

## Thermal Characteristics of *Spirulina platensis* cells at Various Values of pH Medium in temperature range 5-140<sup>0</sup>C. DSC investigation.

Institute of Physics, Georgian Academy of Sciences, Tbilisi, 380077.

J.Monaselidze, Sh.Barbakadze, G.Majagaladze, L.Topchishvili.

E-mail: [mon@iph.hepi.edu.ge](mailto:mon@iph.hepi.edu.ge)

The thermal characteristics of *Spirulina platensis* (*Sp.pl.*) cells being in logarithmic phase of growth (three-day culture) in the temperature range 0 – 140 <sup>0</sup>C at various values of pH medium have been determined. The measurements were carried out by modified DSC created on the basis of work [1]. The sensitivity of DSC is 0.5  $\mu$ W, measuring vessel volume –0.3 cm<sup>3</sup>, scanning rate may be changed from 0.01 up to 100 <sup>0</sup>C/min, measurements of temperature range 0-150 <sup>0</sup>C. It should be noted that DSC, which is used in our experiments, is equipped with all programs needed for determination of the thermodynamic parameters of protein denaturation process in solutions and deconvolution of calorimetric curves. It was shown that there exists a bell like dependence between the value of heat (-Q) released by *Sp.pl* cells in the temperature range 0-50<sup>0</sup>C (-Q) does not contain heat of membrane protein denaturation (Fig.1a, exotheric peak I at 39<sup>0</sup>C) and pH medium. Maximum value of (-Q) is observed in pH range 9.3-10.3 and at heating rates lower than 0.08<sup>0</sup>C/min. In this conditions –Q=86.2 $\pm$ 10cal/g *Sp.pl.* biomass. It was also shown that clear and narrow heat absorption peaks (Fig 1a,b) are observed in the temperature range 50-115<sup>0</sup>C. We conclude on the basis of each transition stage identification that the subcellular structures denature independently from each other *in situ*. The data obtained give also the possibility to carry out comparative analysis of thermal properties of *Sp.pl.* cells being in the phase of logarithmic growth with data of thermal properties of cells being in stationary phase of growth [2].

The work is supported by ISTC project G-342.

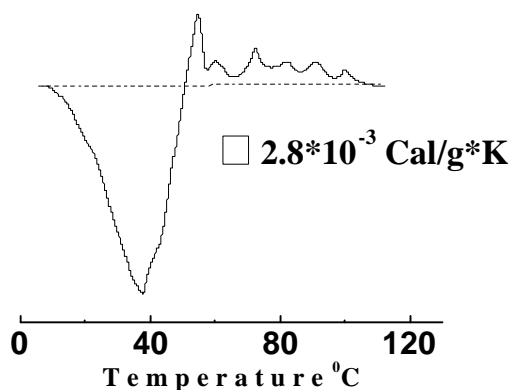


Fig.1a

Microcalorimetric record of thermal effect of *Sp.pl* cells being in logarithmic phase of growth (Zarrouk's medium, pH 10.0), in stationary regime, in dark and non-aerobic conditions. Quantity of cell suspension-280.5mg, quantity of dry biomass-4.85mg, scanning rate –0.33<sup>0</sup>C/min. –Q=16.9 $\pm$ 1.5cal/g *Sp.pl.*

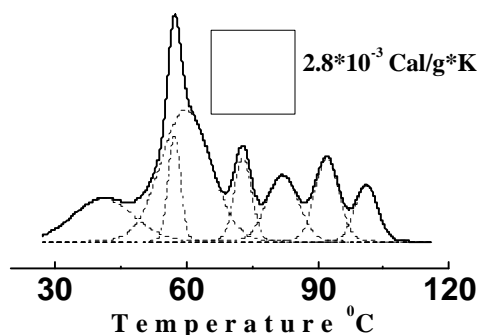


Fig. 1b

Heat absorption curves as a function of temperature ( $dQ/dT$ ) cal\*g<sup>-1</sup> K<sup>-1</sup> of *Sp.pl.* being in logarithmic phase of growth (Zarrouk's medium, pH 10.0) preliminary heated up to 40<sup>0</sup>C and than cooled for 30min up to 5<sup>0</sup>C and again heated, scanning rate – 0.33<sup>0</sup>C/min. Q<sub>total</sub>=4.5 $\pm$ 0.4cal/g *Sp.pl.*

## REFERENCES

1. G.Majagaladze, J.Monaselidze, R.Chikvashvili. Differential Calorimetry – Copyright No.1267175. Russia.
2. L.Topchishvili, Sh.Barbakadze, A.Khizanishvili, G.Majagaladze, J.Monaselidze. Microcalorimetric Study of Iodized and Non-iodized Cells and C-Phycocyanin of *Spirulina platensis*. – Biomacromoleculs. in press.