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A synthesis of 4-methylumbelliferyl-β-D-glucopyranosiduronic acid

[a025]

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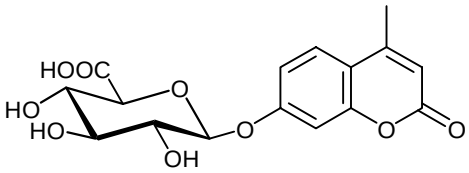
ABSTRACT

A synthetic route to prepare 4-methylumbelliferyl-β-D-glucopyranosiduronic acid (MUG) from 4-methylumbelliferyl-β-D-glucopyranoside (MUGluc) was developed affording the MUG with an overall yield of 37 % from the MUGluc.

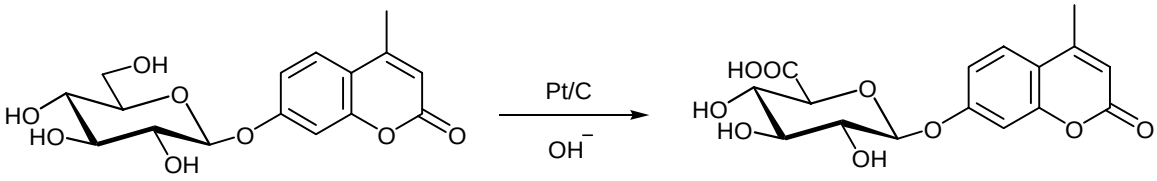
INTRODUCTION

Substrates based on 4-methylumbelliferone have been extensively used for the detection of enzymes in the microbiological diagnostic [1,2]. The facility of hydrolysis of these kind of compounds by a specific enzyme makes possible its detection by the fluorescence expressed by the 4-MU in the media [3-5]. The 4-methylumbelliferyl-β-D-glucopyranosiduronic acid (MUG) (Figure 1) is a fluorogenic substrate widely used for quantitatively identifying and differentiating the presence of the Coliform group and specially *Escherichia coli* in water, food and other products for human consumption[6-8].



MUG

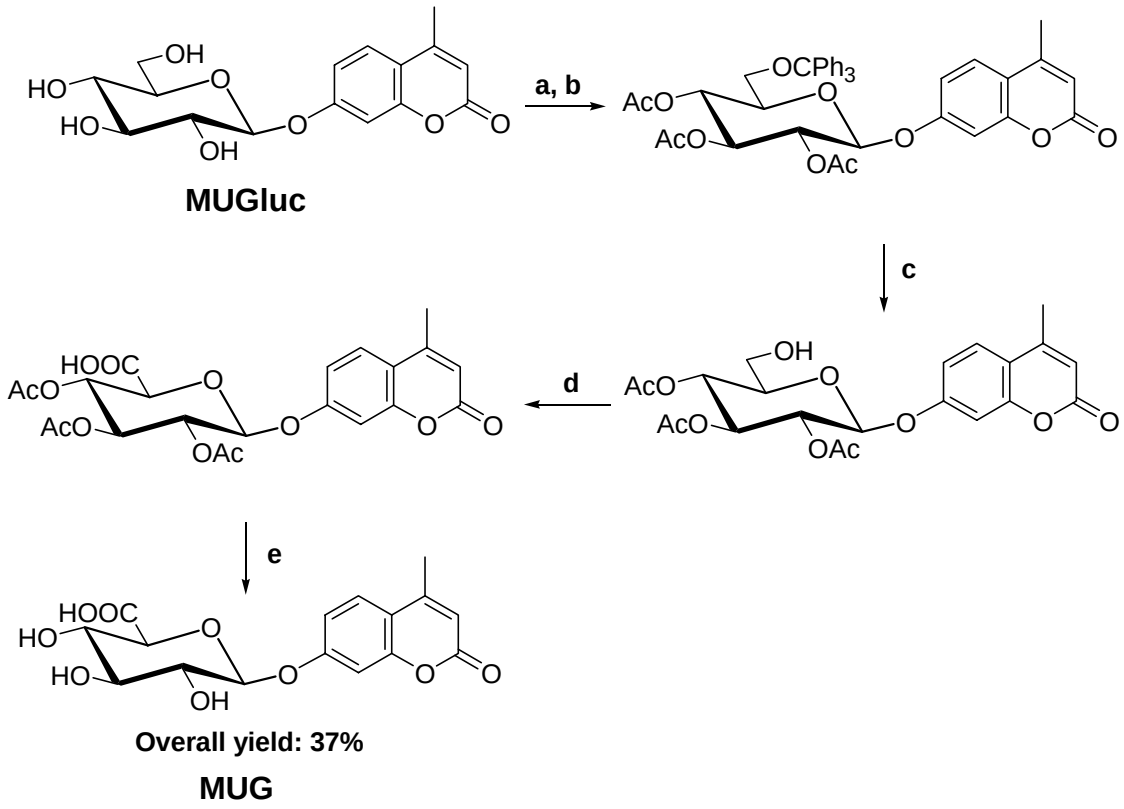
The only reported procedure in order to synthesize the MUG carries out the oxidation of primary hydroxyl group of the easily available MUGluc by oxygen gas in aqueous-alkaline media using a large charge of platinum as catalyst (Scheme 1) [9].



MUGluc **MUG**

18-20%

In order to overcome the previous cited drawbacks, we developed an alternative way for obtaining MUG (Scheme 1).



Scheme 1 a) Ph_3CCl, pyridine, 90 °C, 5 h. b) acetic anhydride, r.t., 24 h, 73%. c) I_2, MeOH, benzene, 65 °C, 24 h, 92%. d) NaOCl, TEMPO, NaBr, $NaHCO_3$, Bu_4NBr, CH_2Cl_2-H_2O, 0 °C, 3h, 68%. e) $Ba(OMe)_2$, MeOH, 0-5 °C, 24 h, 85%.

This synthetic route is very useful to prepare MUG. Despite of additional synthetic steps than the reported procedure, the overall yield obtained from MUGluc was 37 %, it means almost twice the yield reported (18-20 %) when this fluorogenic substrate was synthesized by oxidation with oxygen gas in the presence of platinum as catalyst.

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