ELECTROLYSIS - THE FORMULA

Salt is added to the water and chlorine (Cl) is produced at the anode of the electrolytic cell by means of the following reaction by electrolysis:

$$2NaCl + 2H_2O = 2NaOH + H_2 + Cl_2$$

(salt + water = caustic soda + hydrogen + chlorine)

This chlorine dissolves in the water, forming hypochlorous acid:

$$CL_2 + H_2O = HClO + HCl$$

(chlorine + water = hypochlorous acid + hydrochloric acid)

The hypochlorous acid oxidises the bacteria, sterilising the water

$$2HClO = 2HCl + O_2$$

(hypochlorous acid = hydrochloric acid + oxygen)

Once the water is disinfected, the hydrochloric acid reacts with the caustic soda in a neutralising reaction, producing salt and water once again.

The hydrogen and the oxygen react, forming water:

$$NaOH + HCl = NaCl + H_2O$$

(caustic soda + hydrocloric acid = salt + water)

As you can see, this is a closed-cycle process in which no product is wasted. The products break down, act and regenerate once again. This explains why the salt concentration remains constant. Salt replacements are mainly necessary due to water loss from the filter backwash, heavy rainfall or the use of the pool itself.