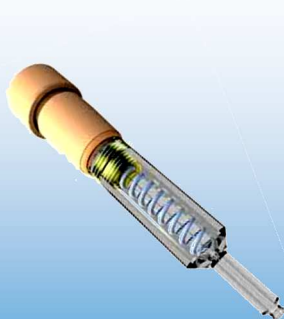




BVT TECHNOLOGIES, a.s.

ELECTROCHEMICAL SENSORS AND DEVICES

AUTUMN 2014



Dear customers,

We are pleased that we can inform you about new measuring set for biochemical activity evaluation.



Minithermostat +TC4 + oxygen electrode + precise stirrer



„Electrochemical sensors and biosensors can be effectively used for biochemical activity measurement.“

Dr. Jan Krejci, CEO



Our team

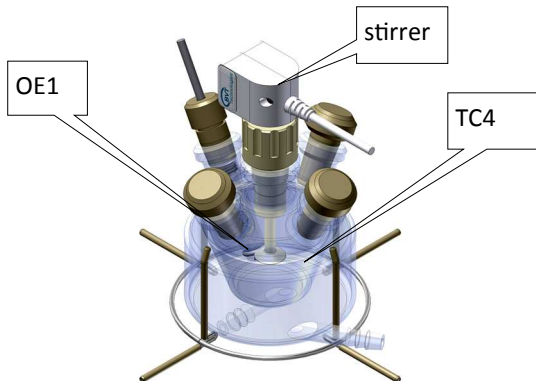
Set for enzymatic and biochemical activity measurement

Typical measurements:

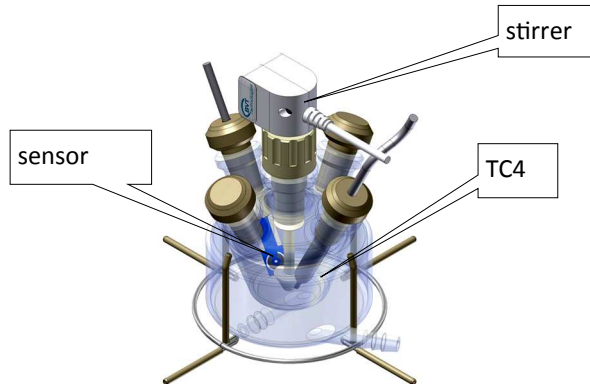
- Measurement of the enzyme activity
- Measurement of the oxygen production — respirometry
- Analysis of biochemical reaction kinetics

Set is available in 2 options:

A) with oxygen electrode



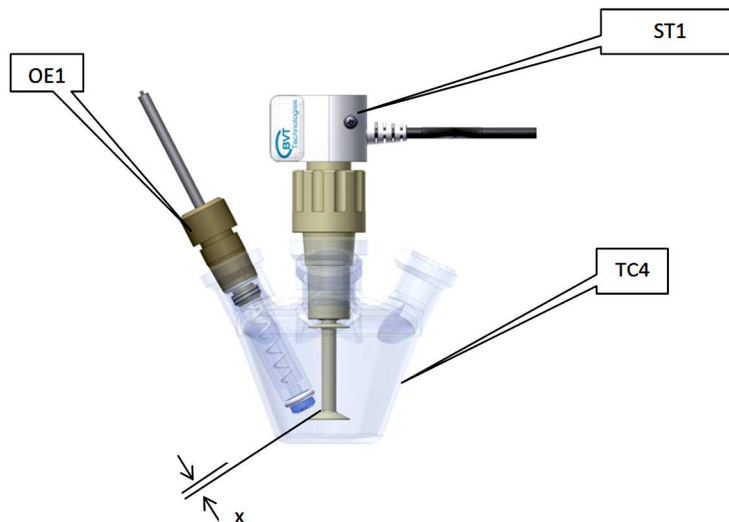
B) with sensor



A) Arrangement of activity measurement with oxygen electrode

Set consists of:

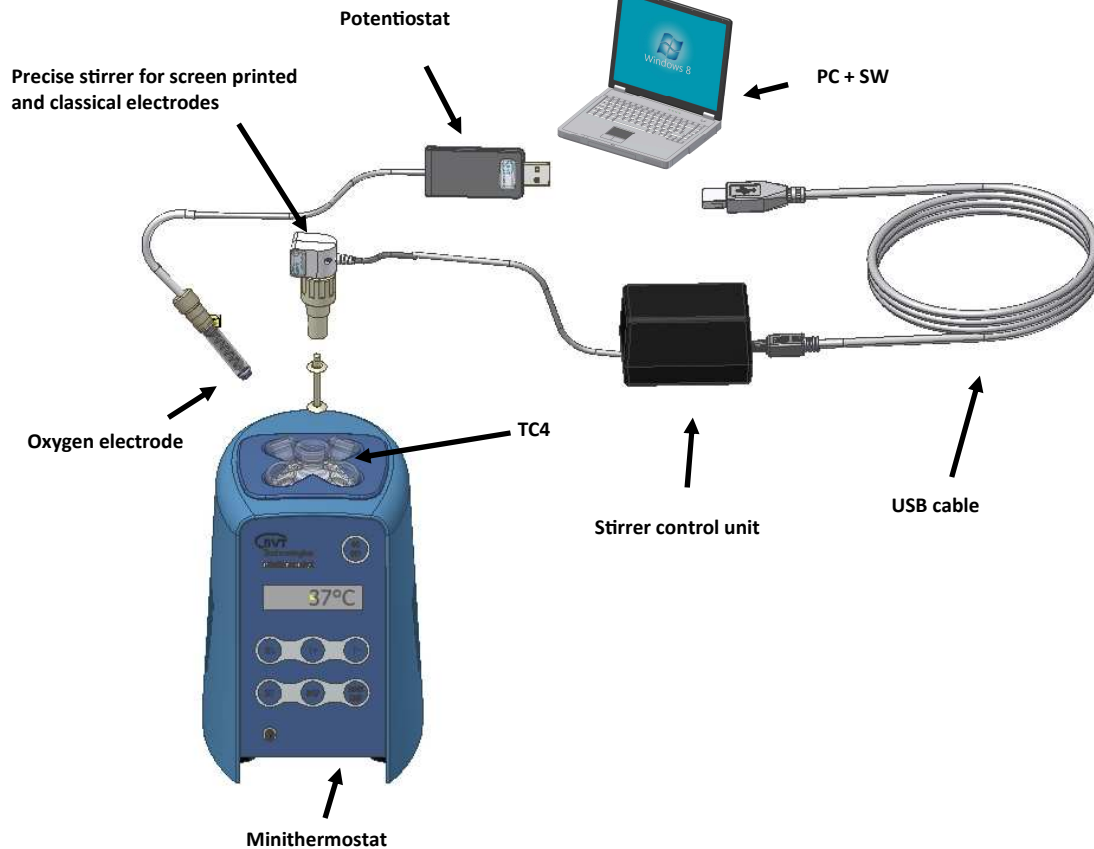
- Precise stirrer for screen printed and classical electrodes
- TC4
- Minithermostat
- Potentiostat
- SW
- Oxygen electrode
- Control unit



Typical measurements:

- Measurement of the enzyme activity
- Measurement of the oxygen production — respirometry

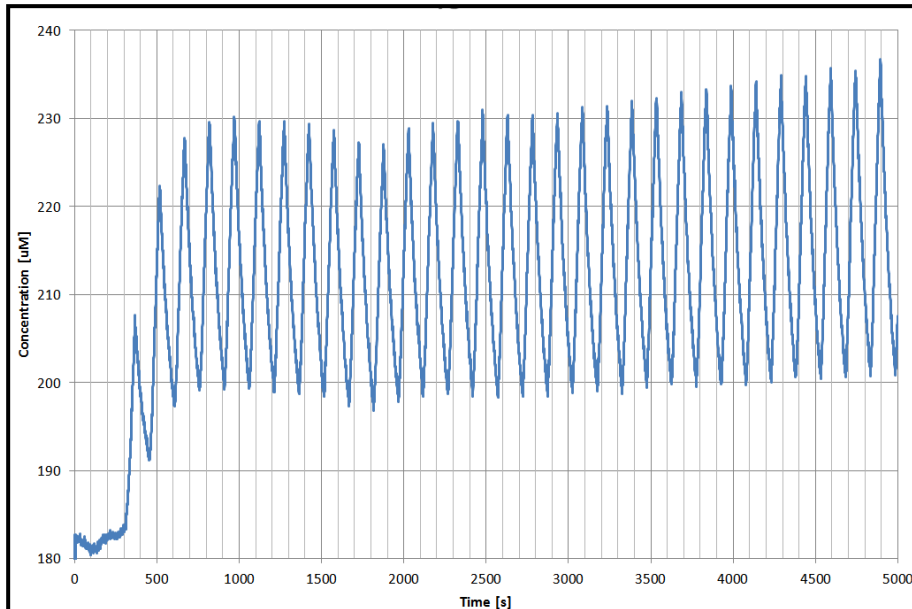
inverse conic stirrer + oxygen electrode



Example 1:

Measurement of algae respiration after illumination (oxygen concentration)

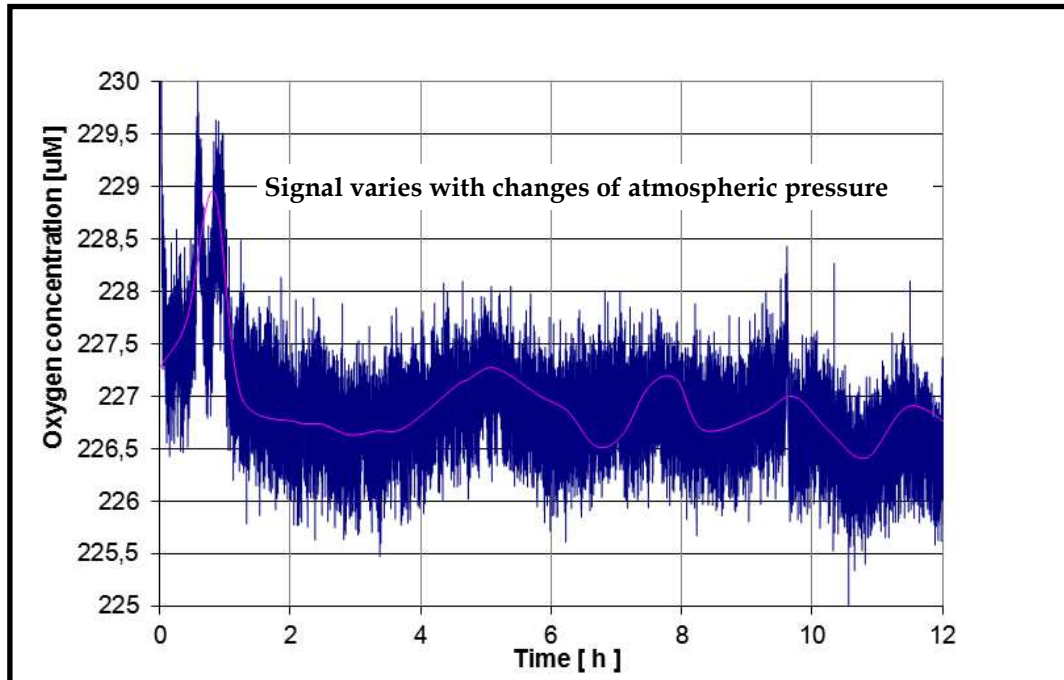
Optimized hydrodynamics and mass transfer assure high stability of signal ($<0,1\%$ / 24 hours) and high sensitivity (better than $0,01\%$ of oxygen in equilibrium with air [4], [1], [2]).



Evaluation in Excel - each spike corresponds to 60 seconds of algae illumination

Example 2:

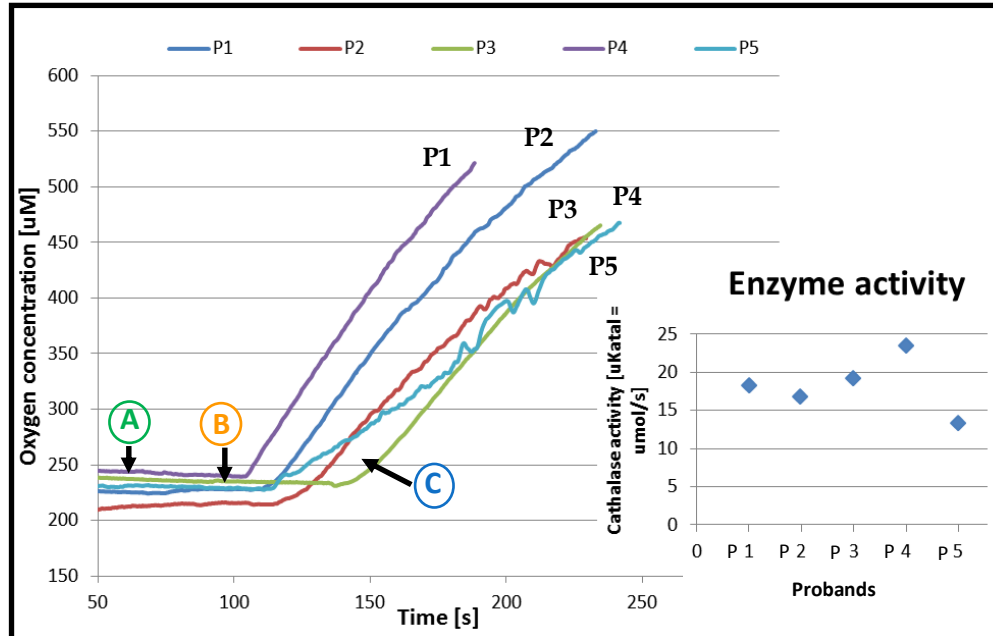
Long-term stability of electrodes



Evaluation in Excel

Example 3:

Measurement of catalase activity in the blood



(A)

Signal of O₂ electrode
in equilibrium.

(B)

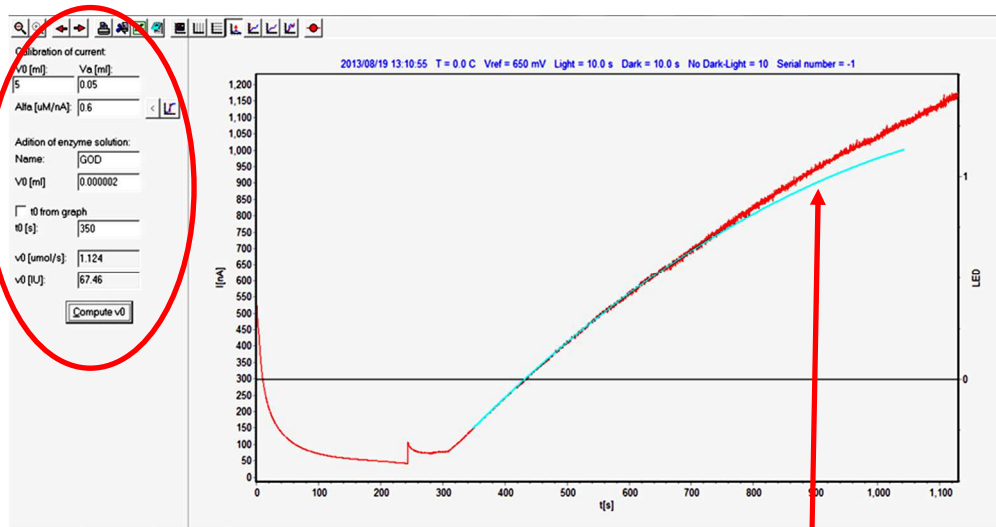
Addition of H₂O₂.

(C)

Addition of 2 μl of
blood.

Evaluation in Excel - catalase in the blood at different probands

SW environment of USB potentiostat



Integrated software for enzyme activity evaluation

Automatic evaluation of initial reaction rate

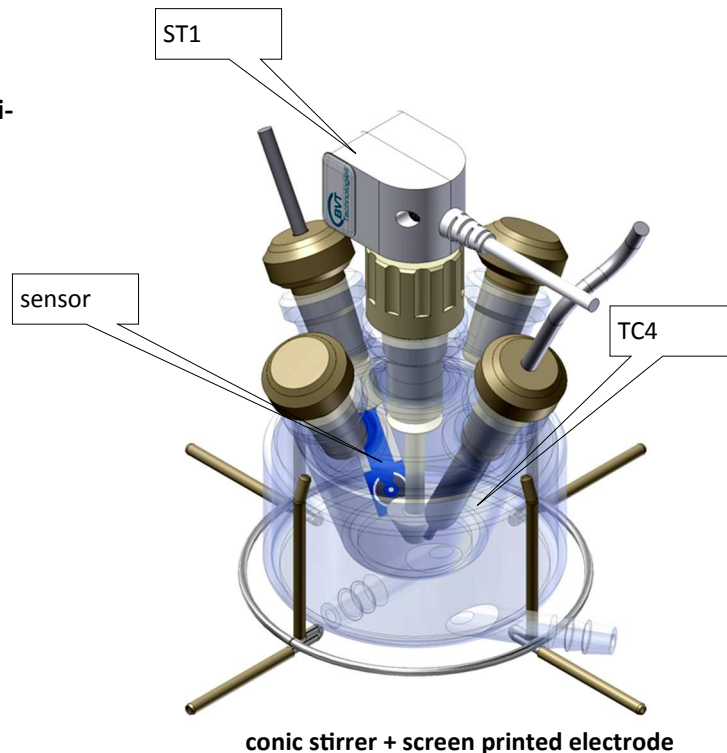
B) Arrangement of activity measurement with sensor

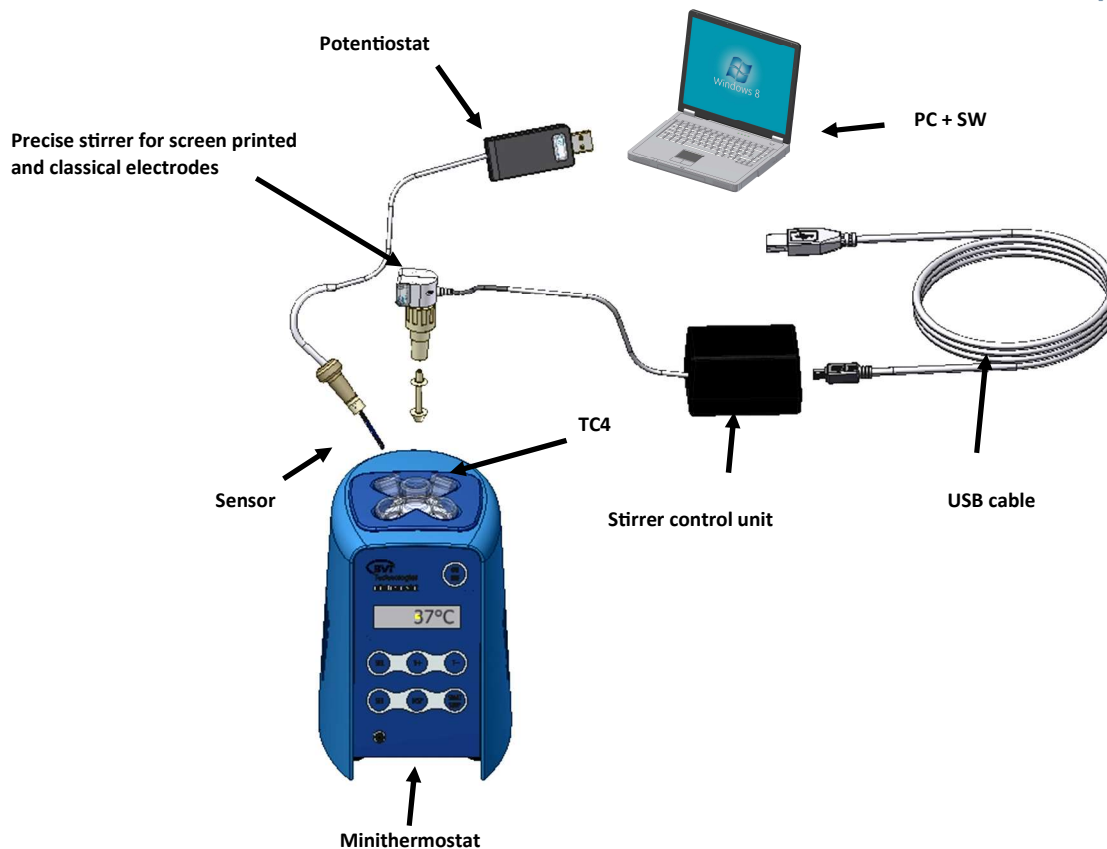
Set consists of:

- Precise stirrer for screen printed and classical electrodes
- TC4
- Minithermostat
- Potentiostat
- SW
- Sensor
- Control unit

Typical measurements:

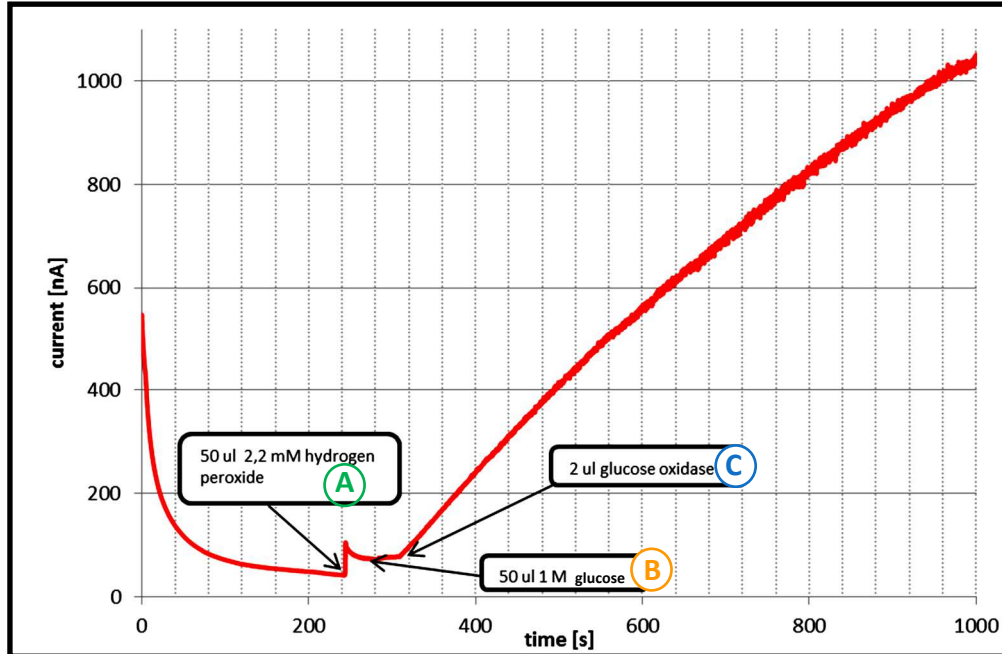
- Concentration measurement
- Enzyme activity measurement
- Analysis of biochemical reaction kinetics





Example 5:

Glucose oxidase activity measurement



(A)

Sensor current is calibrated by product addition (H_2O_2)

(B)

Substrate of enzymatic reaction is added (glucose).

(C)

Enzyme (GOD) is added. Initial reaction rate is measured and evaluated.

Reliability and fast response are assured by conic stirrer and screen printed sensor.

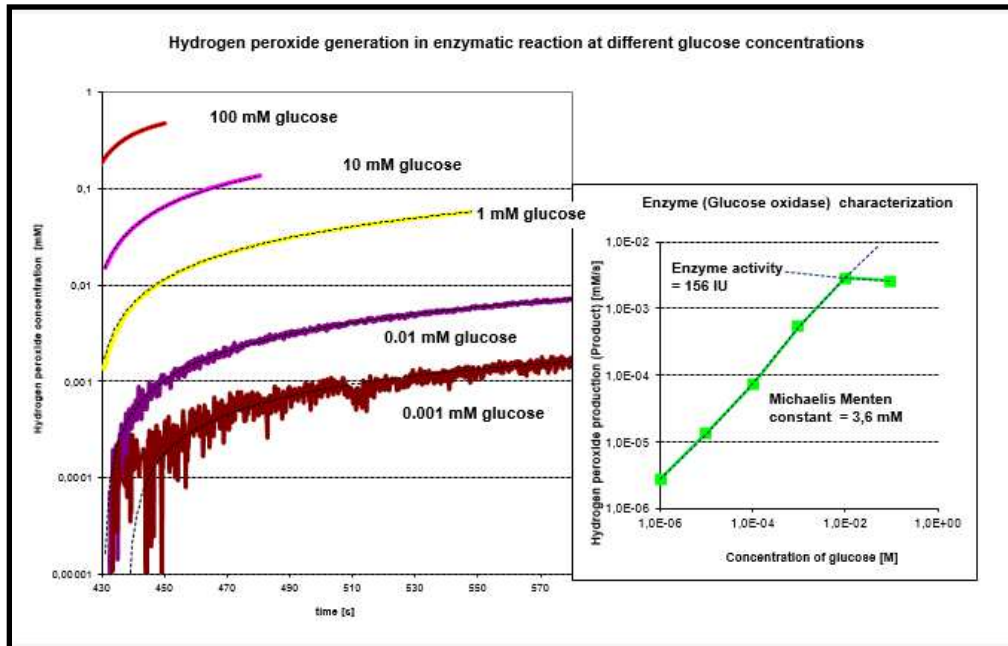
[2], [3], [5]

Evaluation in Excel

Example 4:

Characterization of enzyme – glucose oxidase (GOD)

Hydrogen peroxide generation in enzymatic reaction at different glucose concentrations



Evaluation in Excel

References

- [1] Schenk Mayerová, A., Bučko, M., Gemeiner, P., Katrlík, J. Microbial monooxygenase amperometric biosensor for monitoring of Baeyer-Villiger biotransformation, *Biosensors and Bioelectronics* 50 (2013) 235-238.
- [2] Krejčí, J. Šejnohová, R. Hanák, V., Vránová H. Screen Printed Electrodes with Mass Transfer. *New Perspectives in Biosensors Technology and Applications*. pp 291-310, June 2011, Croatia. ISBN 978-953-307-448-1.
- [3] Krejčí, J., Lacina, K., Vránová, H., Grosmanová, Z. Microflow Vessel Improving Reproducibility and Sensitivity of Electrochemical Measurements. *Electroanalysis* 20 (2008) 2579-2586.
- [4] POSTER—Krejčí, J, Uhlířová, L., Auger, V., Pasirayi, G. The influence of hydrogen peroxide and pyocyanin in the life cycle of *Scenedesmus quadricauda*. 1th Satellite Workshop “High Sophisticated Biosensor Systems and their Applications” in Brno, Czech Republic.
- [5] Macholán, L. Biocatalytic Membrane Electrodes. *Biocatalytic Membrane Electrodes*, 329 - 369.



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