboratory** where samples are coming to be analyzed from the activated sludge process (**ASP**) of different wastewater treatment plants (WWTPs)



One common application for that type of working mode is to take the pulse to each of the mixed-liquors samples coming from the treatment plants. On that way we can make an screening of the samples with potential problems and then go more in deep, with other respirometry analysis.

As a fixed system for one WWTP

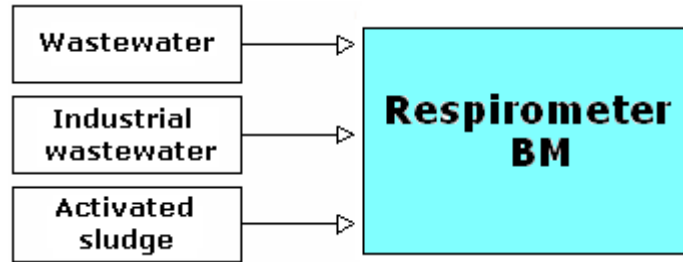
Here, the BM is installed in the **laboratory of one WWTP** for its own specific activated sludge process control and protection.



On that condition, in most part of the cases, it exist a higher availability of the instrument. Hence, we can make use of more respirometry tests and go further on any type of diagnosis.

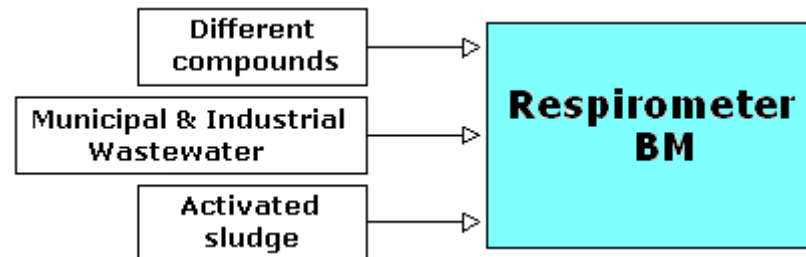
As a system in a Lab for general Respirometry tests

There are many **laboratories** dedicated to make Respirometry tests in their wide fan of possibilities: toxicity, biodegradability, biokinetic parameters, modeling and design.



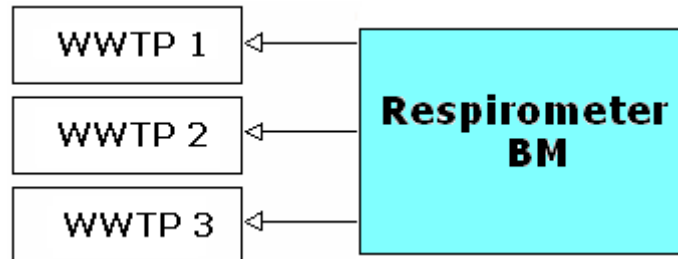
As a system for research purposes

Recently many **universities** and **water research centres** are interested in Respirometry technology as one of the most important tools to discover new treatment systems, industrial wastes impact on different treatment types, treatment capacities, energy optimization and many others.



As an easy transportable system (only BM-T+) to be displaced to several wastewater treatment plants (WWTP)

This case can only be applied in the BM-T+ because of more reduced size and provided with special suitcases for that purpose. The respirometer is supporting several plants and going to one to the other to be installed in each laboratory during the necessary time to get the corresponding analysis and diagnostics of the activated sludge process.



Others

BM Respirometry is open and flexible. For that reason the way on which the system can be used is very wide and can be adapted to most of the situations.

Some reasons to make use the BM Respirometry

1. Together with the microscopy, but much more efficient, the Respirometry is the only one open window to the microorganisms of the activated sludge and the actual reality of the activated sludge process.
2. Effective, simple, extremely fast, non-pollutant and at reasonable price.
3. It is not possible to assess an activated sludge process with only physic-chemical measurements: we are in need of parameters coming from the own biomass (activated sludge) and this can be only achieved by the Respirometry.
4. Analyze the effect that a wastewater or compound is making in the actual activated sludge process.
5. On easy, fast and practical ways, assess, protect, control the activated sludge process and follow-up its actual health.
6. Detect possible future problems and give up the guide lines for solutions.
7. Assess pre-treatment processes, effluent toxicity and biodegradation potential of waste streams.
8. Asses the impact of various inhibitory wastes and industrial effluents.
9. Lead to a route to improved plant performance.
10. Assess the exact requirements for the plant in order to optimize the efficiency at the lowest capital and operating costs.
11. Assess the amount of urban growth that the current operating plant can support.
12. Estimate the amount of industrial effluent that can be treated at a municipal plant.
13. Design new activated sludge processes.
14. It permits to optimize the current process operative parameters and lead the process to a possible energy optimization and important money savings.
15. It gives an essential support to simulation programs (BioWin, SassPro, GPS-X, ..)

Main benefits from the BM Respirometry use

In summary:

Problems prevention

The perfect combination of the most appropriate operative parameters together to the efficient follow-up of the activated sludge process health permits to anticipate and avoid typical problems such as bulking, foaming and progressive toxicity/inhibition.

Problems solutions

BM Respirometry is an essential tool to find out the guide lines to solve all problems related with the biological activated sludge process. Any corrective change we make in the process depends on the sludge activity. The BM-T can make a follow-up of that activity and give the corresponding alarm when it goes out of the normal range.

Assessing the actual removal capacity

By means the fast determination of the substrate removal rate and determine the biodegradable, slowly and readily biodegradable, and non-biodegradable (inert) substrate fractions.

Best Nitrification-Denitrification performance

The nutrients removal, under the frame of best performance and energy saving, constitutes a key point in the activated sludge process; and the BM Respirometry has demonstrated to be the best tool for it.

Energy optimization

Not always the energy saving is possible in the process but its best optimization.

Surcis has developed a protocol from which, by means the BM Respirometry, the aeration energy can run under its limit level without losing any efficiency within the biological treatment.

Wastewater treatment research

Wastewater treatments are on constant development and many Water Institutes and Universities have got important research projects on this sense. For that reason many BM systems are being used in those centres as an important tool for all the analysis of the biological wastewater treatment on different operative conditions that can be set in the BM respirometers.

Image

Efficient Respirometry analyzes, no-problems in the sludge process, efficiency, energy optimization, .. automatically gives an important image to the enterprise that is carrying out the BM-T Respirometry: Maintenance Company, Laboratory, Water organism, etc.

Environment protection

Finally, the most benefited is the Environment, and ... this is the most important.