

Laccase-catalyzed C-S and C-C coupling for a one-pot synthesis of 1,4-naphthoquinone sulfides and 1,4-naphthoquinone sulfide dimers

Dr. Kevin W. Wellington^{1,*}, Dr. Gregory E. R. Gordon¹, Lindelani A. Ndlovu¹, Prof. Paul Steenkamp^{1,2}

1 Council for Scientific and Industrial Research (CSIR), CSIR Biosciences, P O Box 395, Pretoria, Gauteng (South Africa), Fax: (+27) 12 841 3388

2 Department of Biochemistry, University of Johannesburg, PO Box 524, Auckland Park, 2006 (South Africa)

Email: Dr. Kevin W. Wellington (kwellington@csir.co.za; kwwellington@gmail.com)

* CSIR Biosciences, P O Box 395, Pretoria, Gauteng (South Africa), Fax: (+27) 12 841 3388

Abstract

Oxidative C-S and C-C bond formation with aryl and alkyl thiols was catalyzed under mild conditions in a reaction vessel open to air at pH 4.5 in the presence of a commercial laccase (Novozym 51003 or Suberase) and a cosolvent (DMF) to afford 1,4-naphthoquinone sulfides. Although both monothiolation and dithiolation of the 1,4-naphthohydroquinone were accomplished, the latter was favored. In addition, unprecedented dimerization of monothiolated intermediates occurred through C-C coupling. These commercial laccases provide a facile and a more environmentally friendly synthetic approach to both 1,4-naphthoquinone sulfides and 1,4-naphthoquinone sulfide dimers.