

Q & A – ECHO RESPIROMETER

1.) What is respirometer?

Respirometer is device that measure respiration of living organisms.

2.) What is the media?

Respirometer can be used to monitor the metabolic reactions of microorganisms in aqueous (wastewaters) or soil media (compost, solid waste). You can also measure insects and small animals.

3.) What is the principal?

Echo Instruments respirometer measure carbon dioxide and oxygen concentration in head space under controlled conditions.

4.) Advantages of respirometric measurements?

- No chemical titrations are required
- Continuous record of oxygen and carbon dioxide concentration
- Larger sample volumes can be used to have more representative results
- Measuring at the same time more (6 or 12) samples to have the same experimental conditions for all biological samples from the start to the end of respirometry test.

5.) What are the advantages of Echo Instrument respirometer?

- Mass flow control of aerating gas for high accuracy
- Automatic condensate return to minimize drying of samples
- Automatic on-line calculation of all respirometry indexes

6.) Can we measure other gases, for example biogas production?

YES. We can add other gas sensors in measuring system: methane, hydrogen, ammonia, hydrogen sulfide...

7.) Can we measure effect of various physical, biological and chemical factors?

Respirometry is used for measuring effect of various factors, such as dilution, substrate type and substrate concentrations, pH, temperature and presence of toxins.

8.) Can we measure kinetic?

Yes. Respirometer can measure and determine kinetic parameters for biological grow.

Applications

9.) Can we measure biodegradability of bioplastic according to ISO standard?

Yes. 12 channels Echo respirometer was special designed to meet all criteria for measuring biodegradable plastic materials following ISO 14855 "Determination of ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide." and ISO 14852 "Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - method by analysis of evolved carbon dioxide".

10.) We like to use respirometer for determine activity of probiotics in different media?

We have made experiments for determine biological activity of probiotics. We test various products and compare the activity at different conditions and with different additives.

11.) We like to measure small animals like worms?

Echo Instruments respirometer with very wide range of set-up can be used for worms measurements at different conditions. You can use it also for different insects and animals. The Echo Instruments can provide custom designed chambers and vessels according to customer needs.

12.) Measuring compost maturity?

You can measure compost maturity in Echo Instruments respirometer. The difference in biological activity of different composts. You can also measure the compost activity adding different substances and measure the influences of different waste material or substance on compost activity.

13.) Can we measure parameters of municipal waste water for optimizing waste water plants?

The municipal waste water can be measured in Echo Respirometer with additional accessories for liquid samples. With this we can have agitating in the reactor vessels. We use dynamic method in aerobic or anaerobic conditions. It is not possible to describe an activated sludge process with only physic-chemical measurements. For this reason, respirometer give us direct all needed parameters of biomass activity (activated sludge) to measure cleaning effectiveness. With the help of respirometer, we have a fast technique for performing optimization of waste water cleaning plant for example in paper industry. Another application is measuring production of biogas by simulating various conditions: chemical composition, addition of active substances and additives, measuring other gases like H₂S, H₂ and NH₃. All in order to achieve the best quality biogas production and biodegradability. Toxicity is another

parameter measured with respirometer and help operator to maintain municipal waste water plant in perfect condition, analyzing any new pollutant before adding in the cleaning system.

14.) We are producer of food and beverage where we can use respirometer?

There are many applications for using respirometer in food and beverage production. You can measure different yeast production on various samples; for example: - wine production by testing different grapes on wine yeast type, - different conditions on wine production adding various additives or changing production conditions, - yeast activity measuring during harvest of beer production, - milk products fermentation and many more. You can use respirometer also for analyzing food and beverage waste degradation in waste re-usage projects.

15) We like to use waste for energy production?

The respirometer can be very effective tool for measuring biodegradation of waste. Measuring different combination of wastes can drastically increase effectiveness of energy production and lower the content of unwanted byproducts.

16) Measuring activity, toxicity and time of biodegradability for different pollutants in solid or liquid media?

The Echo Instruments respirometer is a perfect tool for simulating and monitoring influence of chemicals or biological agents in nature. For example, if you have an oil, petrol or chemical pollution you can determine how fast this pollution will degrade in nature and what will be the effect on microorganisms in nature. This is very important for some products which will end on land filled.

17) Can we measure degradation of our products and determine carbon dioxide finger print?

YES. Respirometer can be used for determine carbon finger print for biodegradable products. You can measure how much carbon dioxide will be released in atmosphere after complete biodegradation of the products and when it will be completely degraded. This can be used also for some product base on natural or bioplastic materials. For example: bags for waste...

Technical questions

18.) We are out of measuring range of sensor. What we can do?

In the case you measure to small concentration of carbon dioxide you need to lower the flow rate. This will increase concentration of carbon dioxide in head space. In the case you have to high concentration of carbon dioxide and you run out of range, the solution is to increase flow rate. This will dilute the sample in head space. If this does not help you need to adjust the quantity of sample in reactor. With low concentration you need to increase mass in the reactor and if you have too high concentration of carbon dioxide you need to decrease the mass. In some cases you can also dilute the sample. If there is very small activity in reference channel, then you need to find and use more active matrix.

19.) We have red alarm for flow control?

The alarm for flow indicate that you have leak in the measuring system. Most often the leaks are caused during closing the vessel. In that case check the cover of the vessel and check the connectors for in and out gas. Check if the pipes have good contact with connectors. Each Echo respirometer is carefully inspected and tested for any leaks in the system before delivery.

20.) There is no flow in the system?

Check the pump. If the pump stops it could be because it was over-heated. The pump has temperature safety switch. Leave the pump off for to cool down. Inspect if there is an obstacle in the pipe system causing resistance to air flow. Inspect pump membrane and replace it if this is needed. Check filters for high dust or water contend and change it if it is necessary.