

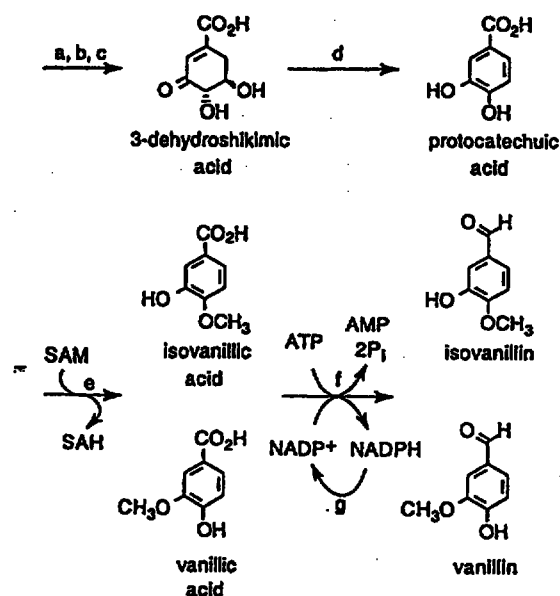


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(54) Title: SYNTHESIS OF VANILLIN FROM A CARBON SOURCE**(57) Abstract**

A bioengineered synthesis scheme for the production of vanillin from a carbon source is provided. The bioconversion methods of the present invention comprise the steps of microbe-catalyzed conversion of a carbon source to vanillic acid followed by enzyme-catalyzed reduction of the vanillic acid to produce vanillin. As shown in the synthesis scheme of Figure 2, the microbe-catalyzed conversion step of the present invention requires five enzymes which are provided by a recombinant microbe. In a preferred embodiment, the recombinant microbe is *Escherichia coli* designed to cause dehydration of 3-dehydroshikimic acid and regioselective methylation of the resulting protocatechuic acid. The enzyme-catalyzed reduction step of the present invention comprises the reduction of vanillic acid to vanillin by aryl-aldehyde dehydrogenase.



^a 3-deoxy-D-arabino-heptulosonic acid 7-phosphate synthase (*aroF*); ^b 3-dehydroquinate synthase (*aroB*); ^c 3-dehydroquinate dehydratase (*aroD*); ^d 3-dehydroshikimate dehydratase (*aroZ*); ^e catechol-O-methyltransferase (*COMT*); ^f aryl-aldehyde dehydrogenase; ^g D-glucose 6-phosphate dehydrogenase, D-glucose 6-phosphate; **SAM**: S-adenosylmethionine; **SAH**: S-adenosylhomocysteine.