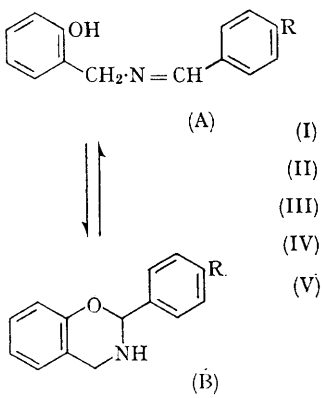
Ring–Chain Tautomerism of Derivatives of *o*-Hydroxybenzylamine with Aromatic Aldehydes

By ANTONY F. MCDONAGH and HOWARD E. SMITH

(*Department of Chemistry, Vanderbilt University, Nashville, Tennessee* 37203)

THIS Communication presents the first quantitative data on the tautomeric equilibrium (A)⇌(B). Although a similar ring–chain tautomerism is possible for many condensates of aldehydes and ketones with primary β- or γ-amino-alcohols,[1–3] quantitative data are lacking. This equilibrium is of additional interest because *o*-hydroxybenzylamine is structurally analogous to pyridoxamine,[4] which in its role in enzymic transamination reactions is considered to form Schiff-base intermediates by condensation with α-keto-acids.[4]



(I) R = NO_2
(II) R = Br
(III) R = H
(IV) R = $CHMe_2$
(V) R = NMe_2

Condensation of *o*-hydroxybenzylamine with several *para*-substituted benzaldehydes in benzene or absolute ethanol gave crystalline products (I—V) which in the solid state have the structure (A) as evidenced by their sharp melting points (Table), infrared spectra [ν_{max}(KBr disc) 1620—1641 cm.$^{-1}$, broad absorption 3400—2500 cm.$^{-1}$, no NH absorption], and elemental combustion analyses. Osmometric molecular-weight determinations indicated these compounds to be monomeric in chloroform at room temperature.

The n.m.r. spectra (60 Mc./sec.) of compounds (I—IV) in deuterochloroform are consonant with the presence of both the Schiff base (A) and the corresponding 3,4-dihydro-1,3-benzoxazine (B) tautomers. For each compound the signal due to the methylene protons of the open-chain structure is a singlet (τ 4·98—5·08), in contrast to that due to the methylene protons of its ring tautomer, which appears as a quartet (τ 5·86—5·98; J_{gem} = 17 c./sec.). The azomethine proton resonance of tautomer (A) is a broadened singlet or triplet at τ 1·48—1·70, and the corresponding methine proton resonance of the cyclic tautomer (B) a singlet at τ 4·08—4·21. In confirmation of these assignments the intensity ratio of the methylene to methine resonances arising from each particular tautomer was found to be 2 : 1, irrespective of the tautomer ratio.

TABLE

	M.p. (°c)	% of B[a]	Solvent[b]
(I)	132—134	51	$CDCl_3$
		35	MeCN
		0	Me_2SO[c]
(II)	134—135	21	$CDCl_3$
(III)[d]	106—107	14	$CDCl_3$
(IV)	97—98	13	CCl_4
		10	$CDCl_3$
(V)	151—153	0	$CDCl_3$

[a] Measured at 35 ± 1°.
[b] Concentration 0·4 M, except where noted otherwise.
[c] Concentration 0·7 M.
[d] Previously reported.[5]

Equilibrium data, calculated from the relative intensities of the proton resonance signals from the ring and chain tautomers respectively, are summarised in the Table.

It is evident that the greater the electron-withdrawing power of the substituent in the *para*-position of the aldehyde moiety, the greater the ring–chain ratio. As expected the equilibrium is markedly solvent-dependent, the percentage of the open-chain tautomer being increased in changing to a solvent of greater dielectric constant (Table).

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