

Quality control

# Rapid analysis

Rapid microbiological testing for the beverage industry can now save up to 15 days on the production cycle for soft drinks, fruits juices and concentrates.

**A**t a time of increasing effectiveness, safe and quick product releases are an important factor. Quality control microbiology has traditionally been limited by the growth rate of microorganisms on culture media, and so rapid microbiology systems have become more interesting to quality assurance managers.

In the beverage industry, production pressures encourage a reduced microbiological tests deadlines for quality control (QC). The main objective is to reduce the time of the production cycle and the storage area, and to minimize the risk and cost associated with potential process contaminations.

Traditional methods such as the petri dish or the test of accelerated ageing, require three to seven days to provide results. Often the raw material is used and sometimes the end product is already dispatched before obtaining the result.

If a contamination problem is belatedly revealed by the QC laboratory, hygiene measures must be applied on the production chain and/or to reprocess the end product. These actions are curative, not preventive.

In the last few years, several alternative methods have been developed to provide earlier results in one or two days. But the majority of them have limitations such as sensitivity of detection, susceptibility of



The BactiFlow® ALS

product interference and the inability to give results in real time.

A new quantitative method, developed by the AES Chemunex division and based on flow cytometry, obtains results in a few minutes. Three systems adapted to routine requirements for the industrials are available: D-Count, BactiFlow ALS and BactiFlow.

The D-Count and BactiFlow ALS systems combine fully automated fluorescent viable cell labelling and digital flow cytometry into powerful systems that can detect and count individual cells without the need for cell growth as a detection requirement. This means that quantitative results can be available within 30 minutes and no pre-enrichment is required as in process control application (e.g. water testing, fruit juice concentrate analysis, pasteurization control). While pre-incubation of final products is required, results are typically available in 24-48 hours. D-Count and BactiFlow ALS have a strong analytical rate of 50 samples per hour (using D-Count) and 25 samples per hour (using BactiFlow ALS).

BactiFlow is a compact system conceived for a slower analytical rate. This technology has been used for many years in beverage, dairy, cosmetic and

pharmaceutical industries, and is a formidable tool for rapid microbiological testing for fruits preparations, fruits juices and fruits concentrate industries.

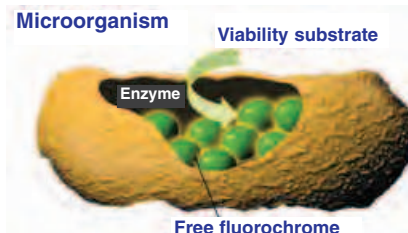
Protocols were developed for the soft drinks and fruits juices industries, to analyze pulpy and non-filterable products such as fruits concentrates. The method is adapted to control the 'sterility' of the end products (after 24-48 hours of incubation) and to enumerate total flora aerobic mesophile or yeasts and spores of moulds, in 45 minutes on fruits concentrates and intermediate products.

A liquid suspension is released in order to separate the microorganisms from the matrix, and then it is centrifuged through a 25 µm filter to eliminate the large particles. The filter and the supernatant are then eliminated. The sample is placed on the sample preparation unit of the D-Count or the BactiFlow ALS to be automatically labelled. Using BactiFlow, the sample treatment is manual.

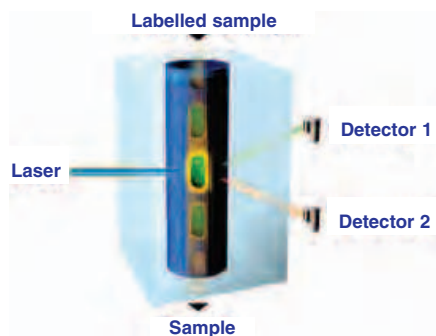
Following standard laboratory separation procedures (stomaching, centrifugation, etc), samples are directly loaded on to the sample preparation unit of the D-Count or BactiFlow ALS. Each system then automatically treats the samples with appropriate labelling reagents and injects these into the analyzer. Samples are treated with Fluorassure reagents which label only viable



The D-Count® system



Fluorochrome labelling of a microorganism



*Cytometer measurement cell with laser beam.*

microorganisms when present. Only viable cells, with intact membranes, have the ability to perform this cleavage and to retain the fluorescent label. Cell multiplication is not required.

After the labelling step, the sample is automatically injected into the measuring quartz flow cell of the cytometer, forming a narrow and laminar flow stream to ensure the passage of the microorganisms, one by one, in front of the laser beam excitation. The flu-

orescent signal of each microorganism is collected by sensitive detectors and analyzed by the processing of numerical data.

Sophisticated discrimination software selects the viable microorganisms and rejects all the auto-fluorescent particle.

Results are displayed as direct cell counts and stored on a PC for traceability. No interpretation is needed and results can be directly compared to the plate count for validation.

Reagents kits are specifically available for the total viable count and yeasts and moulds. It is important to detect only the viable cells susceptible to develop themselves in the product and to potentially deteriorate it. The dead cells do not have any impact over the shelf life of the products and only the viable cells are labelled and detected. However, a specific labelling protocol of the dead cells is also applicable by the AES Chemunex technique and can be important in the control of the freshness of raw materials.

Through the combination of automation, speed and sensitivity, Chemunex's analysers



*Digital results on PC monitor.*

can be exploited in a number of in-process control applications where the availability of real-time results are desirable, as well as for fast end product release. The D-Count, BactiFlow ALS and BactiFlow represent an evolution in the reduction of production cycle time by providing microbiological results 'in real time' at each step of manufacture, while supporting and influencing product quality with a direct impact on the productivity and profitability of a company.

# Ultra-Rapid Quality Control



**Release your production within hours and increase your profits**

The innovative CHEMUNEX technology guarantees your Company's reputation

**D-Count<sup>®</sup> and BactiFlow<sup>®</sup> ALS Analyzers:  
Soft Drinks Quality & Microbiological Safety**



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**CHEMUNEX, Worldwide Leader of Cytometry applied to the Detection of Microorganisms**