

Seminar

Section for Microbiology, Aarhus University

WATEC - Aarhus University Centre for Water Technology

Prof. Emeritus

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ICBM, University of Oldenburg



“Magic measurements of proton-related processes”

Wednesday 20 February, 2019

9.45 – 10.45

Ny Munkegade 114 - Bld. 1540 - Room 116

All interested are welcome to join the seminar

Abstract

Many microbiological processes are coupled to release or uptake of protons, e.g. by production of acids or bases, transport processes, photosynthesis, respiration-driven proton translocation. The changes can be scalar (chemical consumption or production of H^+) or vectorial if protons are transiently translocated across the cytoplasmic membrane. In physiological studies those changes are normally ignored by adding buffer. In non-buffered cell suspensions, a pH electrode can be used to study a large number of physiological processes on a nano- to micromolar range and at a time scale of seconds to minutes. Problems arise from the facts that (a) scalar and vectorial processes are running concomitantly and (b) the vectorial processes are typically in a steady state.

In my presentation I would like to show how to handle the problems by the experimental set-up and by computer-based simulation. The examples shown will include sulfate transport and reduction, nitrate- and nitrite ammonification, H_2 oxidation, aerobic respiration, electron transport-coupled and light-driven proton translocation.

A freeware application '**Proton**' (or **H^+**) was developed that allows for quantifying the metabolic steps by Michaelis-Menten and first-order kinetics. The app also calculates proton-motive force and ATP conservation and can be downloaded from www.microbial-world.com