A portion of the thiazole was heated for 3 hr. with excess methyl iodide in butanone. On standing, crystals separated, m.p. 117–119°, undepressed by authentic **3,4-dimethylthiazolium iodide**[45] (m.p. 119–120°) and identical in the infrared (KBr pellet).

A second attempt to prepare the methiodide of 2-(α-hydroxybenzyl)-4-methylthiazole succeeded, yielding a compound with m.p. 165–167° after repeated crystallization from methanol (cold)–ether.

Anal. Calcd. for $C_{12}H_{14}INOS$: C, 41.50; H, 4.07. Found: C, 40.76; H, 4.43.

The substance was warmed in pyridine for 10 minutes, and then diluted, acidified and treated with dinitrophenylhydrazine reagent. The orange precipitate, m.p. 239–240°, was undepressed in m.p. on mixing with authentic **benzaldehyde 2,4-dinitrophenylhydrazone** (m.p. 240°).

In a separate experiment the methiodide XXV was warmed in pyridine for 10 minutes and the mixture was then cooled and diluted with ether. 3,4-Dimethylthiazolium iodide (m.p., mixed m.p., infrared spectrum) was obtained as the only ether-insoluble material.

***pK* of 3-Methylbenzothiazolium Iodide.**—The compound was titrated with 0.1 *N* NaOH under N_2 using a Beckman model G *p*H meter and allowing 0.5 hour after each addition for *p*H equilibrium to be reached. The *p*H after addition of one equivalent of alkali corresponded to that for minimum slope (dpH/dn) of the titration curve, 6.35, which is thus the pK_{av} for a diprotic acid with no detectable singly dissociated intermediate.

NEW YORK 27, N. Y.

(45) H. Erlenmeyer, H. Baumann and E. Sorkin, *Helv. Chim. Acta*, **31**, 1978 (1948).

[CONTRIBUTION FROM THE RESEARCH LABORATORIES OF THE U. S. VITAMIN CORPORATION]

Indanols. I. Preparation and Spectra of Benzylated Indanols[1]

BY SEYMOUR L. SHAPIRO, THEODORE BAZGA, KURT WEINBERG AND LOUIS FREEDMAN

RECEIVED JANUARY 14, 1958

The zinc chloride catalyzed benzylation of 4-indanol and 5-indanol has yielded mono- and dibenzylated products. Group assignments have been made on the basis of the existing literature on phenol chemistry. Benzylation of 4-indanol yielded 7-benzyl-4-indanol and 5,7-dibenzyl-4-indanol, while 5-indanol yielded 6-benzyl-5-indanol and 4,6-dibenzyl-5-indanol. A consideration of the ultraviolet absorption spectra of the indanols along with the corresponding xylenols gave unexpected findings which could not be reconciled with steric factors.

A wide variety of substituted indanols has been prepared in our studies involving derivatives of selected moieties of the pharmacologically active steroids and alkaloids. In addition to the unsubstituted 4-indanol and 5-indanol,[2] their benzylated and chlorobenzylated derivatives[3] were required as initial reactants.

The substituted benzylindanols were prepared by the zinc chloride catalyzed condensation of the required benzyl halide with the indanol following Buu-Hoï and Demerseman.[4] Mono- and dibenzylation products were obtained in each instance. Although the group assignments cannot be made with certainty, it is known that the Friedel–Crafts type of benzylation occurs at the position *para* to the phenolic group whenever that position is free, or otherwise at the *o*-position.[4–6] Consequently, the monobenzylated product from 4-indanol has been designated as the 7-benzyl(or chlorobenzyl)-4-indanol, and the disubstituted derivative, the 5,7-dibenzyl-4-indanol. A similar pattern of substitution has been established for the chlorination of 4-indanol.[7]

In the instance of the benzylated products from 5-indanol, the monosubstituted product would enter the 4- or 6-position. Studies by Dev[8] on the chloromethylation of indan have indicated 75% of the 5-chloromethyl isomer (equivalent to the 6-position) and 25% of the 4-chloromethyl isomer (equivalent to the 7-position). This would indicate that in the presence of equal orientation effects by the alicyclic substituent, steric effects influence a preferred attack at the 6-position.[9–11] Similarly, the presence of a hydroxyl group in the 5-position would indicate that monobenzylation occurs at the 6-position to afford 6-benzyl(or chlorobenzyl)-5-indanol. The disubstituted product was assigned as 4,6-dibenzyl-5-indanol. Conversion in the benzylation ranged from 50 to 79%, monobenzylation being effected in 35 to 55% and dibenzylation in 13 to 31% yields.

In the effort to effect maximal conversion to the monobenzylated product, 3:2 molar ratios of indanol to benzyl (or monochlorobenzyl) halide were used. However, subsequent experiments wherein the dichlorobenzyl halides were condensed with the indanols in equimolar ratios showed no significant alteration of the pattern of mono- and dibenzylation.

The compounds which were prepared have been described in Table I.

The ultraviolet absorption spectra of some of the compounds herein prepared, along with those of the indanols, their methyl ethers and the corresponding xylenols were determined and have been recorded in Table II.

The unsubstituted indanols compared in methanol to their respective methyl ethers reflected the

(1) Presented at the Meeting-in-Miniature, New York Section, American Chemical Society, March, 1958.

(2) These difficultly accessible phenols have become commercially available through Union Carbide Corp., New York, N. Y.,

(3) Enhanced pharmacologic response relative to the unsubstituted phenols has been noted through the use of benzylated derivatives; (a) L. C. Cheney, R. R. Smith and S. B. Binkley, THIS JOURNAL, **71**, 60 (1949); (b) W. B. Wheatley, L. C. Cheney and S. B. Binkley, *ibid.*, **71**, 64 (1949); (c) **71**, 3795 (1949).

(4) Ng. Ph. Buu-Hoï and P. Demerseman, *J. Org. Chem.*, **20**, 1129 (1955).

(5) C. C. Price, "Organic Reactions," Vol. III, John Wiley and Sons, Inc., New York, N. Y., 1949, Chapter I.

(6) R. C. Huston and A. L. Houk, THIS JOURNAL, **54**, 1506 (1932).

(7) J. S. Buck, R. A. Cutler, F. C. Nachod, R. G. Powles, R. Rakoczy, T. J. Slauson and B. F. Fuller, *ibid.*, **79**, 3559 (1957).

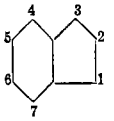
(8) S. Dev, *J. Indian Chem. Soc.*, **32**, 403 (1955).

(9) R. T. Arnold, THIS JOURNAL, **61**, 1405 (1939).

(10) R. T. Arnold and R. A. Barnes, *ibid.*, **66**, 960 (1944).

(11) R. M. Keefer and L. J. Andrews, *ibid.*, **78**, 5623 (1956).

TABLE I



BENZYLATED INDANOLS

Substituent	Yield,[a] %	B.p. °C.	Mm.	M.p.,[b,c] °C.	Formula	Analyses[d] Carbon, % Calcd.	Carbon, % Found	Hydrogen, % Calcd.	Hydrogen, % Found
Derivatives of 4-indanol									
7-$C_6H_5CH_2$–	50	140–148	0.1	115–116	$C_{16}H_{16}O$	85.7	86.0	7.2	7.0
7-$C_6H_5CH_2$–[e]	32			63–64	$C_{17}H_{18}O$	85.7	85.4	7.6	7.5
5,7-Di-$C_6H_5CH_2$–	26	175–205	0.17		$C_{23}H_{22}O$	87.9	87.4	7.1	7.3
7-(2-$ClC_6H_4CH_2$)–	41	162–178	.16		$C_{16}H_{15}ClO$	74.3	74.3	5.8	5.8
5,7-Di-(2-$ClC_6H_4CH_2$)–	19	194–202	.04		$C_{28}H_{20}Cl_2O$	72.1	71.5	5.2	5.1
7-(4-$ClC_6H_4CH_2$)–	41	146–153	.03	84–85	$C_{16}H_{15}ClO$	74.3	74.3	5.8	5.6
5,7-Di-(4-$ClC_6H_4CH_2$)–	19	226–232	.1		$C_{23}H_{20}Cl_2O$	72.1	71.8	5.2	5.5
7-(2,4-Di-$ClC_6H_3CH_2$)–	46	180	.06		$C_{16}H_{14}Cl_2O$	65.5	65.2	4.8	5.4
5,7-Di-(2,4-di-$ClC_6H_3CH_2$)–	23	240–250	.04		$C_{23}H_{18}Cl_4O$	61.1	61.3	4.0	4.1
7-(3,4-Di-$ClC_6H_3CH_2$)–	46	186–190	.1	65–67[c1]	$C_{16}H_{14}Cl_2O$	65.5	65.0	4.8	5.5
5,7-Di-(2,4-di-$ClC_6H_3CH_2$)–	17	252–266	.1	142[c2]	$C_{28}H_{18}Cl_4O$	61.1	61.2	4.0	4.2
Derivatives of 5-indanol									
6-$C_6H_5CH_2$–[f]	44	146–152	0.07	64–66	$C_{16}H_{16}O$	85.7	86.1	7.2	7.2
6-$C_6H_5CH_2$–[e]	53	156–160	.5		$C_{17}H_{18}O$	85.7	85.4	7.6	7.5
4,6-Di-$C_6H_5CH_2$–	31	190–198	.04	62–64	$C_{23}H_{22}O$	87.9	87.8	7.1	7.3
6-(2-Cl-$C_6H_4CH_2$)–	53	162–170	.04	79–82	$C_{16}H_{15}ClO$	74.3	74.4	5.8	6.2
4,6-Di-(2-$ClC_6H_4CH_2$)–	13	205–220	.03		$C_{23}H_{20}Cl_2O$	72.1	72.4	5.2	5.0
6-(4-$ClC_6H_4CH_2$)–	55	138	.05	73–74	$C_{16}H_{15}ClO$	74.3	74.4	5.8	5.9
4,6-Di-(4-$ClC_6H_4CH_2$)–	24	230	.05	83–85	$C_{23}H_{20}Cl_2O$	72.1	71.9	5.2	5.2
6-(2,4-Di-$ClC_6H_3CH_2$)–	40	186–196	.08		$C_{16}H_{14}Cl_2O$	65.5	65.8	4.8	5.1
4,6-Di-(2,4-di-$ClC_6H_3CH_2$)–	13	256–258	.08		$C_{23}H_{18}Cl_4O$	61.1	61.3	4.0	4.1
6-(3,4-Di-$ClC_6H_3CH_2$)–	35	198–208	.12		$C_{16}H_{14}Cl_2O$	65.5	65.6	4.8	5.0
4,6-Di-(3,4-di-$ClC_6H_3CH_2$)–	15	256–260	.2	78–80[c2]	$C_{28}H_{18}Cl_4O$	61.1	60.6	4.0	4.7

[a] Yields are based on distilled product. [b] Melting points are not corrected. [c] Compounds for which melting points are shown were recrystallized from hexane unless otherwise indicated: [c1] = ethanol–hexane; [c2] = ethanol. [d] Analyses by Weiler and Strauss, Oxford, England. [e] Monomethyl ether. [f] Ref. 4 reports m.p. 60°.

anticipated similarity[12] of spectral characteristics. The spectra of the ionized forms, in sodium methoxide, showed bathochromic shifts of about 17 mμ comparable to that observed with other phenols.[13] However, 5-indanol, with an extinction coefficient already remarkably high in the neutral form, did not show the anticipated doubling[13] of intensity of the corresponding peak in the alkaline form. Some suggestion of a similar pattern was noted also with 3,4-dimethylphenol.

Particularly striking were comparisons of the spectra of the indanols with the corresponding xylenols. Thus in methanol, relative to 2,3-dimethylphenol, the spectrum of 4-indanol showed finer resolution with two maxima at 269 and 277 mμ as compared to but one maximum for the phenol at 273 mμ while in cyclohexane, both compounds have three characteristic and closely parallel maxima. However, the extinction coefficient at these maxima for 2,3-dimethylphenol is about double that noted for the 4-indanol.[14]

Comparison of 5-indanol with 3,4-dimethylphenol indicated a less striking inverse trend. The absorption noted for 5-indanol occurred at a 4–5 mμ longer wave length with considerably higher extinction coefficients than the xylenol and much finer resolution being noted in cyclohexane.[15]

The parallelism of the effects noted in the strongly polar solvent methanol and in the nonpolar hexane would negate consideration of a hydrogen bonding with the solvent and would suggest that the noted spectral differences are due to intramolecular factors. The facts are not readily reconciled by steric considerations. Thus, studies of the phenols have shown that a single methyl group in the *o*-[16] or *m*-[13] position causes little change in λ_{max}.

In the case of 2,3-dimethylphenol, the "buttressing effect"[17] of the *m*-methyl group on the *o*-methyl group, which in turn sterically interacts with the hydroxyl group, accounts for the lower extinction coefficient noted relative to that of phenol.

(12) The spectra of phenols and their respective methyl ethers are similar; (a) L. Doub and J. M. Vandenbelt, THIS JOURNAL, **69**, 2714 (1947); (b) A. Kiss, J. Molnar and C. Sandorfy, *Bull. soc. chim. France*, **159**, 277 (1949).

(13) E. F. G. Hetherington and W. Kynaston, *Trans. Faraday Soc.*, **53**, 138 (1957).

(14) Reference 20 reports $\epsilon(\lambda_{max}, m\mu)$ for phenol, *o*-cresol, 2,3-dimethylphenol and 3,4-dimethylphenol as 1495 (270), 1572 (270), 1231 (271) and 1807 (277), respectively, in 0.01 *N* hydrochloric acid.

(15) (a) G. Baddeley, N. H. P. Smith and M. A. Vickers, *J. Chem. Soc.*, 2455 (1956); (b) B. T. Commins and A. J. Lindsey, *Anal. Chim. Acta*, **15**, 446 (1956). These workers noted 2–7 absorption maxima with aryl methyl ethers in the critical portion of the spectrum using hexane or cyclohexane as the solvent. Such findings can be compared with the lack of fine structure noted in ethanol (ref. 12b) and in aqueous systems (ref. 13).

(16) D. H. McDaniel and H. C. Brown, THIS JOURNAL, **77**, 3756 (1955), showed that a single *o*-alkyl group contributes no significant inhibition of resonance or F-strain.

(17) (a) W. F. Forbes and M. B. Sheratte, *Can. J. Chem.*, **33**, 1829 (1955); (b) W. C. Sears and L. J. Kitchen, THIS JOURNAL, **71**, 4110 (1949).

TABLE II

ULTRAVIOLET ABSORPTION SPECTRA OF SUBSTITUTED INDANOLS[a,c]

Substituent[b]	In methanol: 4-Indanol λ_{max}, mμ	$\epsilon \times 10^{-2}$	In methanol: 5-Indanol λ_{max}, mμ	$\epsilon \times 10^{-2}$	In 0.1 *M* NaOMe: 4-Indanol λ_{max}, mμ	$\epsilon \times 10^{-2}$	In methanol: 5-Indanol λ_{max}, mμ	$\epsilon \times 10^{-2}$
Unsubstituted[b1]	269	7.6	282	28.4	285	22.3	301	34.8
	277	7.5						
Unsubstituted (in hexane)	268	6.7	283	30.3				
	270	6.5	289	26.8				
	276	7.74						
Methyl ether	267	6.4	280	28.2	267	6.4	280	28.3
	276	6.7			276	6.6		
Benzyl	262–267° sh.	8.7	287	41.7	287	27.8	303	39.8
	269–267 sh.	10.8						
	274	11.1						
	282	10.9						
Methyl ether of benzyl	269	9.1	285	48.0				
Dibenzyl	263	12.8	285	35.9	295	32.2	292	33.8
	269	14.9					308	33.7
	278	14.9						
	282	15.1						
2-Cl-benzyl	273	12.9	287	48.7	290	33.1	305	50.2
Di-2-Cl-benzyl	274	18.6	286	41.2	295	40.6	308	50.0
4-Cl-benzyl	270	15.8	288	47.3	292	35.3	307	47.5
	278	15.6						
Di-4-Cl-benzyl	273	27.0	286	41.4	290	44.0	310	56.3
2,3-Di-CH_3-phenol[b2]	273	14.4			290	27.6		
2,3-Di-CH_3-phenol (in hexane)	269	13.9						
	273	14.0						
	278	15.6						
3,4-Di-CH_3-phenol[b3]			278	18.8			295	26.0
3,4-Di-CH_3-phenol (in hexane)			277.5	18.9				
			284	17.5				

[a] The spectra were determined in a Beckman ultraviolet recording spectrophotometer using 1-cm. cells. [b] The compounds were of the purity reported in Table I and the known structures were recrystallized before use. [b1] M.p., 4-indanol (pentane), 50–50.5° (reported m.p. 49–50°, R. T. Arnold and H. E. Zaugg, THIS JOURNAL, **63**, 1317 (1941)); m.p., 5-indanol (pentane), 59–60°. [b2] M.p. 75–76° (hexane). [b3] M.p. 62–64° (hexane). [c] Spectra for 4-indanol and 5-indanol have been previously recorded (R. A. Friedel and M. Orchin, "Ultraviolet Spectra of Aromatic Compounds," John Wiley and Sons, Inc., New York, N. Y., 1951). The spectra of 2,3-dimethylphenol and 3,4-dimethylphenol are described in ref. 13.

With a methyl group in the *p*-position, studies[13,18] have shown that a bathochromic shift of about 7–9 mμ relative to the unsubstituted compound is obtained. Another methyl group in the case of 3,4-dimethylphenol could possibly lead to some distortion of the 4-methyl group by the 3-methyl group due to the "buttressing effect," but the spectra indicate that this apparently does not occur.

In the indan ring system, Arnold[19] has shown that the methylene groups of indan introduce a lesser steric factor than *o*-methyl groups which would reflect a lesser degree of steric influence with 4-indanol than with 2,3-dimethylphenol.

Similarly, no more distortion from planarity would be anticipated in comparing 5-indanol with 3,4-dimethylphenol.[20]

Consideration of the spectra of 5,6,7,8-tetrahydro-1-naphthol and 5,6,7,8-tetrahydro-2-naphthol[21] indicates that the maxima and extinction coefficients fall between those observed with the corresponding indanols and xylenols. While the spectra are more comparable to the xylenols, these naphthols appear to exhibit a similar (but much less pronounced) anomaly in the pattern of the extinctions which have been noted with the indanols.

While the data at hand clearly reflect marked differences in the spectra of the indanols and the xylenols, we have been unable to adequately rationalize these anomalous extinctions. More detailed studies as well as infrared spectra probably are required to critically assess whether the Mills–Nixon effect[22] or some other factor is the factor involved.

Benzylation is accompanied by a variety of spectral changes with retention, in methanol, of the characteristic differences noted in the 4- and 5-indanol series. In the 4-indanol series, the 7-benzyl compound showed four resolvable maxima with some increase in extinction coefficient relative to the unsubstituted indanol. This compound reddened quite rapidly in air. In contrast, the 7-(4-

(18) W. F. Forbes and W. A. Mueller, *Can. J. Chem.*, **34**, 1542 (1956).

(19) R. T. Arnold, V. J. Webers and R. M. Dodson, THIS JOURNAL, **74**, 368 (1952).

(20) R. A. Friedel, *ibid.*, **73**, 2881 (1951). In an infrared study of intermolecular association of phenols, 4-indanol showed more association (is less hindered) than *o*-cresol, while 5-indanol was similar to *m*- and *p*-cresols.

(21) R. A. Friedel and M. Orchin, "Ultraviolet Spectra of Aromatic Compounds," John Wiley and Sons, Inc., New York, N. Y., 1951, lists 5,6,7,8-tetrahydro-1-naphthol as spectrum no. 51: λ_{max} 261 mμ (ϵ 12.9 × 10^3) and 279 mμ (ϵ 14.2 × 10^3) in cyclohexane, and 5,6,7,8-tetrahydro-2-naphthol as spectrum no. 52: λ_{max} 278–282 mμ (ϵ 21.4 × 10^3) and 288 mμ (ϵ 20.4 × 10^3) in cyclohexane. We are grateful to the Referee for suggesting the introduction of these pertinent spectra.

(22) W. G. Mills and I. G. Nixon, *J. Chem. Soc.*, 2510 (1930).

chlorobenzyl) derivative did not discolor on standing.

The chlorobenzyl derivatives showed increased extinction coefficients relative to the benzyl with the 4-chlorobenzyl compounds having the greatest effect. All of the dibenzylated structures had increased extinction coefficients relative to the monobenzylated products in the order 4-chlorobenzyl >> 2-chlorobenzyl = benzyl, although no significant change in absorption maximum was observed. In alkali, bathochromic shifts in reference to the 4-indanol were obtained and considerable increases in extinction coefficients were observed with the benzylated derivatives. In terms of the standards of Coggeshall and Glessner[23] no steric hindrance is indicated.

In contrast, in the 5-indanol series monobenzylation yielded significant increases in extinction coefficients and bathochromic shifts relative to the unsubstituted indanol, with alkali having an effect comparable to that observed with 5-indanol.

The spectra of the dibenzylated products in methanol were associated in all cases with a decrease in the extinction coefficient when compared to the monobenzylated product. Here apparently, the two benzyl groups in the position *ortho* to the phenolic hydroxyl introduce some steric inhibition[23] of resonance. With the ionic spectra a varying pattern is observed for the extinction coefficients relative to the monobenzylated indanols. The dibenzyl absorbs less, the di-2-chlorobenzyl the same and the di-4-chlorobenzyl more than the corresponding monobenzyl structure.

Experimental[24]

7-Benzyl-4-indanol and 5,7-Dibenzyl-4-indanol.—A mixture of 100 g. (0.74 mole) of 4-indanol, 62.8 g. (0.496 mole) of benzyl chloride and 32 g. of freshly fused anhydrous zinc chloride in 400 ml. of chloroform was refluxed with stirring for 12 hours, cooled and added to 1.6 l. of water. The chloroform phase was separated, dried (anhydrous magnesium sulfate), filtered and distilled. After removal of chloroform and unreacted 4-indanol, there was obtained 56 g. of 7-benzyl-4-indanol, b.p. 140–148° (0.1 mm.), which crystallized, m.p. 111–113°.

On further distillation there was obtained 20 g. of 5,7-dibenzyl-4-indanol, b.p. 174–205° (0.17 mm.).

6-(4-Chlorobenzyl)-5-indanol and 4,6-Di-(4-chlorobenzyl)-5-indanol.—A mixture of 12.5 g. (0.093 mole) of 5-indanol, 10 g. (0.062 mole) of *p*-chlorobenzyl chloride and 4 g. of freshly fused anhydrous zinc chloride was allowed to react as above. Upon distillation, there was obtained 8.82 g. of 6-(4-chlorobenzyl)-5-indanol, b.p. 138° (0.05 mm.), m.p. 73–74°.

On further distillation there was obtained 2.87 g. of 4,6-di-(4-chlorobenzyl)-5-indanol, b.p. 230° (0.05 mm.), m.p. 83–85°.

6-Benzyl-5-methoxyindan.—A solution of 30 g. (0.134 mole) of 6-benzyl-5-indanol and 32.8 g. (0.26 mole) of methyl sulfate in 100 ml. of acetone was treated with 27.6 g. (0.2 mole) of anhydrous potassium carbonate and heated under reflux with vigorous stirring for 4 hours. The cooled reaction mixture was filtered, the filtrate diluted with 100 ml. of water and extracted with three 100-ml. portions of ether. The ethereal extracts were combined, washed with 100 ml. of 6 *N* sodium hydroxide and the ether phase separated and dried over anhydrous magnesium sulfate. After filtration and evaporation of the ether, the product was collected, 16.9 g., b.p. 156–160° (0.5 mm.).

4-Methoxyindan.—In a similar manner 4-methoxyindan was obtained in 33% yield, b.p. 56–60° (0.1 mm.).

Anal. Calcd. for $C_{10}H_{12}O$: C, 81.0; H, 8.2. Found: C, 81.3; H, 8.2.

5-Methoxyindan.—In a similar manner 5-methoxyindan was obtained in 72% yield, b.p. 65–78° (1.0 mm.).

Anal. Calcd. for $C_{10}H_{12}O$: C, 81.0; H, 8.2. Found: C, 80.8; H, 8.4.

Acknowledgment.—The authors wish to express their appreciation to M. Blitz and his associates for the determination of the ultraviolet absorption spectra.

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(23) N. D. Coggeshall and A. S. Glessner, Jr., THIS JOURNAL, **71**, 3150 (1949).

(24) Descriptive data shown in Table I are not reproduced in this section.

[CONTRIBUTION FROM THE RESEARCH LABORATORIES, U. S. VITAMIN CORPORATION]

Indanols. II. Aminoalkyl Ethers

BY SEYMOUR L. SHAPIRO, KURT WEINBERG, THEODORE BAZGA AND LOUIS FREEDMAN

RECEIVED JANUARY 14, 1958

A series of disubstituted aminoalkyl ethers of 4-indanol, 7-benzyl(and chlorobenzyl)-4-indanol, 5-indanol and 6-benzyl-(and chlorobenzyl)-5-indanol and their salts have been prepared for pharmacologic evaluation. Significant responses such as hypotension, ganglionic block, anti-inflammatory activity and depression of the central nervous system have been noted with selected members of this series.

The indan ring is a structural component of pharmacologically active steroids and alkaloids. A variety of investigations[2-5] have been reported wherein the indan fragment has been derivatized in the search for pharmacologic activity in relatively simple structures.

The recent availability of 4-indanol and 5-indanol[6] made it attractive to consider evaluation of the aminoalkyl ethers of these phenols as broad spectrum[7] pharmacologic agents. Since benzylated phenol derivatives have proved more effective than the corresponding unsubstituted phenol,[8] the benzylated and chlorobenzylated indanols were

(1) Presented in part at the Meeting-in-Miniature, New York Section, American Chemical Society, March, 1958.

(2) F. C. Uhle, J. E. Krueger and A. E. Rogers, THIS JOURNAL, **78**, 1932 (1956); veratramine analogs.

(3) J. A. Barltrop, R. M. Acheson, P. G. Philpott, K. E. MacPhee and J. S. Hunt, *J. Chem. Soc.*, 2928 (1956); methadone analogs.

(4) D. B. Cowell and D. W. Mathieson, *J. Pharm. and Pharmacol.*, **9**, 549 (1957); adrenal cortical analogs.

(5) A. M. Akkerman, *Rec. trav. chim.*, **74**, 1281 (1955); analgesics.

(6) Union Carbide Corp., New York, N. Y.

(7) C. Riffkin and N. Rubin, *J. Am. Pharm. Assoc., Sci. Ed.*, **45**, 317 (1956).

(8) (a) L. C. Cheney, R. R. Smith and S. B. Binkley, THIS JOURNAL, **71**, 60 (1949); (b) W. B. Wheatley, L. C. Cheney and S. B. Binkley, *ibid.*, **71**, 64 (1949); (c) **71**, 3795 (1949).