

Short Note

3,5-Di(-O-acetyl)-3',4',7-tri[-O-(2-O-acetylethyl)]quercetin

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Abstract: A new quercetin derivative, 3,5-di(-O-acetyl)-3',4',7-tri[-O-(2-O-acetylethyl)]-quercetin, was synthesized. The structure of the target compound was characterized by IR, ¹H NMR, ¹³C NMR and MS.

Keywords: quercetin; acetylation; 3',4',7-tri[-O-(2-O-acetylethyl)]quercetin; oxyethylation

1. Introduction

Quercetin (3,3',4',5,7-pentahydroxyflavone) and its derivatives have a wide range of biological activity, such as antioxidant [1-4], anticarcinogenesis [5-10], vasodilatation [11-13], inhibition of various enzymes [14-16], UV-shielding properties [17-18], *etc.* Troxerutin (trihydroxy-ethylrutoside), which serves as a drug, is known as a radical scavenger with antioxidant effects, so that treatment with it increases the healing of capillary endothelial defects [19]. Thus, the synthesis of quercetin derivatives is of considerable importance. For instance, modifications can increase fat-solubility and stability of the molecule. The compound may be useful as an intermediate to synthesize other relevant compounds. Here, we would like to report a convenient procedure for the preparation of 3,5-di(-O-acetyl)-3',4',7-tri[-O-(2-O-acetylethyl)]quercetin.

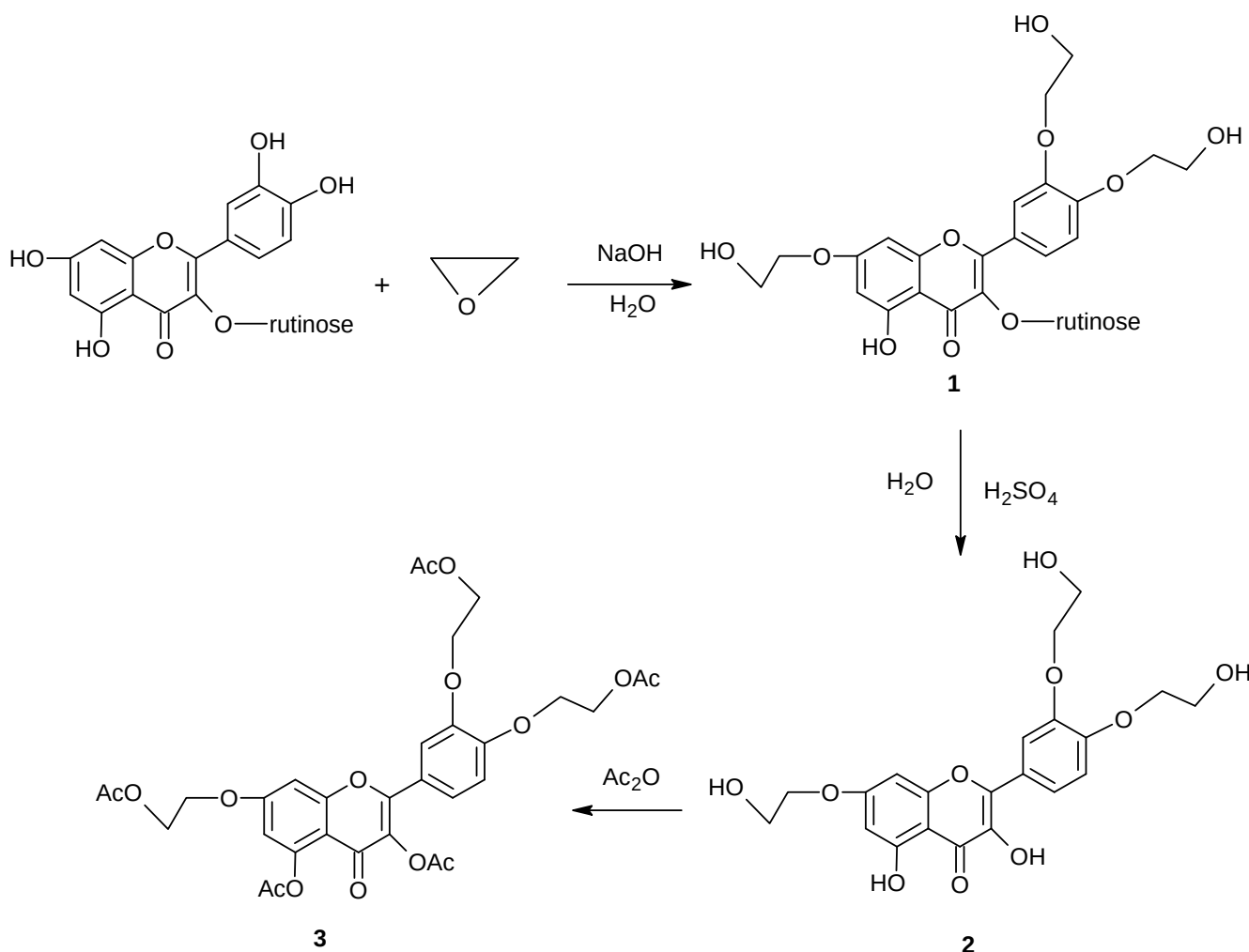
2. Structural Characterization

¹H NMR (Bruker 300 MHz, CDCl₃): δ_H 7.45 (d, *J* = 9.0 Hz, 1 H, 6'-H), 7.40 (s, 1 H, 2'-H), 7.00 (d, *J* = 9.0 Hz, 1 H, 5'-H), 6.87 (s, 1 H, 8-H), 6.65 (s, 1 H, 5-H), 4.46 (s, 6 H, 3 × OCH₂), 4.27 (s, 6 H, 3 × OCH₂), 2.42 (s, 3 H, COCH₃), 2.31 (s, 3 H, COCH₃), 2.10 (s, 9 H, 3 × COCH₃) ppm. ¹³C NMR (75 MHz, CDCl₃): 170.85, 170.76, 169.99, 169.44, 167.86, 162.45, 157.96, 154.38, 151.42, 150.82,

148.50, 133.27, 123.12, 122.96, 115.35, 114.17, 111.36, 108.83, 99.52, 67.93, 67.26, 66.75, 62.71, 62.53, 62.08, 21.05, 20.77, 20.58 ppm. IR (Bruker Tensor 27, KBr): 3453, 1760, 1636, 1384 cm^{-1} . ESI-MS: m/z 645.6 ($M^+ + 1$). Elemental Anal. (Perkin Elmer PE 2400 II CHNS/O): calcd for $\text{C}_{31}\text{H}_{32}\text{O}_{15}$ (644.59): C, 57.76; H, 5.00; O, 37.23. Found: C, 57.8; H, 5.0; O, 37.2.

3. Experimental

Scheme 1. Synthesis of 3,5-di(-O-acetyl)-3',4',7-tri[-O-(2-O-acetylethyl)]quercetin.



Ethylene oxide (6.60 g, 150 mmol) was added dropwise over a period of 6 h to a mixture of rutin (12.21 g, 20 mmol) and NaOH (0.28 g, 7 mmol) in 100 mL of H₂O with continuous stirring at 75 °C. The pH value of the mixture was adjusted to 4.0 by concentrated hydrochloric acid, then the yellow solid that was formed was collected by filtration, washed with cold water, and dried under vacuum to give compound **1**. The purity was sufficient for use in the next step.

A mixture of compound **1** (7.42 g, 10 mmol) and H₂SO₄ (1%, 500 mL) was stirred under reflux for 2 h (reaction progress was checked by TLC). After cooling, the pH value of the mixture was adjusted to 4.5 by sodium hydroxide solution, then the yellow solid that was formed was collected by filtration, washed with cold water, and dried under vacuum to give compound **2**.

To a mixture of compound **2** (2.17 g, 5 mmol) and acetic anhydride (50 mL, 530 mmol) was added H₂SO₄ (93%, 5 drops), and the mixture was stirred at room temperature for 24 h (reaction progress was checked by TLC). The precipitate was collected by filtration, washed with cold water, and recrystallized from EtOH/H₂O to give 2.10 g (65.2%) of compound **3** as white powder, m.p. 95.9–97.2 °C.

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