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NOTE

Synthesis and Antimicrobial Activity of Newly Synthesised Substituted 3-Flavanol

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2′-Hydroxy-5′-chlorochalcone and its derivatives react with H_2O_2 in presence of NaOH to give 6-chloro-3-flavanol and its derivatives. These synthesised compounds were tested against test organisms *Staphylococcus aurecus*, *Staphylococous pyrogens*, *S. agalactiae*, *S. faecalis*, *Corynebacterium ulcerans*, *C. minutissimum*, *Clostridum septicum*, *Clostridium tetani* and *Escherichia coli*. The % MIC values were determined by using serial dilution method.

Chalcone dibromide serves as a starting material for the synthesis of flavanols and reactions of theoretical importance have been carried out.[1-3] Wheeler[4] has used 2′-hydroxy-ω-chloroacetophenone as the starting material and obtained flavanols by condensation with aldehydes in presence of alkali. Limaye[5] gave one-step synthesis of flavanols where starting material was 2′-hydroxy-acetophenone or its derivatives. The completion of this reaction requires very long time and sometimes it extends to a period of one month and the yield is very low. Marathe[6] has shown that sodium peroxide acts as a very effective condensing agent and that flavanols could be obtained within 1 h from 2′-hydroxy-acetophenones or its derivatives. 3-Hydroxy chromes or flavanols are usually synthesised by the oxidation of chromes with alkaline hydrogen peroxide.[7-11] The intermediate dihydroflavanols can be isolated by oxdation in cold. According to Wheeler[12] aurones are formed in cold and flavanols in hot reaction mixture.

Recently flavanone-3-ol on oxidation with SeO_2 gave flavanol in good yield.[13]

Literature survey indicates that flavanols were not prepared from 2′-hydroxy-5′-chlorochalcone and its derivatives. Hence it was thought interesting to prepare flavanols. These flavanols were also tested against test material for biological activity. The MIC values are determined by using serial dilution method.[14]

2′-Hydroxy-5′-chloro-3′-bromochalcone (Ic) (0.01 mole) was suspended in ethanol (20 mL) and H_2O_2 (1 mole, 2.5 cc, 6%) and 2N NaOH (0.5 mole, 1.25 cc) was added. The reaction mixture was kept in an ice-cold bath for 4 h and then

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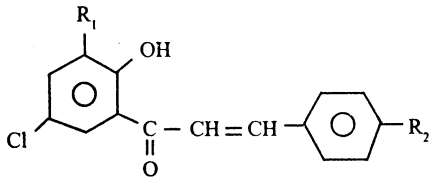
it was allowed to stand at room temperature for 24 h till the colour of the mixture changed. The reaction mixture was filtered, washed with water, acidified with dil. HCl (5 cc HCl + 5 cc H_2O) and crystallised from alcohol to get IIc (m.pt. 194°C, yield 75%).

Properties of the compound (IIc)

1. It is yellow in colour with m.p. 194°C and mol. wt. 351.5.
2. R_f value in methanol was 0.85.
3. From analytical data molecular formula was found to be $C_{15}H_8O_3ClBr$.
4. It gave blue colouration with alcoholic $FeCl_3$ solution indicating the presence of phenolic —OH group.
5. IR (Nujol): 3450 ν(—OH); 1620 ν(C=O); 710 ν(C—Cl); 610 cm^{-1} ν(C—Br).
6. PMR ($CDCl_3$): 7.03 (br, 1H, —OH) and 7.4–8.4 δ (m, 7H, Ar—H).

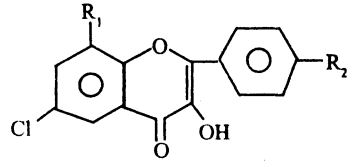
From chemical and analytical data the compound (IIc) is 6-chloro-8-bromo-3-flavanol.

The other compounds were prepared by same method and listed in Table-1.



(Ia-f)

H_2O_2 + NaOH



(IIa-f)

TABLE-1

Compound	R_1	R_2	m.p. (°C)	Yield (%)	m.w.	R_f value in methanol
IIa	H	H	156	80	272.5	0.75
IIb	H	OCH_3	58	82	286.5	0.91
IIc	Br	H	194	75	351.5	0.85
IId	Br	OCH_3	197	80	381.5	0.65
IIe	*NO_2*	H	184	75	317.5	0.80
IIf	NO_2	OCH_3	195	73	347.5	0.80

These compounds were tested against test organism. They are listed in Table-2

TABLE-2
MINIMUM INHIBITORY CONCENTRATION OF 3-FLAVONOL (% MIC values)

Compd.	*S. aureus*	*S. pyogens*	*S agalac-tiae*	*S. faecalis*	*C. ulcerans*	*C. minutis-simum*	C. *septicum*	*C tetani*	*E. coli*
IIa	0.20	0.12	0.13	0.16	0.16	0.21	0.18	0.21	0.25
IIb	0.27	0.26	0.23	0.19	0.23	0.21	0.27	0.54	0.33
IIc	0.13	0.13	0.29	0.16	o.29	0.23	0.19	0.15	0.18
IId	0.20	0.27	0.39	0.19	0.36	0.23	0.28	0.32	0.26
IIe	0.16	0.19	0.14	0.29	0.28	0.14	0.12	0.16	0.20
IIf	0.54	0.40	0.44	0.48	0.52	0.49	0.42	0.44	0.30

The presence of —OCH_3 group decreases the activity of the compounds. All these compounds are moderately active against test organism.

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