

# Stable Isotope Gas Analyzer

Continuous measurement of  $^{13}\text{C}$  and  $^{18}\text{O}$  isotopes in exhaled breath

The new Stable Isotope Gas Analyzer is a cutting-edge upgrade to our standard Promethion™ systems, allowing simultaneous measurement of stable isotope tracers synchronously with the Promethion data stream.

## Measure the oxidation of *exogenous* nutrients

Figure A demonstrates the oxidative disposal of IP injected  $^{13}\text{C}$ -U-glucose tracer at different doses in control mice. Critical metrics include magnitude and duration of response and Area Under the Curve (AUC) for calculating % dose recovery. Possible experimental manipulations include: age, diet, hormonal treatment, experimental drugs, microbiome manipulations, exercise, thermal exposure, surgical procedures, illness/injury, etc.

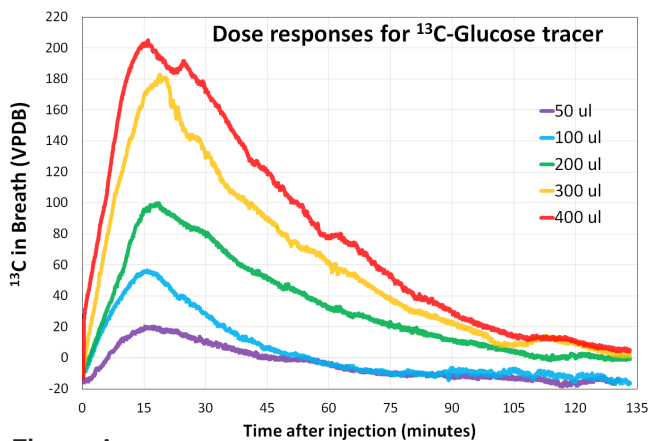


Figure A



## FEATURES

Simultaneous measurement of  $^{13}\text{CO}_2$ ,  $\text{C}^{18}\text{O}_2$ ,  $\text{CO}_2$ , and  $\text{H}_2\text{O}$

One analyzer can be multiplexed with up to 8 cages

Fast response time and low power requirement

Wide measurement ranges for  $\delta^{13}\text{C}$  (-100‰ to 4000‰) and  $\text{CO}_2$  (380 ppm to 25,000 ppm)

High precision for both  $\delta^{13}\text{C}$  (0.6‰) and  $\delta^{18}\text{O}$  (4.0‰) as well as  $\text{CO}_2$  (0.05 ppm) and  $\text{H}_2\text{O}$  (50 ppm)

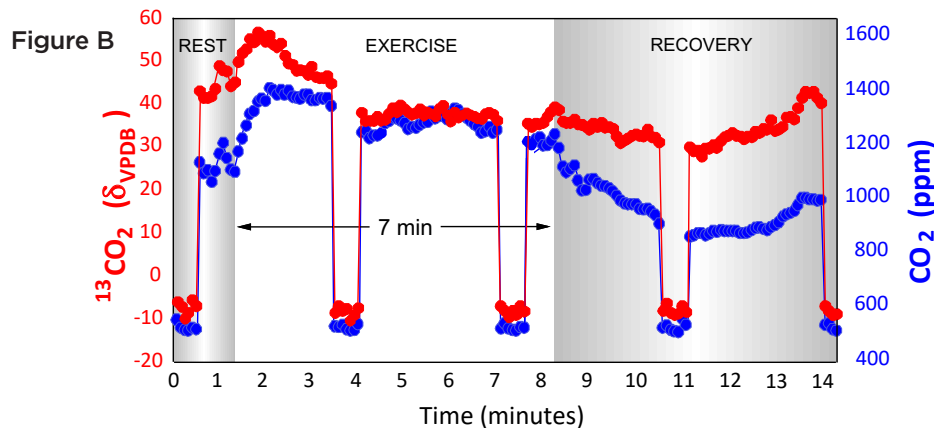
Over 10,000 different isotopically-labeled tracers commercially available

No consumables or external calibration required

# Stable Isotope Gas Analyzer

## Measure the oxidation of *endogenous* nutrients

Figure B shows the oxidation of a fatty acid tracer ( $^{13}\text{C}$ -Palmitic acid) infused into rodent diet for 10 days, selectively enriching the body lipids with  $^{13}\text{C}$ . The  $\text{CO}_2$  and  $\delta^{13}\text{C}$  measured during rest, treadmill exercise (15 m/min) and recovery show that total lipid oxidation of a mouse increases during the first minute of exercise, but decreases to resting levels during steady-state exercise. Researchers could also selectively enrich the proteins in the body by feeding rodent diet infused with  $^{13}\text{C}$ -L-Leucine, thereby allowing quantitative assessment of endogenous protein oxidation in real-time.



## SPECIFICATIONS (air background)

<b>PRECISION</b> (1 SEC/10 SEC/100 SEC)	$\delta^{13}\text{C}$ : 6.0‰ / 2.0‰ / 0.6‰
	$\delta^{18}\text{O}$ : 32‰ / 10‰ / 4‰
	$^{12}\text{CO}_2$ : 1.6 ppm / 0.6 ppm / 0.2 ppm
<b>TOTAL UNCERTAINTY</b>	< 1%
<b>MEASUREMENT RANGE</b> (MEETS ALL SPECS)	$\text{CO}_2$ : 380 – 25,000 ppm
	$\text{H}_2\text{O}$ : 4000 – 60,000 ppm
<b>OPERATIONAL RANGE</b>	$\text{CO}_2$ : 0 – 50,000 ppm
	$\text{H}_2\text{O}$ : 0 – 70,000 ppm (non-condensing)
<b>MEASUREMENT RATES</b>	User-selectable rates up to 1 Hz
<b>SAMPLING CONDITIONS</b>	Ambient Humidity: non-condensing (0 – 100% RH)
	Sample Temperature: -20 – 50 °C
	Operating Temperature: 5 – 45 °C
<b>FITTINGS</b>	Outlet (internal pump): 1/4 in.
	Inlet: 3/8 in.
<b>OUTPUTS</b>	Digital (RS-232), Ethernet, USB
<b>POWER REQUIREMENTS</b>	115/230 VAC, 50/60 Hz, 66 W
<b>DIMENSIONS (H x W x D)</b>	18cm (7") x 47 cm (18.5") x 36 cm (14")
<b>WEIGHT</b>	17 kg (37.5 lbs.)

For more information on stable isotope labeling utilization, see:

McCue, M. D. (2011). "Tracking the oxidative and non-oxidative fates of isotopically labeled nutrients in animals." *BioScience* 61(3): 217-230.

Welch Jr, K. C., et al. (2016). "Combining respirometry with stable isotopes to investigate fuel use in animals." *Annals of the New York Academy of Sciences* 1365(1): 15-32.

McCue, M. D. and K. C. Welch Jr (2016). " $^{13}\text{C}$ -Breath testing in animals: Theory, applications, and future directions." *J Comp Physiol* 186B(3): 265-285.

## ABOUT US

Sable Systems International designs and manufactures leading-edge gas, metabolic and behavioral measurement systems for calorimetry, respirometry, metabolic/behavioral phenotyping, and gas analysis. Our products enable the highest precision and resolution, optimum workflow and reliable performance – giving you utmost confidence in your results. By scientists, for scientists, Sable enables results that impact research and industry breakthroughs.



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