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NOTE

Synthesis of Schiff Bases under Ultrasound-Irradiation

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Ultrasound irradiation promoted the formation of a series of Schiff bases in the condensation reaction between substitute benzaldehydes and substitute anilines. Substitute benzaldehydes and substitute anilines, containing either electron-withdrawing or electron-releasing groups, were assessed to identify any substituent effect on the formation of the Schiff bases. This new procedure is environmentally benign because no solvent was employed in the transformations.

Key Words: Ultrasound irradiation, Promoter, Schiff base.

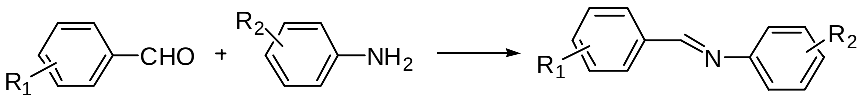
The environment friendly synthetic methods have attracted more attentions in recent years[1-8]. One reason is that there are still so many unsolved environmental problem. The synthesis of imines has been reviewed many times in recent years[9-11]. Imines are important intermediates in synthetic organic chemistry and pharmaceutical compounds such as β-lactams and some metal complexes[12-18].

Although alternative methods exist[19] but reaction of aldehydes compounds with anilines remains still the most important route. The classical method involves refluxing of an alcoholic solution of these reactants. Under certain circumstances, ultrasonic irradiation can replace the heating procedure[20]. Herein, the preparation of a series of Schiff base using a ultrasound technique is reported.

Melting points were determined using a Yanaco MP-241 apparatus and are uncorrected. Infrared spectra were recorded on a Bruker Equinox55 spectrophotometer as potassium bromide tablets. ^{1}H NMR spectra were measured on a Bruker AC-P500 instrument (300 MHz) using tetramethylsilane as an internal standard and $CDCl_3$ as solvent. Ultrasonic irradiation was carried out with KQ-218 ultrasonic cleaner 20 kHz/50 W.

General procedure of synthesis of Schiff bases

The reactants in the molar ratio substitute benzaldehydes/substitute anilines (1:1) were resolve in ethanol at 50ºC. Then the mixture was exposured to the ultrasound. The compound was irradiated for 10-20 min (Table-1) and the completion of the reaction is monitored by TLC examination, then the solvent evaporated. Yields are given in Table-1. In addition, to identify the substituent effect on the formation of the Schiff bases under ultrasound irradiation, several reactions using both electron-poor and electron-rich benzaldehydes and electron-poor and electron-rich anilines (**Scheme-I**) were carried out. When electron-rich benzaldehydes and electron-rich anilines were irradiated, the conversion rate decreased. On the other way, the conversion rate increased.



Scheme-I

TABLE-1
PHYSICAL DATA OF SCHIFF BASES UNDER ULTRASOUND IRRADIATION

Substrate	R_1	R_2	Time (min)	Products	Yield (%)
1a	C_6H_5	*p*-$NO_2C_6H_4$	10	2a	92.2
1b	*p*-$CH_3C_6H_4$	*p*-$NO_2C_6H_4$	15	2b	80.4
1c	*p*-$OCH_3C_6H_4$	*m*-$NO_2C_6H_4$	15	2c	75.6
1d	*o*-BrC_6H_4	*m*-$NO_2C_6H_4$	10	2d	88.6
1e	*o*-FC_6H_4	*o*-$NO_2C_6H_4$	10	2e	89.6
1f	*o*-ClC_6H_4	C_6H_5	10	2f	90.3
1g	*m*-$NO_2C_6H_4$	C_6H_5	10	2g	90.3
1h	*p*-$NO_2C_6H_4$	*p*-BrC_6H_4	10	2h	91.6
1i	2,4-$Cl_2C_6H_3$	*o*-ClC_6H_4	10	2i	94.2
1j	*p*-BrC_6H_4	C_6H_5	15	2j	85.2
1k	*p*-OHC_6H_4	*p*-$OCH_3C_6H_4$	15	2k	93.1
1l	*o*-$OCH_3C_6H_3$	*p*-$OCH_3C_6H_4$	20	2l	82.6
1m	3,4-di$(CH_3)_2C_6H_3$	*o*-$OCH_3C_6H_3$	20	2m	74.3
1n	3,4-di$(OCH_3)_2C_6H_3$	*o*-$OCH_3C_6H_3$	20	2n	72.6
1o	$N(CH_3)_2C_6H_4$	*p*-$CH_3C_6H_4$	20	2o	82.3

Almost all derived Schiff base are known compounds and their spectral data, as well as melting points of solids, were in agreement with those known.

Conclusion

A new, simple, efficient and environmentally benign method for the preparation of substituted N-benzylideneaniline derivatives, *via* condensation of several substitute benzaldehydes and substitute anilines, by means of ultrasound irradiation was developed. The condensations proceed with good yields and in considerably shorter times. Additional advantages of the method were lower cost, ease of work-up.

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