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BVT Technologies, a.s.

Company head office: Strážek 206, 592 53 Strážek, Czech Republic

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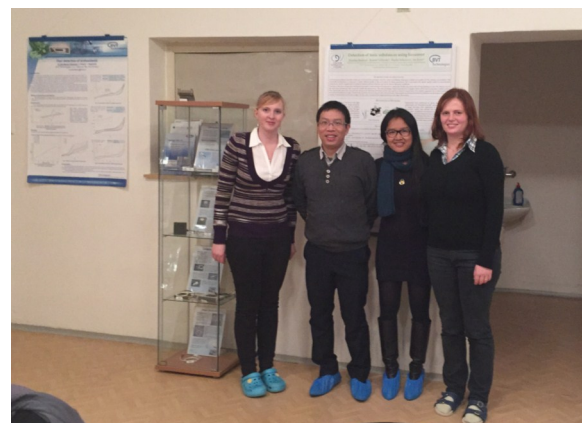


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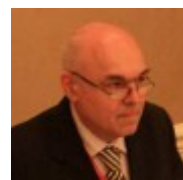
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Dear customers,

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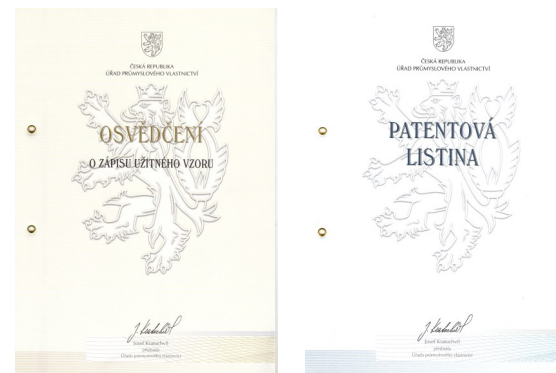


Partners from University of Science and Technology of Ha Noi , Vietnam



"We finally finished the project INTEGDO (TA02030179). The applications are presented here.

Dr. Jan Krejci, CEO



The utility model no. 27636 was granted.

Where we can meet in future:

January 2016

- Nanotech, 27th—29th January 2016, Tokio

February 2016

- Vodárenská biologie 2016, 3rd—4th February 2016, Prague, Czech Republic
- Roadshow Austria, Germany (Linz, Regensburg, Tulln)

May 2016

- XXXVI. Modern Electrochemical methods, 18th—22nd May 2016, Jetřichovice, Czech Republic

July 2016

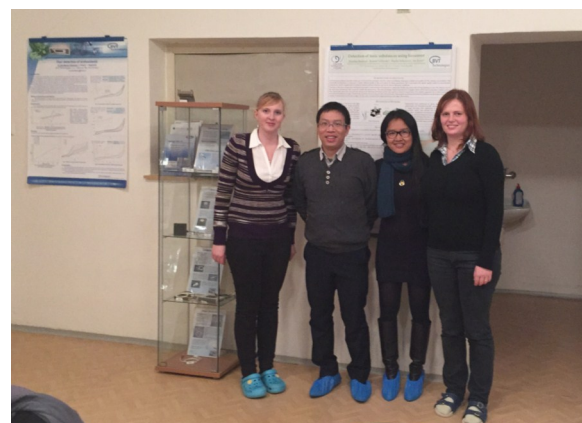
- follow www.bvt.cz for details
- Roadshow Dresden, Sensortechnik Neainsberg, Liberec
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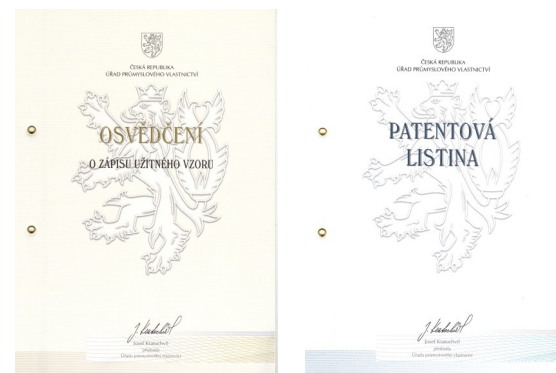


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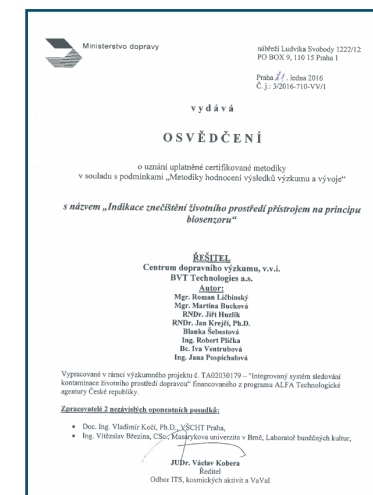
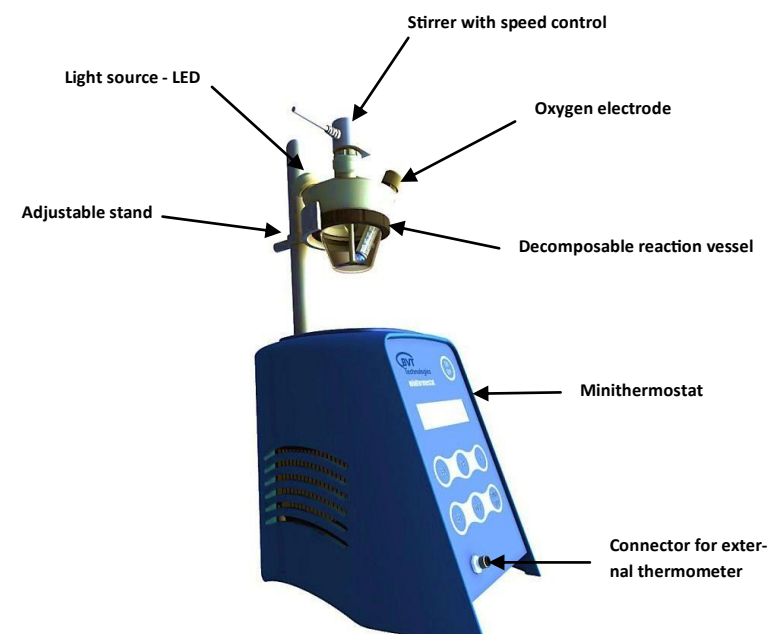
- [1] Utility model no. 27636 (Czech Republic)
- [2] Patent no. CZ305687 (Czech Republic)
- [3] Certified methodology: Indikace znečištění životního prostředí přístrojem na principu biosenzoru
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- [5] MACHOLÁN, Lumír. *Enzymologie*. 2. upr. vyd. Brno: Vydavatelství Masarykovy univerzity, 1994. 152 s. ISBN 80-210-1039-8

The device AlgaTox was developed with support of the **Technological Agency of the Czech Republic (TACR)** in project no. TA02030179 with partner **The Transport Research Centre (CDV)**.



AlgaTox

AlgaTox is a new device for detection ecotoxicity based on precise monitoring of algae oxygen production after their light stimulation. The **methodology was certified** by Czech ministry of transport. The use of device is, however, broader. We make some overview here to give you some inspiration in your work. We are seen to introduce this technology and we will be happy to measure your samples. [1], [2] Algatox was patented in the Czech Republic (CZ 305687).



Certificate of the methodology

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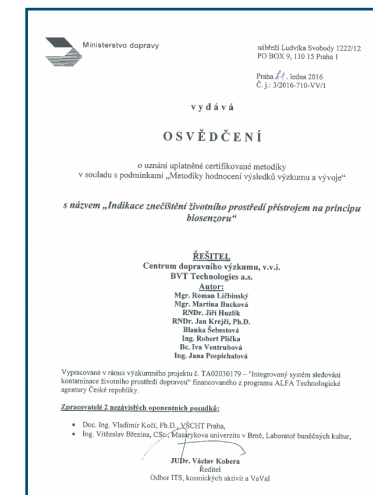
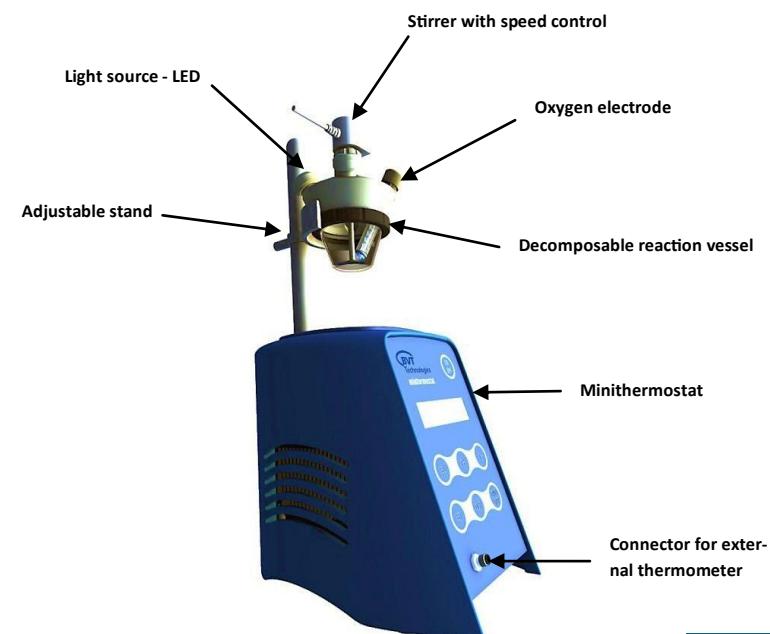
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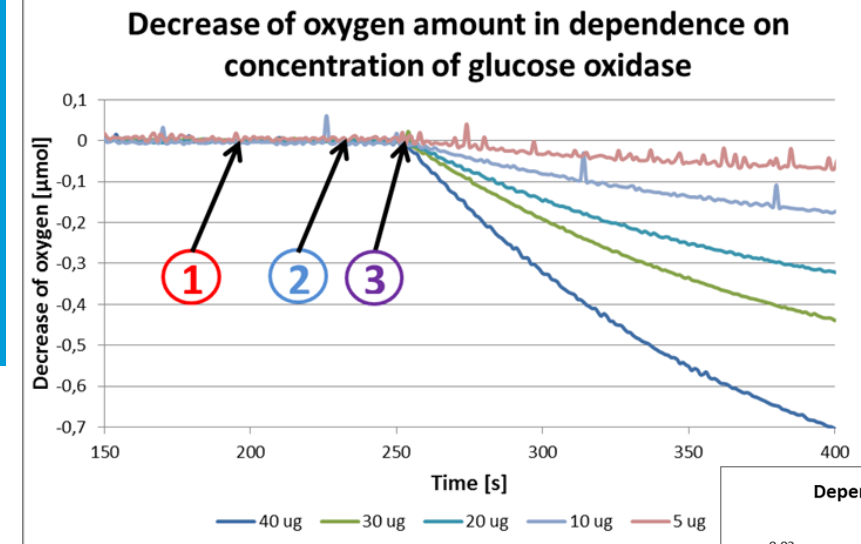
Examples of measurement with AlgaTox device

The device AlgaTox was developed to **monitor the oxygen production by algae**. However the device can be used for **many other applications**.

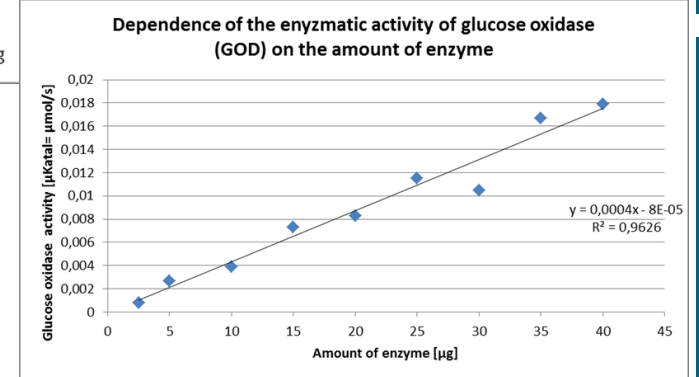
Some of them are described in next examples.

- The effect of aqueous extract on oxygen production by algae
- The measurement of the production of oxygen by plant leaves at different temperatures
- Measurement of enzymatic activity of blood catalase by oxygen electrode
- Measurement of enzymatic activity of glucose oxidase

4



- 1 — Stabilized concentration of oxygen
- 2 — Addition of 25µL of 1mol/L glucose
- 3 — Addition of 2µL of enzyme glucose oxidase in different concentrations



The specific enzymatic activity of the GOD sample is 0,4 µkatal/mg.

13

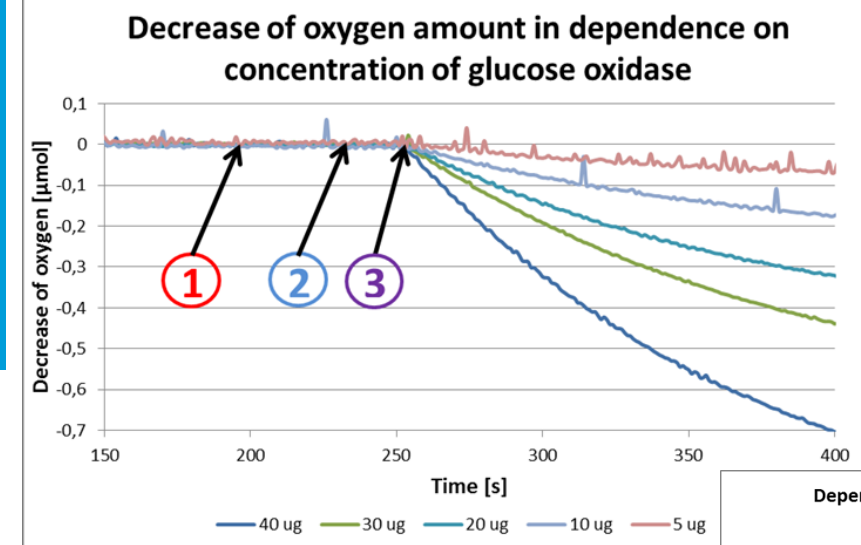
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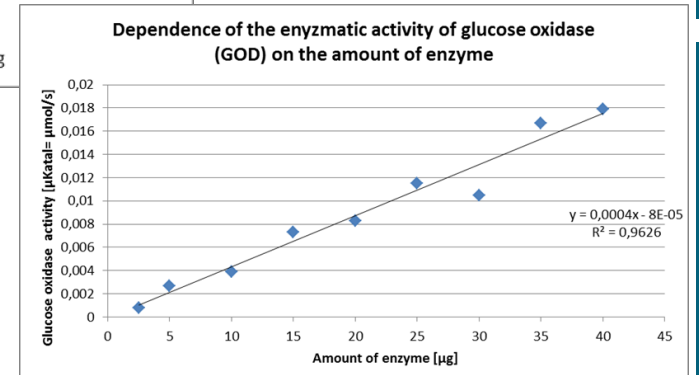
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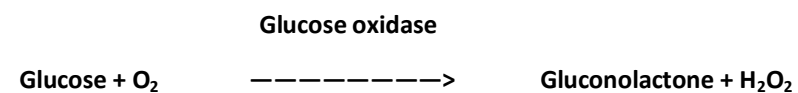
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4) Measurement of enzymatic activity of glucose oxidase

Prepared: Iva Ventrubová

The analysis of **enzyme kinetics** is used as a tool to find out the enzyme activity and enzyme-substrate interaction and affinity. The example shows the measurement of glucose oxidase activity.



Glucosaoxidase catalyses the reaction between the glucose and oxygen. The product of reaction is **gluconolactone and hydrogen peroxide**. We can measure the decrease of oxygen by **oxygen electrode** which is **incorporated in AlgaTox device**.

12

Work with AlgaTox in laboratory of Transport Research Centre (CDV), Czech Republic.



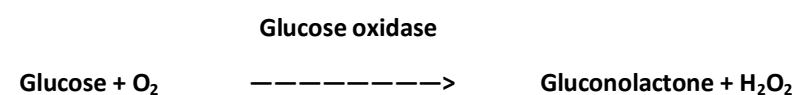
Photo is made by Mr. Pecháček, Czech Republic.

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1) The effect of aqueous extract on oxygen production by algae

Prepared: Jana Pospíchalová

The **algae ecotoxicological test** takes at least 72 hours.

The test duration including sampling, delivery of samples, their analysis and result evaluation can be up to 1 – 2 weeks in practical conditions.

Long time of test does not allow to make action in case of acute toxicity.

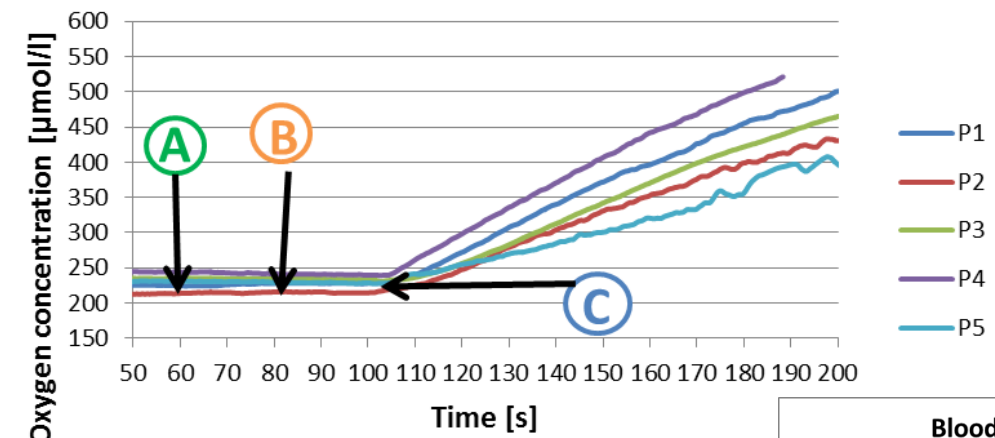
The graph presents the toxicity measurement by device AlgaTox.

The device measures the production of oxygen **after algae illumination**. It enables to measure the acute toxicity higher than 10x EC₅₀ in classical test in 2 hours. The results of toxicity measurement based on oxygen production were compared with **ISO8692** results.

The **methodology** for measuring the algae with device AlgaTox **was certified** in January 2016 by the Czech Ministry of Transport.

6

Reaction of blood catalase at different probands

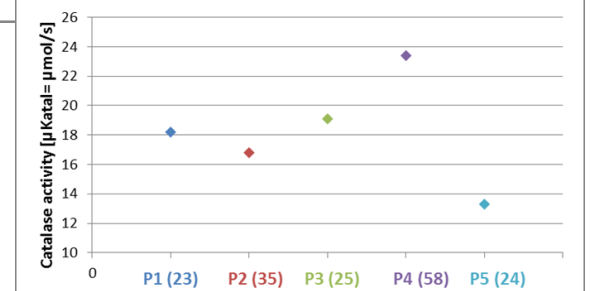


A — Signal of O₂ electrode in equilibrium.

B — Addition of hydrogen peroxide.

C — Addition of 2µl of blood sample.

Blood catalase activity



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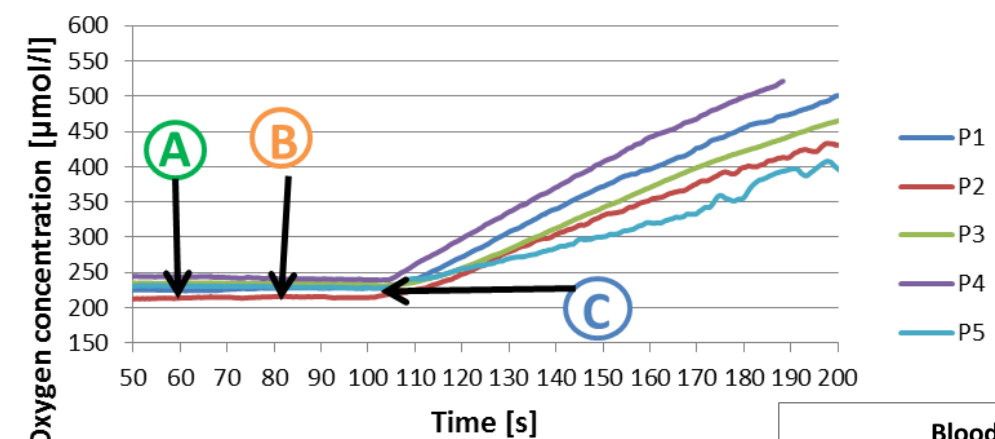
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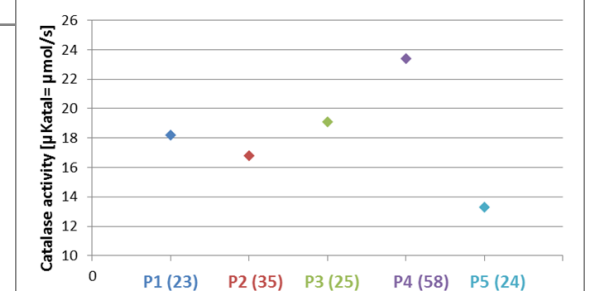


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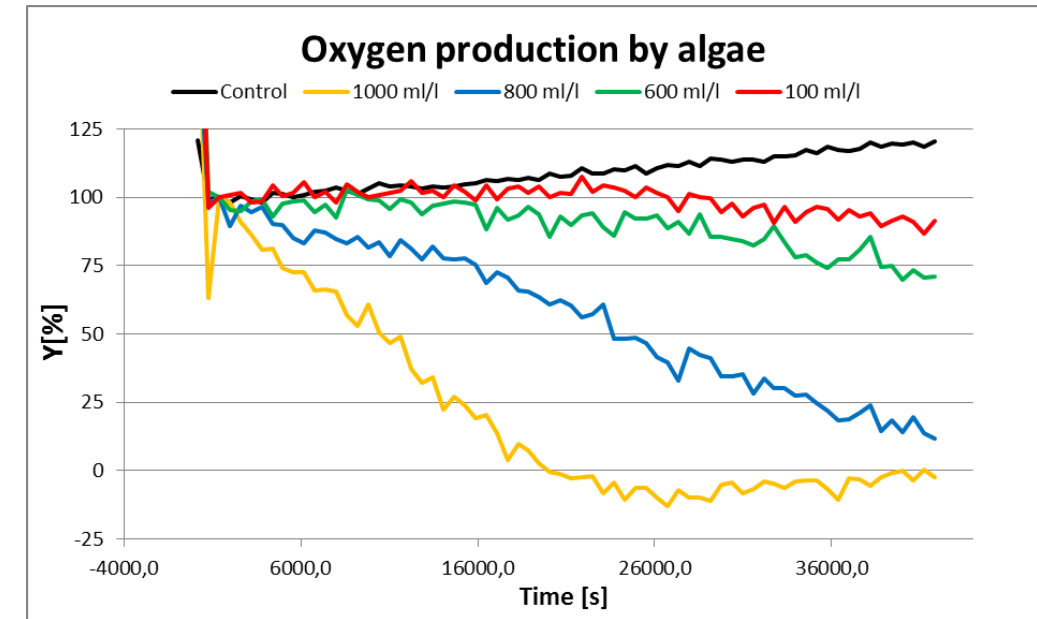
11

3) Measurement of enzymatic activity of blood catalase by oxygen electrode

Prepared: Iva Ventrubová

Catalase is very specific in its reaction, which is the conversion of hydrogen peroxide to water and oxygen. Hydrogen peroxide is a product of a number of oxidation reactions in cells and it can damage them. One of the functions of catalase is to **degrade hydrogen peroxide** and thus prevent the accumulation of toxic levels of the oxidant.

This catalase is a **marker of antioxidant activity of body**.



(Y = relative decrease of oxygen which is produced by one cell of algae and referenced to oxygen production by algae in growth medium)

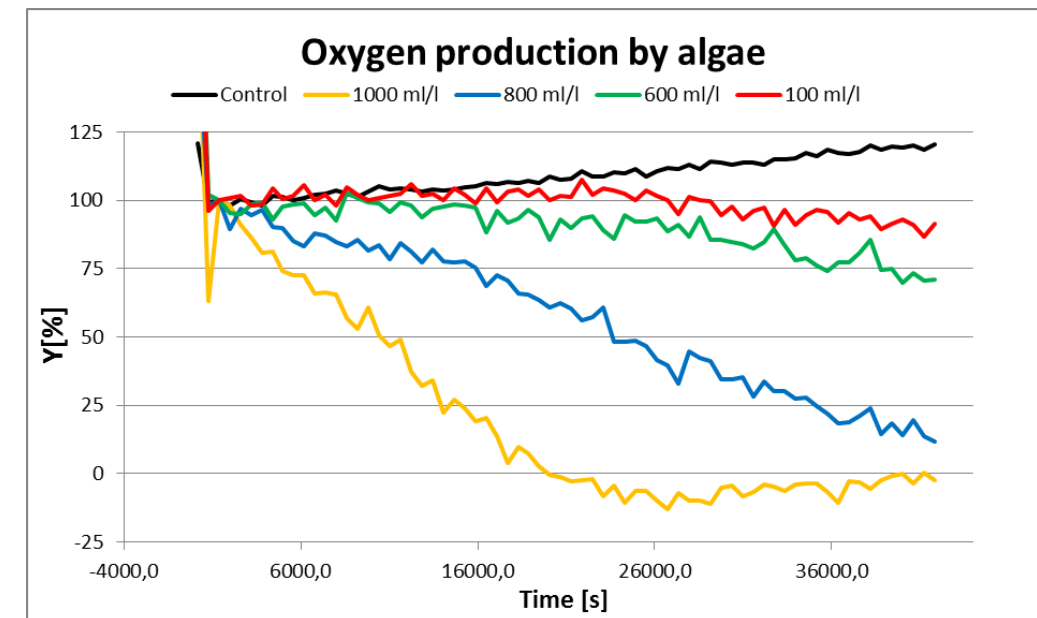
The test was made as an interlaboratory test. Certified body prepared unknown sample of ecotoxic compound. Each laboratory must find the dilution of sample which generates the toxicity EC_{50} in classical test of algae growth (ISO 8692). The results of 72 h laboratory test was 7 - 20 ml/l. AlgaTox was able to detect the dilution 100 ml/l (the lowest concentration in 10 hours). [3], [4]

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2) The measurement of the production of oxygen by plant leaves at different temperatures

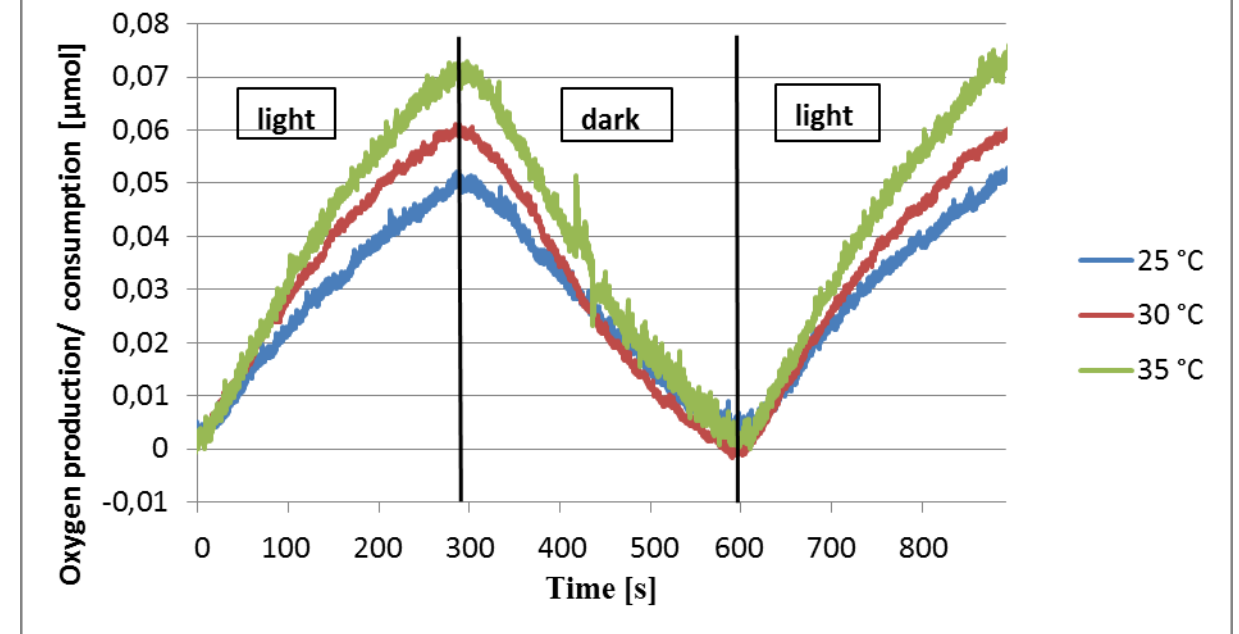
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Extraordinary sensitivity of device enables to measure the production of O₂ by photosynthesis in plant leaves.

As an example the course of oxygen production of *Eruca sativa* L. leaves after illumination at different temperatures, is displayed in next figure.

8

Temperature dependence of the production of oxygen by *Eruca sativa* L.



9

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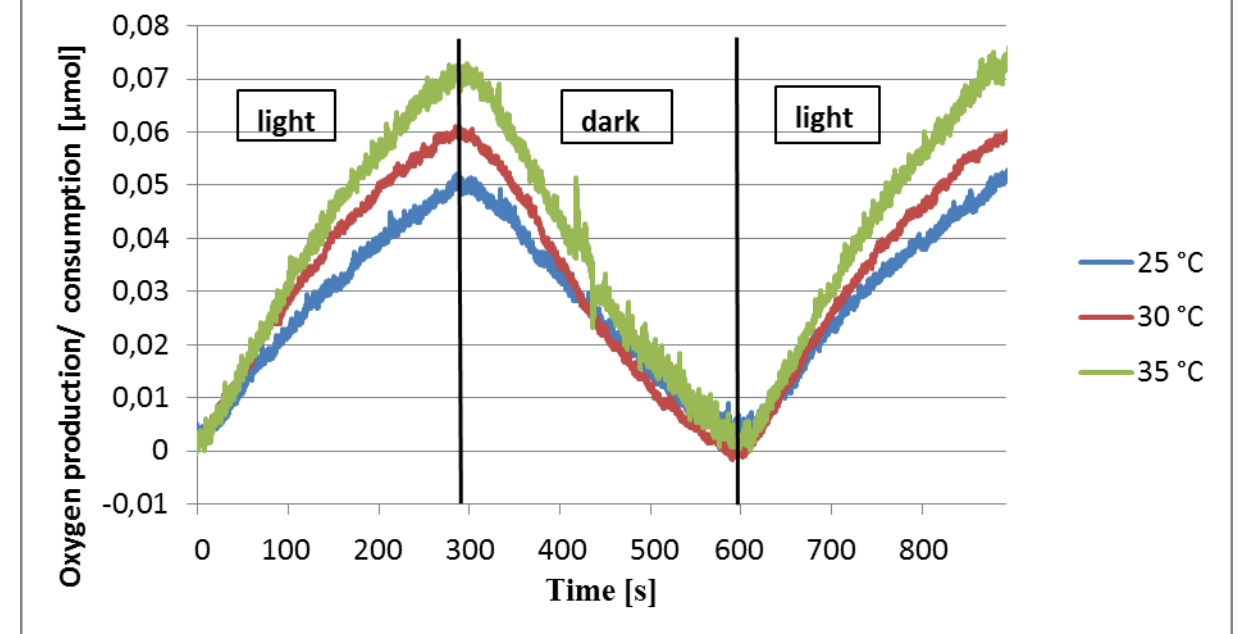
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