

NOTE

Synthesis of 4'-Hydroxychalcones, 1, ω -Bis-(Chalcon-4'-oxy)-Alkanes and Their Antibacterial Activity

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1, ω -bis-(chalcon-4'-oxy)-alkanes have been synthesised by refluxing a mixture of 4'-hydroxychalcones, dihaloalkane, anhydrous K_2CO_3 and dry acetone. The structures were confirmed by chemical and spectral analyses and tested for antibacterial activity against *S. aureus* and *E. coli*.

Chalcones are reported to possess antimicrobial^{1,2}, bacteriostatic³, insecticidal⁴, antirhinovirus and antipicornivirus activity⁵. It was thought interesting to synthesise 4'-hydroxychalcones and 1, ω -bis-(chalcon-4'-oxy)-alkanes ranging from methane to hexane from 4'-hydroxychalcones and dihaloalkane and compare the antibacterial activity in both types of compounds before and after blocking the —OH groups.

Bis- compounds were found to be insoluble in cold, dilute sodium hydroxide solution and gave negative test with neutral ferric chloride solution. It was observed that incomplete reaction leads to mixture of symmetrical bis- compounds and α -chalconoxy- ω -bromoalkane and can be separated by extraction with ether, since α -component is soluble in ether and bis- insoluble.

4'-Hydroxychalcones and bis-chalcones were tested for activity against *S. aureus* and *E. coli* by disk-diffusion technique⁷. 4'-Hydroxychalcones showed moderate to strong activity against *E. coli* at concentration of 100 $\mu\text{g/mL}$ whereas moderate activity against *S. aureus* at concentration 100 $\mu\text{g/mL}$. For bis-chalconoxy alkanes no appreciable activity was observed at 50–100 $\mu\text{g/mL}$ concentration. In this method disks 6.25 mm in diameter from No. 1 Whatman filter paper were impregnated with the solutions of compounds in DMSO to get concentrations of 50 and 100 $\mu\text{g/mL}$. For control studies DMSO was used. After incubating at 37°C for 24 h the degree of sensitivity was determined by measuring the easily visible areas of inhibition of growth produced by the diffusion of the compound from the disks into the surrounding medium.

Melting points were taken in open capillaries and are uncorrected, IR spectra on Perkin-Elmer model 283B and PMR on Varian FT-80A, 200 MHz spectrometer. IR spectra of bis- compounds showed the absence of peaks due to —OH group indicating the formation of bis- compounds.

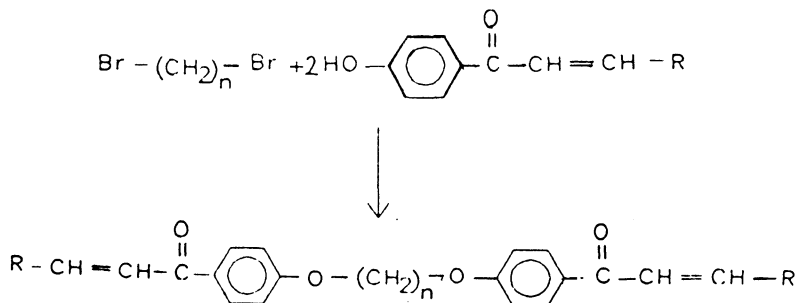
4'-Hydroxychalcones the starting materials were prepared by following the known procedure⁶.

TABLE-1
PHYSICAL DATA OF BIS-CHALCONOXY ALKANES

| Compound | n | Reflux time (h) | m.p. (°C) |
|----------------|---|-----------------|-----------|
| a ₁ | 1 | 15 | 167 |
| b ₁ | 1 | 12 | 218 |
| c ₁ | 1 | 11 | 231 |
| d ₁ | 1 | 12 | 223 |
| e ₁ | 1 | 10 | 234 |
| f ₁ | 1 | 12 | 169 |
| a ₂ | 2 | 12 | 244 |
| b ₂ | 2 | 10 | 202 |
| c ₂ | 2 | 09 | 185 |
| d ₂ | 2 | 11 | 181 |
| e ₂ | 2 | 14 | 244 |
| f ₂ | 2 | 11 | 175 |
| a ₃ | 3 | 14 | 166 |
| b ₃ | 3 | 10 | 215 |
| c ₃ | 3 | 15 | 215 |
| d ₃ | 3 | 11 | 209 |
| e ₃ | 3 | 15 | 230 |
| f ₃ | 3 | 10 | 170 |
| a ₄ | 4 | 14 | 165 |
| b ₄ | 4 | 10 | 160 |
| c ₄ | 4 | 12 | 156–158 |
| d ₄ | 4 | 10 | 162 |
| e ₄ | 4 | 16 | 134–135 |
| f ₄ | 4 | 12 | 156 |
| a ₅ | 5 | 11 | 164–165 |
| b ₅ | 5 | 13 | 139 |
| c ₅ | 5 | 10 | 184 |
| d ₅ | 5 | 12 | 190 |
| e ₅ | 5 | 18 | 175 |
| f ₅ | 5 | 12 | 150 |
| a ₆ | 6 | 12 | 172 |
| b ₆ | 6 | 11 | 162 |
| c ₆ | 6 | 10 | 210 |
| d ₆ | 6 | 13 | 205 |
| e ₆ | 6 | 13 | 165 |
| f ₆ | 6 | 12 | 120 |

*All compounds gave satisfactory C and H analysis, crystallised from acetic acid or benzene.

General procedure for preparation of 1,ω-bis-(chalcon-4'-oxy)-alkanes: A mixture of 4'-hydroxychalcone (0.02 mol), dihaloalkane (0.01 mol), anhydrous K_2CO_3 (0.04 mol) and dry acetone (25 mL) was refluxed on water bath. Completion of reaction was tested by TLC and negative test with neutral $FeCl_3$ solution. Crushed ice was added to the residue. The residue was then washed with dilute NaOH solution and water. The physical data of bis chalconoxy alkanes are given in Table-1.



Where n = 1 to 6

R = (a) - H, (b) - OCH_3 , (c) 4-Cl

(d) 2-Cl, (e) 3,4- $O-CH_2-O-$, (f) 2-Furyl

IR (KBr) of b_4 : 2940, 2860 (CH), 1600 (CO), 1595 (asymmetric stretching in α , β -unsaturated compounds), 1250 (COC asymmetric stretching) cm^{-1} .

PMR of b_4 : δ 1.9–2.0 and 4.1 (CH_2 and methine protons) and 6.8–8.0 (ArH).

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