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An improved microbiological water quality monitoring enzymatic kit for commercial use

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Outbreaks of waterborne diseases – such as cholera, typhoid fever and bacillary dysentery – remain a major challenge to public health providers, claiming millions of lives annually, worldwide. The need for more rapid, sensitive and specific tests is essential; not only for water industry, but for a better public safety.Total coliforms and *Escherichia coli* are widely accepted as indicators and its presence can provide information about the efficacy of the treatment, cleanliness and integrity of the systems of distribution of water (total coliforms), as well as indicate that a faecal contamination has occurred and security measures should be taken in order to protect public health (*E. coli*) since pathogens may be present. Therefore, the purpose of this research was to design an enzymatic commercial kit, at request and in collaboration with a Portuguese company, capable of detecting *E. coli* and total coliforms in water samples. In order to be competitive in the market, it was sought distinction from other existing commercial kits for being fast to obtain the results, of simple handling, low cost, high efficiency and sensitivity (1 CFU). The detection was based on the enzymes β-galactosidase, which catalyses the hydrolysis of a chromogenic substrate into a yellow coloured product indicating the presence of total coliforms; and β-glucuronidase (specific for *E. coli*), which catalysis the hydrolysis of a fluorogenic substrate into a product capable of exhibiting blue fluorescence when exposed to UV light, indicating the presence of faecal coliforms on the sampled water and, consequently, the possible presence of pathogenic organisms.It was achieved a medium capable of simultaneous detection of total coliforms and *E. coli* in 14 h to 18 h with a sensitivity of 1 cell per sample. This medium was successfully tested on different types of water: drinking water (public distribution, treated with chlorine), river water (Rio Este) and sea water (Praia de Esposende), with efficient differentiation of the indicators. Due to the inhibitory effect of the high concentration of sodium chloride in sea water, the fluorescence on this type of water is comparatively fainter than the observed on other sources of sampling and some adjustments should be made in order to improve the visibility of detection. A kit for microbiological water quality monitoring was successfully developed, with the competitive advantage of providing results considerably faster than other commercial options.