**Abstract** : One way to store electrical energy takes place by electrolysis of alkaline water, hydrogen and oxygen obtained are stored and thereafter be re-used as fuels in internal combustion engines or in fuel cells which are cheaper, safer than the latter. Among these fuel cells, CFLs we find English Alkaline Fuel Cell. The electrolyte of the fuel cell is a potassium hydroxide solution, the chemical reaction that occurs within the fuel cell is the recombination of hydrogen with oxygen to give water, electric energy and heat energy.

One of the major challenges for the proper functioning of the fuel cell is discharging water and heat that can damage the electrolytic solution; therefore, it is essential to master the phenomena of mass transfer of water that operates within the fuel cell, and the optimum temperature of the inlet gas, knowing that fuel cells typically operate in isothermal conditions. This mastery must first go through the modeling of these phenomena then the real-time simulation of the main factors involved ensuring good cell efficacy. This model is articulated around Nernst-Planck equations, the equation of continuity and the two of Fick laws. The resolution of these equations requires a numerical approach of the partial differential equations.

**Key words**: Water transport, AFC Alkaline Fuel Cell, Mathematical Model, Hydrogen, Oxygen.