

Effect of phenolic compounds on the rapid direct enzymatic detection of β -D-galactosidase and β -D-glucuronidase

Sagaran Abboo and Brett I Pletschke*

Department of Biochemistry, Microbiology and Biotechnology, Rhodes University, PO Box 94, Grahamstown 6140, South Africa

Abstract

β -D-Galactosidase and β -D-glucuronidase are 2 marker enzymes used in the rapid detection of total coliforms and *E. coli*, respectively. A range of bioprobes and biosensors have recently been developed for the rapid, direct and *in situ* detection of these enzymes. Chromogenic substrates are often used to assay for these enzymes and result in phenolic products being formed. However, phenolic compounds may also be present in water due to industrial activity. In this study, the effect of 11 US EPA priority pollutant phenols (PPP) on these enzyme assays were investigated and it was shown that over- and under-estimation of β -D-galactosidase and β -D-glucuronidase activities may occur due to inhibition or activation of these enzymes in the presence of these phenolic compounds. The types of inhibition as well as inhibition constant (K_i) values were established for the inhibited activities. Wastewater treatment plant and other effluents (e.g. tannery effluents) may contain these phenolic compounds at concentrations high enough to inhibit or activate the activities of the marker enzymes, therefore influencing the rapid and direct enzymatic measurement of faecal contamination using these metabolic marker enzymes.

Keywords: coliforms, *E. coli*, faecal, β -D-galactosidase, β -D-glucuronidase, inhibition, wastewater