

NOTE

Synthesis and Characterization of Some Schiff Bases

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A series of ten Schiff bases have been synthesized by condensation of a variety of aromatic amines with some aniline (or derivatives) and aromatic aldehyde derivatives. These Schiff bases have been characterized by IR, ^1H NMR in addition to elemental analysis.

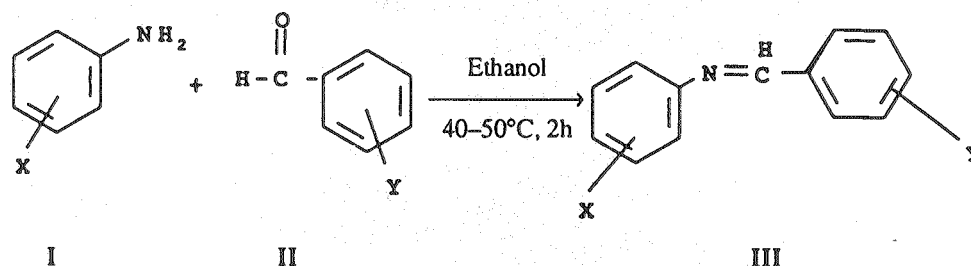
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Schiff bases derived from aniline and its derivatives and aromatic aldehyde derivatives have a wide variety of applications in many fields, *e.g.*, biological^{1–4} and analytical chemistry⁵. It is well known from the literature that much work have been done on the synthesis and characterization of these compounds^{6–8}. In this work, the syntheses of various Schiff bases with different substituents on either the aromatic amines or the aromatic aldehydes are reported.

Synthesis of Schiff Bases

The Schiff bases were prepared according to the reported method⁶. The procedure is as follows: A solution of aniline (or derivative) 0.1 mole is dissolved in absolute ethanol (30 mL) was slowly added to a solution of the aldehyde (or derivative) in absolute ethanol (30 mL). After stirring the reaction mixture for two hours at 40–50°C, then on cooling the precipitate formed was collected by filtration. The product was washed several times with cold water, then recrystallized from ethanol.

The Schiff bases (IIIa_j) were obtained by the reaction of aniline I (and its derivatives) with benzaldehyde II (and its derivatives) in a 1 : 1 molar ratio in ethanol, can be represented by the following equation:



The structures of benzylidene aniline derivatives (IIIa–j) were as follows:

IIIa = X = H	Y = H	IIIf = X = <i>o</i> -NO ₂	Y = <i>o</i> -OCH ₃
IIIb = X = H	Y = <i>p</i> -NO ₂	IIIg = X = <i>p</i> -NO ₂	Y = <i>o</i> -OCH ₃
IIIc = X = H	Y = <i>m</i> -OH	IIIh = X = <i>o</i> -COOH	Y = <i>o</i> -OH
IIId = X = HD	Y = <i>p</i> -OH ₃	IIIi = X = <i>p</i> -OCH ₃	Y = <i>o</i> -OH
IIIe = X = H	Y = <i>p</i> -N(CH ₃) ₂	IIIj = X = <i>o</i> -Br	Y = <i>o</i> -OCH ₃

The physical and elemental data of the above compounds (given in Table-1) are consistent with the calculated results.

TABLE-1
ANALYTICAL DATA AND SOME PHYSICAL PROPERTIES OF THE SCHIFF BASES

Compd. No.	m.f.	m.p. (°C)	Yield (%)	Micro analysis: Found (Calcd.) (%)		
				C	H	N
IIIa	C ₁₃ H ₁₁ N	48	87	86.13 (85.74)	6.07 (6.14)	7.73 (7.88)
IIIb	C ₁₃ H ₁₀ N ₂ O ₂	90	96	68.99 (68.75)	4.42 (4.39)	12.38 (12.34)
IIIc	C ₁₃ H ₁₁ NO	80	87	79.15 (78.64)	5.58 (5.47)	7.10 (7.16)
III d	C ₁₄ H ₁₃ NO	58	83	79.56 (79.65)	6.16 (6.12)	6.63 (6.81)
IIIe	C ₁₅ H ₁₆ N ₂	100	79	80.29 (79.84)	7.14 (7.18)	12.49 (12.60)
III f	C ₁₄ H ₁₂ N ₂ O ₃	103	77	56.00 (56.20)	5.07 (5.10)	10.90 (10.60)
III g	C ₁₄ H ₁₂ N ₂ O ₃	145	78	56.00 (56.25)	5.07 (5.28)	10.90 (10.80)
III h	C ₁₄ H ₁₁ NO ₃	107	77	69.63 (69.90)	4.56 (4.85)	5.80 (5.90)
III i	C ₁₄ H ₁₃ NO ₂	82	82	73.92 (74.23)	5.72 (5.67)	6.16 (5.86)
III j	C ₁₄ H ₁₂ BrNO	85	79	57.93 (58.16)	4.13 (3.77)	4.82 (5.06)

IR: In general, the Schiff bases exhibited very similar features and showed the expected bands for the characteristic groups⁹⁻¹¹ which are present in these compounds such as the C—H and the C=N stretching vibrations in another specific band for ArC—N vibrations. Then for each specific compound the bands appearing at certain values correspond to the type of the functional groups present on each compound. The detailed IR bands and their assignments were shown in Table-2.

¹H NMR: ¹H NMR spectra of Schiff bases show the characteristic bands for the protons present in these compounds. In general, a sharp singlet peak appears at 8.66 ppm assigned for —CH=N— proton in all compounds, the aromatic protons appeared as multiplet peaks within the range 6.8–7.8 ppm. As with the IR spectra, each individual compound shows the peaks, which corresponds to the different functional groups present. Table-3 shows the NMR peaks and their assignments.

TABLE-2
IR (cm⁻¹) SPECTRAL DATA OF THE SCHIFF BASES

Compd. No.	v(C=N)	v(OC)	v(CN)	v(Ar-CH)
IIIa	1625		1190	790
IIIb	1615		1180	740
IIIc	1625	1280	1200	775 3610 (OH, Phenol)
III d	1605	1450	1160	840 1250 (C—O, Ether)
IIIe	1600		1230	760 1440, 1365 (N(CH ₃) ₂)
III f	1615	1440	1150	740 1495 (NO ₂) 1250, 1030 (C—O, Ether)
III g	1600	1450	1185	830 1500 (NO ₂) 1250, 1020 (C—O, Ether)
III h	1637		1180	750 3610 (OH, Phenol); 3000 (OH, Carboxyl) 1730 (C=O); 1280, 1245 (Acid)
III i	1625	1480	1180	730 3400 (OH, Phenol) 1240, 1020 (Ether)
III j	1615	1480	1185	750 1250 (Ether) 670 (C—Br)

TABLE-3
¹H NMR SPECTRA OF THE SCHIFF BASES (δ ppm)

Compd. No.	OH	Ar-H	CH=N	OCH ₃	N(CH ₃) ₂	COOH
IIIa		7.2–8.0 (m, 10H)	8.5 (s, 1H)			
IIIb		7.2–8.3 (m, 8H)	8.5 (s, 1H)			
IIIc	9.9 (s, 1H)	6.7–7.9 (m, 11H)	10.5 (s, 1H)			
III d		7.8 (m, 9H)	8.5 (s, 1H)	3.9 (s, 3H)		
IIIe		6.6–7.8 (m, 9H)	8.3 (s, 1H)		3.0 (s, 6H)	
III f		6.0–8.9 (m, 8H)	8.5 (s, 1H)	3.9 (s, 3H)		
III g		6.6–8.1 (m, 8H)	10.5 (s, 1H)	3.9 (s, 3H)		
III h	13.0 (s, 1H)	6.9–7.9 (m, 8H)	8.6 (s, 1H)			10.2 (s, 1H)
III i	13.4 (s, 1H)	6.9–7.3 (m, 8H)	8.7 (s, 1H)	3.9 (s, 3H)		
III j		6.9–7.7 (m, 8H)	8.9 (s, 1H)	3.8 (s, 3H)		

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