PO E 11

Scanning Microcalorimetry Investigation of Native and Iodized Spirulina Platensis Cell Culture

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The measurements were carried out on the difference scanning microcalorimeter (DSM) specially designed for investigation of complex biological systems on the basis of work [1]. The sensitivity of DSM is 10^{-7} cal/sec, the measuring cell volume - 0.290ml, heating rate may change from 0.1° up to 100°C/hour, the temperature range of measurements: 10-150°C.

The stationary cell culture of Spirulina Platensis was investigated in the wide range of pH 9.0 -11.85 and cell concentration 0.2 - 15%. lod concentration in iodized Spirulina Platensis cell (buffer solution of Zarrouk, 1960) was l00μg/Iod on 100mg of dry weight of cells.

It was shown that the denaturation process of Spirulina Platensis cell culture suspension has a complex profile and at a given pH solution is reproduced with high precision. The dependences Qd = f(pH), Qd = f(c%), Td = f(pH), where Qd is an integral heat absorbed in the process of cell denaturation, Td - temperature corresponding to one of the main maxima on heat capacity curve (pH 9.0, Td = 70°C, pH 11.5, Td = 79.5°C) were obtained.

It was estabilished that the heat-evolution (Qd°) - endothermal process, is observed in living culture of cells at their heating (in temperature range 30 - 52°C). The Qd° value is changed from 0 up to 4.7cal/g and depends on the intensivity of cell respiration and O_2 evolution (photosynthesis). The maximum of heat absorption peak of native cells at scanning rate 40°/hour is equal to 51.3±0.3°C and 2°/hour is equal to 44°C. Six distinct maxima with Td 55.0±1.0°C, 70±1.0°C, 85±1.0°C, 98±2.0°C, 108 °C, 120°C are observed in the temperature range 15.0 - 135 °C. The observed heat absorption peaks are identified on the basis of DSM study of solution C-phycosianin and RNP and DNP complexes isolated from Spirulina Platensis.

Similar measurments were carried out with cell culture in the presence of KI. The influence mechanism, of lod on substructures of Spirulina cells is discussed.

The special attention is paid to the identification of peak at 70°C which becomes dominant at high pH.

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1. Majagaladze G., Monaselidze J., Chikvashvili R., 1986 USSR authors certificate member 1267175