SABLE ENABLES

Stable Isotope Gas Analyzer

Continuous measurement of ^{13}C and ^{18}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 shows the oxidative disposal of a 2.5 mg bolus of ^{13}C-glucose in a control mouse. Possible experimental manipulations include: age, diet, hormonal treatment, experimental drugs, microbiome manipulations, exercise, thermal exposure, surgical procedures, illness/injury, etc. Critical metrics include magnitude and duration of response and AUC for calculating % dose recovery.

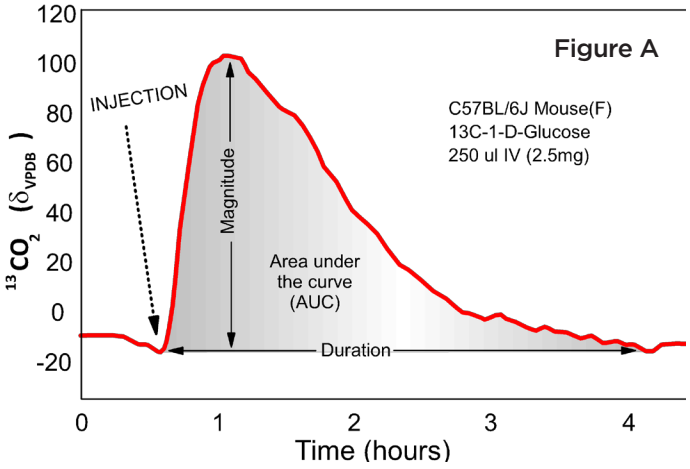


Figure A

FEATURES

- Simultaneous measurement of $^{13}CO_2$, $C^{18}O_2$, CO_2, and H_2O
- One analyzer can be multiplexed with up to 8 cages
- Fast response time and low power requirement
- Wide measurement ranges for $\delta^{13}C$ (-100‰ to 4000‰) and CO_2 (300 ppm to 25,000 ppm)
- High precision for both $\delta^{13}C$ (0.15‰) and $\delta^{18}O$ (1.0‰) as well as CO_2 (0.05 ppm) and H_2O (50 ppm)
- Over 10,000 different isotopically-labeled tracers commercially available
- No consumables or external calibration required

PROMETHION™ PROMETHION CORE™

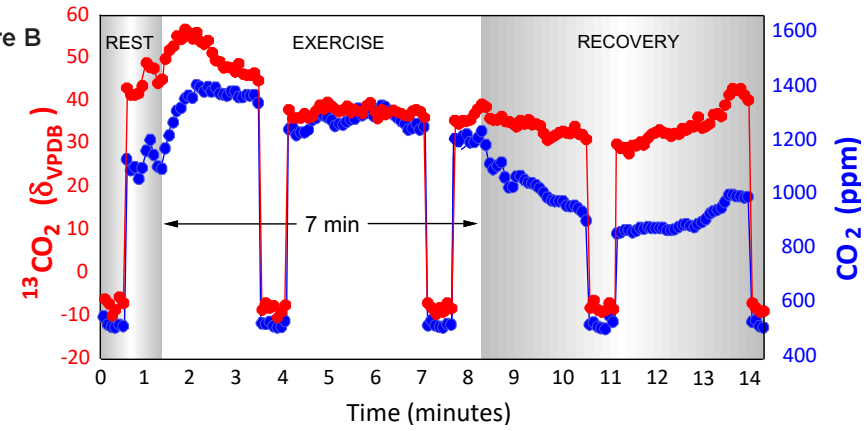
SABLE SYSTEMS INTERNATIONAL

Stable Isotope Gas Analyzer

Measure the oxidation of *endogenous* nutrients

Figure B shows the oxidation of a fatty acid tracer (^{13}C-Palmitic acid) infused into rodent diet for 10 days, selectively enriching the body lipids with ^{13}C. The CO_2 and $\delta^{13}C$ 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}C-1-L-Leucine, thereby allowing quantitative assessment of endogenous protein oxidation in real-time.

Figure B



SPECIFICATIONS

PRECISION (1 SEC/10 SEC/100 SEC)	$\delta^{13}C$: 3.0‰ / 1.0‰ / 0.30‰
	$\delta^{18}O$: 16‰ / 5‰ / 2‰
	$^{12}CO_2$: 0.8 ppm / 0.30 ppm / 0.10 ppm
	H_2O: 200 ppm (60 sec) / 100 ppm (300 sec)
TOTAL UNCERTAINTY	< 1%
MEASUREMENT RANGE (MEETS ALL SPECS)	CO_2: 380 – 25000 ppm
	H_2O: 4000 – 60000 ppm
OPERATIONAL RANGE	H_2O: 0 – 70000 ppm (non-condensing)
	CO_2: 0 – 50000 ppm
MEASUREMENT RATES	User-selectable rates up to 1 Hz
SAMPLING CONDITIONS	Ambient Humidity: non-condensing (0 – 100% RH)
	Sample Temperature: -20 – 50 °C
	Operating Temperature: 0 – 45 °C
FITTINGS	Outlet (internal pump): 1/4 in.
	Inlet: 3/8 in.
OUTPUTS	Digital (RS-232), Ethernet, USB
POWER REQUIREMENTS	115/230 VAC, 50/60 Hz 66 W
DIMENSIONS (H x W x D)	18cm (7") x 47 cm (18.5") x 36 cm (14")
WEIGHT	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}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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