ADVANCES IN MEASURING RESPIRATORY ETS ACTIVITY AS A MEASURE OF POTENTIAL RESPIRATION IN PLANKTON.

T.T. Packard[1], M. Alcaraz[1] y M. Gómez[2]

[1]Instituto de Ciencias del Mar, CSIC, Barcelona.
[2]Facultad de Ciencias del Mar, Universidad de Las Palmas de Gran Canaria

Measuring the activity of the respiratory electron transport system (ETS) requires the application of analytical chemistry, biochemistry, enzymology, and physiology. In addition, the interpretation and application of ETS measurements to oceanography and ecology requires knowledge of these two fields plus microbiology, invertebrate zoology and algology. Understanding the reactions involved and their relation to the respiratory process, determining the dependence of ETS activity on biomass, time, temperature, pH, enzyme stabilizers, extinction coefficients, and substrate concentration; and developing reliable biological standards are all critical to good ETS activity measurements. Here we discuss the concept behind ETS measurements and interpretation, explain advances in its measurement, recommend changes in terminology, and propose future experiments.

Specifically, we will demonstrate the following. (1) How a kinetic ETS assay guarantees evidence of reaction-rate linearity with time, cuts reaction time in half, and eliminates the need for turbidity blanks. (2) Why one can eliminate substrate blanks and why it is necessary to measure the Michaelis-Menten V_{max} when measuring ETS activity. (3) The biochemical meaning of the respiration-ETS ratio in seawater. (4) New measurements of the molar specific absorption coefficient for the tetrazoliums, INT and CTC, yielding 17.8 and 22.9 absorbance units $(\text{mM formazan})^{-1}$ $(1\text{ cm cuvette})^{-1}$, respectively. Finally we propose using baker's yeast (*Saccharomyces cereviseae*), with an ETS activity (20°C) of $25.1 \pm 5.1\ \mu\text{mol } e^{-}\ \text{min}^{-1}\ (\text{mg dry weight})^{-1}$ as a biological standard.