REACTIONS OF EPICHLOROHYDRIN WITH PHENOLS

In continuation of our previous work[1] on the reactions of epichlorohydrin (I) with amines, we wish to report the results of the condensation of (I) with phenols. Although some work has appeared on this subject,[2] our results are of interest, since the condensation leads to products similar to Mephenisin, which has muscle-relaxing properties.

The reaction of (I) with *o*-, *m*-, and *p*-cresols, *p*-chloro and *p*-nitrophenols, and 3 : 5-xylen-1-ol, in the presence of piperidine hydrochloride gave compounds of the following general formula

R-O-CH_2-CH(OH)-CH_2Cl (II)

By refluxing these compounds over powdered potassium hydroxide in ether solution, the corresponding epoxy compounds were obtained. These epoxy compounds on treatment with dilute sulphuric acid yielded the corresponding diols (IV).

R-O-CH_2-CH - CH_2 (III)
(CH and CH_2 bridged by O)

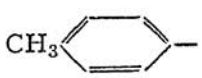
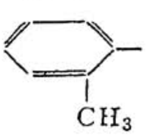
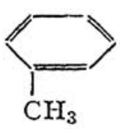
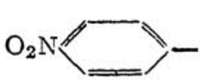
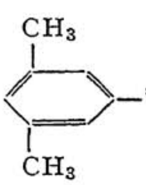
R-O-CH_2CH(OH)-CH_2OH (IV)

The hydroxychloro (II) as well as epoxy (III) compounds on reaction with ammonia gave rise to a mixture of primary, secondary and tertiary bases having the following structures,

R-O-CH_2-CH(OH)-CH_2-NH_2 (V)
[R-O-CH_2-CH(OH)-CH_2]$_2$ NH (VI)
and [R-O-CH_2-CH(OH)-CH_2]$_3$ N.

The compounds prepared are listed in Tables I and II.

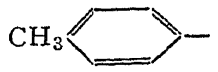
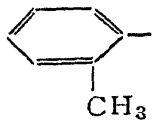
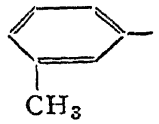
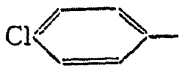
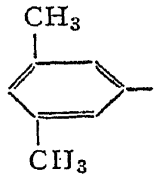
TABLE I

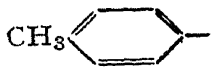
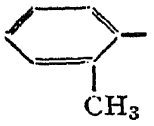
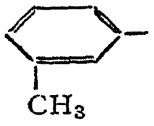
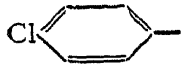
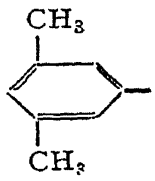
No.	R-O-CH_2-CH(OH)-CH_2Cl		R-O-CH_2-CH - CH_2 (epoxy, O bridged)			R-O-CH_2-CH(OH)-CH_2OH		
	Compound R=	b.p./pr	b.p./pr	Analysis Calcd.	Analysis Found	m.p.	Analysis Calcd.	Analysis Found
I		190-94°/20 mm.	136-40°/15 mm.	C, 73·2; H, 7·3;	C, 73·6 H, 7·1	71-72°	C, 65·9; H, 7·7;	C, 65·8 H, 7·8
II		158-70°/20 mm.	136-38°/20 mm.	C, 73·2; H, 7·3;	C, 73·5 H, 7·3	66-67°	C, 65·9; H, 7·7;	C, 65·6 H, 7·8
III		175-77°/20 mm.	140-42°/15 mm.	C, 73·2; H, 7·3;	C, 73·8 H, 7·5	62-65°	C, 65·9; H, 7·7;	C, 65·5 H, 7·5
IV		180-84°/20 mm.	146-48°/20 mm.	C, 58·5; H, 4·9;	C, 58·7 H, 4·8	Oil	..	..
V		216-18°/10 mm.	..	..	..	62-64°	C, 53·3; H, 5·4;	C, 53·5 H, 5·3
VI	 *	138-40°/10 mm.	..	..	..	Oil	..	..

* Analysis : Calcd. for $C_{11}H_{15}O_2Cl$, C, 61·5 ; H, 7·0
Found C, 61·2 ; H, 7·3

Compounds I to V in column 1 are known.

TABLE II

No.	Compound R=	R-O-CH_2-CH(OH)-CH_2-NH_2 Characterized as	m.p.	Analysis Calcd.	Analysis Found	[R-O-CH_2-CH(OH)-CH_2]$_2$NH Characterized as	m.p.	Analysis Calcd.	Analysis Found
I		Base	103–4°	C, 66·3; H, 8·3; N, 7·7;	C, 66·5 H, 8·1 N, 7·6	Base	108–10°	C, 69·6; H 7·8; N, 4·1;	C, 70·0 H, 7·8 N, 4·4
II		Base-HCl	Softens at 131° Clears at 256°	N, 6·4;	N, 6·5	do.	116–17°	N, 4·1;	N, 4·3
III		do.	Softens at 126° Clears at 264°	N, 6·4;	N, 6·5	..	..	..	..
IV		do.	Softens at 172° Clears at 270°	N, 5·9;	N, 6·1	Base	125–27°	N, 3·6;	N, 3·4
V		do.	Softens at 190° Clears at 270°	N, 6·5;	N, 6·6	Base-HCl	128–29°	N, 3·8;	N, 4·0

No.	Compound R=	[R-O-CH_2-CH(OH)-CH_2]$_3$N Characterized as	m.p.	Analysis Calcd.	Analysis Found
I		Base-HCl	170–71°	C, 66·5; H, 7·3; N, 2·6;	C, 66·4 H, 7·0 N, 2·6
II		do.	134–35°	N, 2·6;	N, 2·8
III		..	..	..	..
IV		Base-HCl	Softens at 170° Clears at 261°	N, 2·3;	N, 2·5
V		do.	Softens at >125°, Clears at 258°	N, 2·5;	N, 2·8

Institute of Science, Bombay-1, November 23, 1960.

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A. S. U. CHOUGHULEY.

1. Merchant and Choughuley, *Curr. Sci.*, 1960, **29**, 142.

2. Lindemann, *Ber.*, 1891, **24**, 2145; Boyd and Knowlton, *J. Chem. Soc*, 1909, **95**, 1802; Boyd and Marle, *J. Chem. Soc.*, 1910, **97**, 1788; Marle, *J. Chem. Soc.*, 1912, **101**, 305; Levas and Lefabre, *Compt. rend.*, 1946, **222**, 555, 1439; Bradley, Forrest and Stephenson, *J. Chem Soc.*, 1951, 1589; Stephenson, *J. Chem. Soc.*, **1954**, 1571.