

SYSTEM FOR THE COMPUTERIZED CONTROL OF AN AUTOMATIC OLIGONUCLEOTIDE SYNTHESIZER

Oswaldo Olmea y Rolando Rodríguez.

Division of Physical Chemistry, Center for Genetic Engineering and Biotechnology, P.O. Box 6162, La Habana 6, Cuba.

SUMMARY

A system for the control of an oligonucleotide synthesizer was designed. The computer program is used to run the synthesis and the user is allowed to perform direct operations. Editors for oligonucleotide sequences and synthesis methods were also included.

RESULTS AND DISCUSSION

The Gene Assembler (Pharmacia, Sweden) is an automatic device for the chemical synthesis of oligonucleotides, built upon a sequence which is the main data entered to the system. The sequence can be formed by the bases A, C, G and T, X and Y are introduced for spare modified bases. Inclusion of wobbles (more than one base added in one cycle) is also possible.

The synthesizer is a continuous flow machine with a peristaltic pump and motorized rotatory valves to release the reagents, the pump and the valves are controlled by a Liquid Chromatography Controller (LCC-500, Pharmacia, Sweden) that can be connected to a computer using an EIA RS232 port.

The LCC-500 can be programmed using a set of instructions (method) to indicate at any moment the flow rate and the reagents to add. In such a way one method is assigned to each base added to the sequence.

In the controller there are up to ten memory locations to store methods, the computer program distributes the methods in each location and creates a special method to organize the calling to the rest in the order defined by the oligonucleotide sequence.

The number of methods can overflow the existing memory locations, and the program makes a planning to the runtime changes in the LCC-500 memory.

The planning consists in the insertion of **wait** instructions to the main method and the construction of a queue with the methods to introduce in previously selected memory locations.

To evaluate the coupling efficiency during the process the machine uses an ultraviolet absorbance monitor, during the control the absorbance data is also used to change the methods at the correct reaction point.

During the synthesis the user not only can follow the evolution of the process, but also is able to edit sequences or methods, because we have developed a library to share the processor time between several running processes.

The system includes several utilities for the setup of the machine and the sequence files handling. All the program is menu driven.

This system was programmed in Borland Pascal version 7 and is now running in a personal computer IBM PS/2 Model 30 compatible with a i8086 CPU running at 10 MHz and a MCGA graphic card.

REFERENCES

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