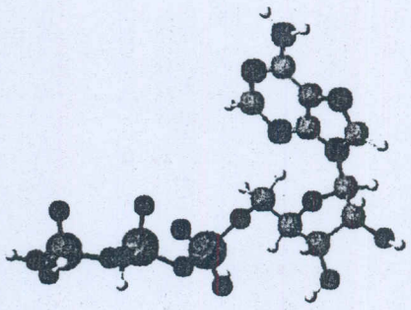
ATP DETERMINATION USING A FLOW INJECTION POTENTIOMETRIC COBALT ELECTRODE

A.Parra [a], S. G. Lemos[b], A. R. A. Nogueira[c], A. Torre-Neto[d] and J. Alonso[a]

[a] *Grup de Sensors i Biosensors, Departament de Química, Universitat Autònoma de Barcelona, Edifici Cn, 08228, Bellaterra, Spain*
[b] *Departamento de Quimica, Universidade Federal de São Carlos, São Paulo, Brazil*
[c] *EMBRAPA Pecuária do Sudeste, São Carlos, Brazil*
[d] *EMBRAPA Instrumentação Agropecuária, São Carlos, Brazil*

All living things, plants and animals, require a continual supply of energy in order to function. The energy is used for all the processes that keep the organism alive. Some of these processes occurs continually, such as the metabolism of foods, the synthesis of large, important molecules *e.g* proteins, DNA, and the transport of molecules and ions throughout the organism. Other processes occur only at certain times, such as muscle contraction and other cellular movements. Animals obtain their energy by oxidation of foods; plants do so by trapping the sunlight using chlorophyll. However, before the energy can be used, it is first transformed into a form, which the organism can handle easily. This special carrier of energy is the molecule adenosine triphosphate, ATP [1].

ATP is a nucleotide that consists of three main structures: the nitrogenous base, adenine; the sugar, ribose, and a chain of three phosphate groups bounded to ribose. Available energy is contained in the phosphate bonds, their hydrolysis reaction release a lot of energy which the organism can use for its metabolism.



This nucleotide acts as a chemical 'battery' storing energy when it is no needed but able to release it instantly when the organism requires it.

Determination of ATP has been carried out using a FIP (Flow Injection Potentiometry) methodology based on a cobalt electrode [2,3]. This detection method shows a linear range

concentration from 10^{-5} M to 0,1 M, a detection limit of 10^{-6} M and a slope of –47 mV/dec. Other phosphate molecule, such as ADP and phosphate creatine will be evaluated on a rat muscle and results will be compared with a **P^{31} RMN technique** [4].

[1] http://www.bris.ac.uk/Depts/Chemistry

[2] R. De Marco, B. Pejcic, Z. Chem. *Analyst,* **123** (1998): 1635

[3] M. Ramon. Treball de Recerca UAB, Bellaterra (1999)

[4] HOERTER J., LAUER C., VASSORT G. and GUÉRON M._Am. Physiol. Soc., 063-6143/88, C191-201, 1988.