

IRTH® FOR LONG-TERM CARBON STUDIES

IRTH RESPIROMETER

For biodegradation or soil health studies it is often desirable to make measurements over a longer term. Any bioassay longer than 3-days is considered “long-term”. For example, it is possible to conduct a 7-day test using IRTH® in a 1-liter jar (see Fig. 1). This permits sufficient O₂ without the need to refresh the air. For studies longer than 7-days (depending on respiratory rate) a flow-through system should be used so that oxygen does not become limiting. IRTH has an option for this.

Fig. 2 shows a set up with a flow-adjustment meter (attached to lab air) which delivers and quantitates the air rate to enable CO₂ emissions to be distinguished from background CO₂. In the example of Fig. 2 the air rate is set at 20 mL per minute and the CO₂ is holding at 902 ppm. In Fig 1. the mass of air is a constant. What are the results? IRTH indicates an accumulation of 3,344 ppm. After adjusting to the start level and substituting into the gas law equation [$n = PV/RT$] where V = vol % as CO₂ we obtain a meaningful result. In Fig 2. To allow for the longer time frame we use modified jars with air connectors attached to a caliper flow-meter. The IRTH unit now operates as a mini-flux chamber over the longer term and the flow rate over the length of the study defines the air volume, calculated for total CO₂.

Figure 1 Simple Assay for 1 to 7 days



Result for respiration with 100 g soil:
144 μ mole CO₂ or 17.24 mg kg⁻¹ as C.

Figure 2 Assay for Longer Term CO₂ Emissions



Result is total flow in liters x CO₂%
adjusted for entire time period.

IRTH® applications include emission rates of soils, for decay of organic residues including plant litter and composts, biodegradation of bioplastics, and compost stability. For more information, contact solvita@woodsend.com or go to our website at solvita.com/IRTH.