

However, it took another five years, before his work was internationally accepted. From this time, the triumphant progress of microtiter plates led to its use in different application ranges like clinical diagnostics, molecular biology and cell biology, also in food analysis and pharmaceuticals. Without Dr. Takátsy's invention, recent scientific applications involving high-throughput screening would be impossible.

New scientific disciplines

In particular clinical chemistry and of course the immune diagnostics of the late seventies and early eighties had a great demand in convenient and quick solutions for the processing of large sample numbers. Therefore, the technical staff of equipment manufacturers put a large effort into designing more exact, more economic and quick detection methods.

However, titration was still the quantitative detection method involved. It would still take some time until the benefits of photometry would be utilized and even years until the first microtiter plate reader as we know it today would be designed. The great handicap of titration was inherent in the method: in volumetric analyses like titration, the endpoint is defined by a change in color. Therefore, its assessment is often

subjective and thus a source of error to be deleted. The technology of choice was photometry, offering the wanted objectivity. However, the requested sample volume was by far too high to be processed by standard photometric measurement. The measuring arrangement of photometers, i.e. light source → filter → sample → detector, does not allow to measure more than nine to ten cuvettes in a sequence. Each sample has to be individually exposed to the light beam.

Vertical instead of horizontal measurement

The solution was ingeniously simple. The technicians had the idea to measure the samples with a vertical light beam, making it relatively simple to measure a high number of samples through the sample bottom when closely arranged in a matrix. The consecutive sample measurement could be performed by moving the sample matrix along the detection site or by moving the measuring device from sample to sample. However, classic photometric measurement is based on the Beer-Lambert Law and requires a well-defined sample thickness in the direction of the light path.

While classic photometry solves this problem using cuvettes with defined thickness, vertical photometry involved highly exact dispensing of the sample

volume, because the direction of the light path is from the bottom of the sample tube to its meniscus or vice versa. No reliable procedure was available at that time, and some time would pass, until microtiter plates would be used for samples. We should keep in mind that they had not been originally designed for photometric purposes. Plates were filled with pipettes and later with multichannel pipettes; therefore, the matter of reproducible sample thickness was solved.

Today, working with microtiter plates is an essential part of laboratory work in biology, chemistry and biotechnology. Applications range from biochemical, medical and cell-biological methods to the pharmaceutical screening of active compounds. Microtiter plates and their periphery develop independently. Increasing needs in high-sample throughput and low-volume measurement lead to the design of economic, time-saving fully automated equipment with highly sensitive detection devices.

Small footprint, flexibility, precision

In the course of time, microtiter plates underwent many changes and modifications to meet market requirements. Also readers were further developed and optimized for a number of various applications.

Today, they are easier to use, smaller and more precise than ever. Also flexibility has become an increasingly important issue. For example, photometers with a monochromator for any wavelength are available, and they are equipped with software that even makes it easy to fulfill FDA requirements like 21 CFR Part 11.

Microtiter plates together with the respective readers and automated devices made life easier for countless users in laboratories. Even today, the handling of high sample numbers would be almost impossible without the equipment that evolved from the pioneering spirit and inventiveness of a man who used a shortage in material to successfully develop an idea. Thank you very much, Dr. Takátsy!

References

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