BIO-CHEMI-LUMINESCENCE and HACCP

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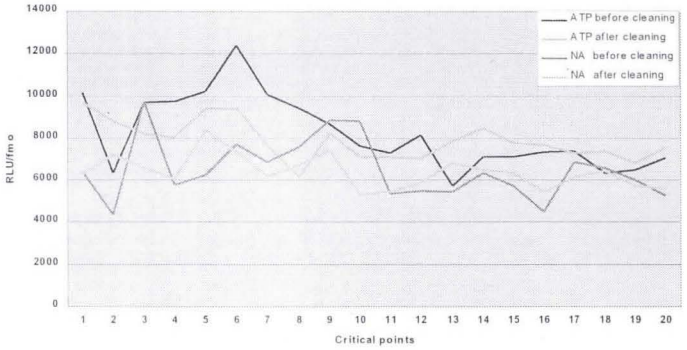
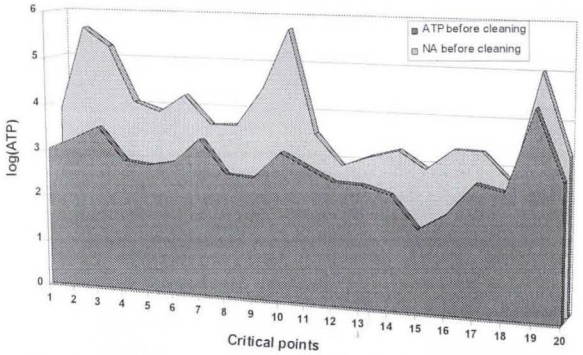
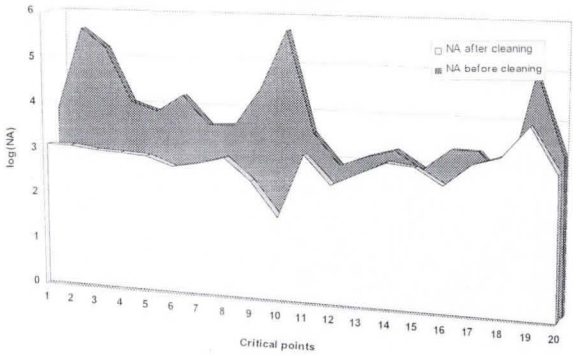
INTRODUCTION:

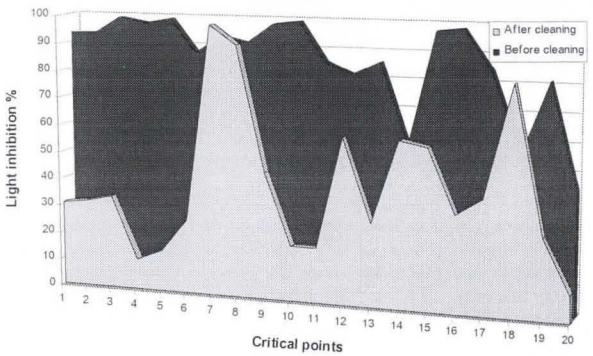
HACCP systems (Hazard Analysis Critical Control Point) are set up with the aim to ensure harmlessness of food along the process chain; from the producer to the ultimate consumer. To set up this system, it is necessary to perform an analysis to identify the dangers and the critical points of the process in real time. Contamination is an increasing threat to public health, but the conventional methods of testing have several constraints. Therefore, appropriately adapted tools are necessary to establish preventive measures in order to control hazard. Biochemiluminescence is certainly one of the essential tools which enables answers to qualitative and quantitative needs.

There are numerous illustrations of HACCP application by using BCL techniques as detection technology in food industry production lines and control of critical points in real time in industrial applications.









METHODS:

The method of ATP assays we have developed, is adapted for measuring the total content of different adenylates in the cell, i.e. the adenylate pool. ATP concentration is then measured through bioluminescence, i.e. the light is measured by a photomultiplier tube detector and the signal is converted to relative Light Units (RLU). Thus RLU have a relationship with the amount of ATP present in the sample, which is not the case with conventional methods. Adequate levels of sensitivity are calculated with appropriate controls and the readings are translated into a statistical designation of positive or negative result.

RESULTS and CONCLUSIONS:

We propose the following alternatives of the BCL technique as an answer to bioanalytical challenges in order to implement HACCP standards for rapid monitoring:

1. detection of living **living organisms** (e.g. low microrganism levels)
2. detection of **pollution and cross contaminations**

Living organisms are detected on the principle of measurement of the cellular energy adenosine triphosphate (ATP) which is produced by all living cells and in particular by the micro-organisms. The principle of the bioluminescence of firefly luciferase is applied, whereby a reduced form of luciferin together with a molecule of oxygen and ATP in the presence of the enzyme luciferase, produces a reaction where oxyluciferine is released together with AMP. This is accompanied by a simultaneous release of photons which are then quantified. The emission spectra recorded with the firefly luciferin/ luciferase system is obtained with absolute sensitivity.

BIBLIOGRAPHY:

'Bio-Chimi-Luminescence': principles and applications (1993) ed. Masson, coordinated by Champiat, D., and Larpent J.-P.