Short Communication

Pak J Sci Ind Res 2001 44(5) 277-278

SYNTHESIS OF 3-HYDROXY-3',4'-METHYLENEDIOXY-6",6"-DIMETHYLPYRANO (2",3":7,8) FLAVONE

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(Received 11 September 1999; accepted 15 November 2000)

3-Hydroxy-3',4'-methylenedioxy-6",6"-dimethylpyrano (2", 3":7, 8) flavone (**6**) has been synthesised by the following unambiguous route. All the new products have been characterized on the basis of spectral data such as UV, IR, ^{1}H, NMR and microanalysis.

Chalcones constitute an important group of natural products and some of them possess a wide range of biological activities such as antibacterial (Mitscher *et al* 1983), antifungal (Conn 1981), antiinflammatory (Methew and Subba Rao 1984), antimicrobial (Sazada and Kedzia 1989), antitumour (Mizabuchi and Sato 1984), anticancer (Bha Kuni and Chaturvedi 1984), prostaglandin binding (Dore and Veil) and insect antifeedant (Simmonds *et al* 1990). A large number of natural products including flavonoids are being reported in the literature every year and their structures need to be established by synthesis. In this paper the synthesis of 3-hydroxy-3',4'-methylenedioxy-6",6"-dimethylpyrano (2",3":7, 8) flavone (**6**) has been reported which may be used as synthetic marker. β-Resacetophenone (**1**) on treatment (Hossain 1999a) with 2-chloro-2-methylbut-3-yne in dry dioxan afforded 2-hydroxy-6', 6'-dimethylpyrano[2',3':4,3] acetophenone (**2**) (Hossain 1999a). Methoxymethylation of (**2**) using methoxymethyl chloride and K_2CO_3 yielded compound (**3**) (Hossain 1999b). Alkaline condensation of (**3**) and piperonal gave 2'-(methoxymethoxy)-6",6"-dimethylpyrano[2",3":4',3']-3, 4-methylenedioxy-chalcone(**4**) (Hossain 1999a) which upon dimethoxy-methylation furnished the monohydroxychalcone(**5**) (Hossain 1999a). Compound (**5**) on treatment with H_2O_2 yielded 3-hydroxy-3',4'-methylenedioxy-6",6"-dimethylpyrano (2",3":7,8) (**6**).

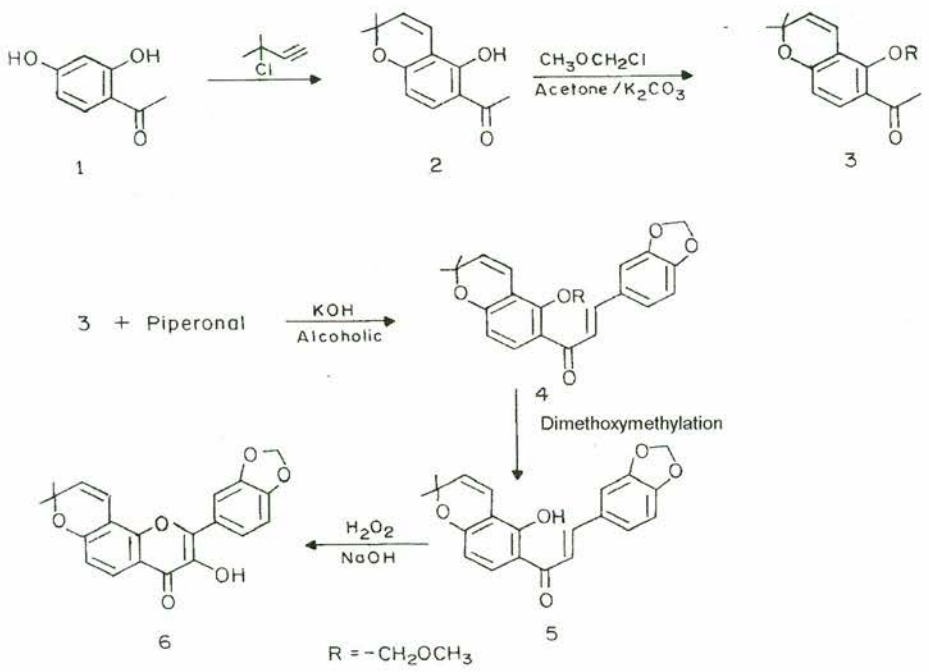
Melting points were determined by using an electrothermal apparatus (Gallenkamp, England) and were uncorrected. IR spectra were recorded (KBr discs) on a Pye-Unicam, England SP_3-300 IR spectrophotometer (ν_{max} in cm^{-1}). PMR spectra were recorded on a Perkin-Elmer, Japan R-32 (90MHz) instrument in $CdCl_3$ with TMS as an internal standard (chemical shifts in δ, ppm). UV spectra were recorded on LKB 4053, England spectrophotometer Ultrospeck in methanol (λ_{max} in nm). TLC performed using silica gel 60G. Mass spectra were recorded on VG 7070E analytical mass spectrometer. Elemental analyses were also obtained for all the compounds.

a) *Synthesis of 2-hydroxy-6',6'-dimethylpyrano [2',3':4,3] acetophenone* ***(2)***. It is prepared according to the method (Sazada and Kedzia); m.p., 58°C (lit. Sazada and Kedzia, m.p.59°C), R_f, 0.78 (benzene); (M^+, 218); UV:235, 265 nm; IR:3450, 2910, 2870, 1645, 1600, 1595 cm^{-1}; [Found:C, 71.8; H,6.7 for $C_{13}H_{14}O_3$ required: C, 71.5; H, 6.4].

b) *Methoxymethylation of* ***(2)***. A mixture of 2-hydroxy-6', 6'-dimethylpyrano [2',3':4,3] acetophenone (Sazada and Kedzia) (**2**) 2.5 g in dry acetone (25 ml), methoxymethyl chloride (1.05 g) and anhydrous potassium carbonate (10 g) was refluxed for about 3 h. The progress of the reaction mixture was examined by TLC. On completion of the reaction, acetone was distilled off and water was added and it was then extracted with ether, washed with water and dried over anhydrous Na_2SO_4. The organic layer was evaporated to dryness and pure methoxymethylated product 3(1.10 g) was obtained by crystallization from benzene, m.p. 42°C (lit. Sazada and Kedzia m.p. 43-44°C), (M^+, 262); R_f, 0.76 (benzene-acetone; 9:1; IR:2910, 2845, 1645, 1600, 1595 cm^{-1}; [Found: C, 68.7; H, 6.9 for $C_{15}H_{18}O_4$ required:C, 68.9; H, 6.7].

c) *2'-Methoxymethoxy-6",6"-dimethylpyrano [2",3":4',3']-3, 4-methylenedioxychalcone(4)*. A mixture of 2-methoxy-methoxy-6',6'-dimethylpyrano[2',3':4,3] acetophenone (Sazada and Kedzia) (**3**) 4 g and piperonal (3.86 g) in ethanolic solution of KOH (50%, 20 ml) was kept at room temperature for 3 days. The reaction mixture was diluted with ice cold water, acidified with dilute. HC1 and extracted with ether. The ether layer was washed with water dried over anhydrous sodium sulphate and evaporated to dryness. The residue was purified by preparative TLC over silica gel 60G using benzene-acetone (15:1) as developing solvent. The product was crystallized from petroleum spirit (b.p. 40-60°C) yielding yellow crystals (2.01 g), m.p. 105°C (lit. Sazada and Kedzia, m.p. 104-105°C), (M^+, 394); R_f, 0.76 (benzene-acetone; 10:1); UV: 228, 254, 370 nm; IR:1642, 1605, 1595, 1375, 1365 cm^{-1}; [Found:C, 70.1; H, 5.6 for $C_{23}H_{22}O_6$ required:C, 70.3, H, 5.9].

d) *Synthesis of 2'-hydroxy-6",6"-dimethylpyrano [2",3":4',3']-3, 4-methylenedioxychalcone(5)*. The titled compound was prepared according to the method (Sazada and Kedzia); m.p. 140°C (lit. Sazada and Kedzia, m.p. 141°C), (M^+, 350); R_f, 0.76 (acetone-benzene; 4:1). It gave positive ferric chloride test. UV: 229, 255, 365 nm; IR:3540, 1650, 1610, 1590, 1385, 1355 cm^{-1}.



Scheme

e) *3-Hydroxy-3',4'-methylenedioxy-6",6"-dimethylpyrano (2",3":7,8) flavone (6)*. To the above chalcone (**5**) 1 g in pyridine (25 ml) and NaOH (20%, 40 ml) at 60-70°C, hydrogen peroxide (30%, ml) was added with stirring during 15 min. The reaction mixture was acidified after 20 min and the solid that separated was filtered. The solid was dissolved in benzene and crystallised from xylene as yellowish crystals (0.54 g), m.p. 172°C; (M^+, 364) R_f 0.64 (benzene-acetone; 20:1); UV:228, 248, 265, 355 nm; IR:2910, 2845, 1645, 1605, 1595, 1505, 1375, 1362, 1040 cm^{-1}, PMR ($CdCl_3$): 1.47 [s, 6H, $>C(CH_3)_2$], 5.45 (d, 1H, J=10Hz, H-5"), 6.00 (s, 2H, $-CH_2-$), 6.44 (d, 1H, J=9Hz, H-6), 6.77 (d, 1H, J=10Hz, H-4"), 7.15 (m, 3H, H-2',H-5' and H-6'), 7.79 (d, 1H, J=9Hz, H-5'), 12.10 (s, 1H, -OH). [Found: C, 69.23; H, 4.39.$C_{21}H_{16}O_6$ requires; C, 69.44; H, 4.67.

Acknowledgement

The author is grateful to Dr. Md. Giasuddin Ahmed, Department of Chemistry, Dhaka University, Dhaka-1000, Bangladesh for his help in connection with PMR and IR spectroscopy. Thanks also due to Dr. Hasan Ahmed, Osaka University, Japan for mass spectral and elemental analysis.

Key words: Synthesis of chalcone, Flavone, Methoxymethylation.

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