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Citric Acid Catalyzed Synthesis of Hydrazones Schiff Bases of 2,4-Dinirtophenyl Hydrazine

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ABSTRACT

An efficient method for the Citric acid-catalyzed synthesis of hydrazones Schiff base using 2,4-dinirtophenyl hydrazine. We have synthesized a series of hydrazones using 2,4-dinirtophenyl hydrazine as a source of amine and substituted aromatic aldehydes and aromatic ketones as a carbonyl source. Synthesized compounds were characterized by FT-IR techniques. Synthesis of above hydrazones using citric acid as a catalyst proved to be a green and eco-friendly approach.

INTRODUCTION

Compounds containing azomethine group (-CH=N-) are known as Schiff's bases and they are synthesized by condensation of primary amine with carbonyl compounds (aldehydes & ketones). [1] Recently there has been considerable interest in the chemistry of hydrazine and hydrazone compounds because of their potential pharmacological applications. [2] Schiff base hydrazone compounds have been extensively used as versatile ligands in coordination chemistry and Schiff base hydrazone complexes are also very attractive model compounds for the elucidation of several biochemical processes. Hydrazones are used as intermediate in synthesis [3], as functional groups in metal carbonyls [4], in organic compounds [5, 6] and in particular hydrazone Schiff base ligands. [7-10] They also act as herbicides, insecticides, plant growth regulators and nematocides. [11-13] Hydrazones have been demonstrated to possess antimicrobial, anticonvulsant, analgesic, anti-inflammatory, anticancer activities. [14, 15] The chemistry of hydrazone derivatives has been investigated intensively in the last decade owing to their coordinative and pharmacological activity as well as their use analytical chemistry as metal extracting agents. [16, 17]The significance of Schiff bases like hydrazones lies in the fact that these compounds not only possess antimicrobial activities but also show greater tendency to form complexes. [18] In analytical chemistry hydrazones find applications as multidentate ligands for transition metals in colorimetric or fluorimetric determination. [19, 20] The above remarkable considerations, pharmaceutical and industrial applications encouraged us to synthesize hydrazone derivatives of 2, 4 dinitrophenyl hydrazine using Citric acid as a green catalyst.

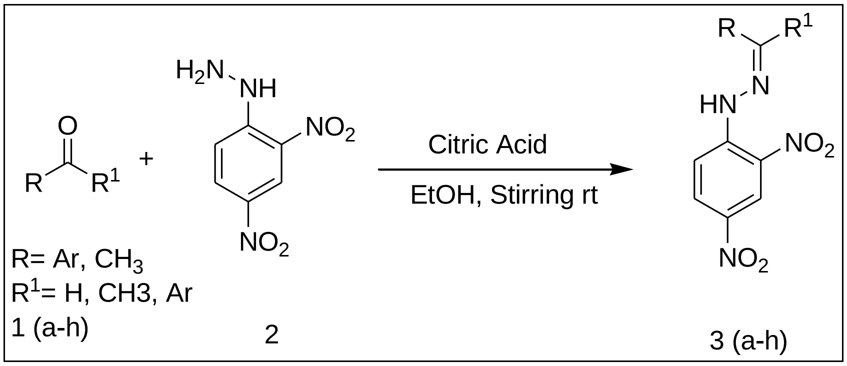
MATERIALS AND METHODS

All chemicals were purchased either from S.D fine and Loba chemicals used without further purification. Melting points were taken in an open capillary and are uncorrected. FT-IR spectra were recorded on JASCO-FT-IR/4100, Japan, in KBr disc. All the reactions were carried out at room temperature.

General procedure for the synthesis of Hydrazones Schiff bases

A reaction mixture of 2,4-dinirtophenyl hydrazine (1 mmol), aromatic aldehydes/ketones (1 mmol) and citric acid (0.1 gm) in ethanol (15 ml) was stirred for specific time mentioned in

Table 3 at room temperature. Insoluble solid was gradually generated, then filter and wash with water. The crude product obtained was recrystallized from ethanol to afford pure products.



Scheme 1

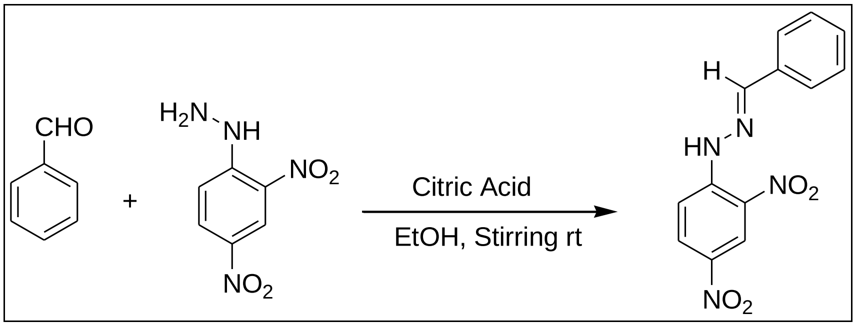
Spectroscopic data of compound:

3b.IR (KBr in cm^{-1}): υ= 3456 (-NH), 1620 (-C=N), 1512 ($-NO_2$) **3d.**IR (KBr in cm^{-1}): υ=3456 (-NH), 1620 (-C=N), 1512 ($-NO_2$), 3268 (-OH), 1273 (-C-O) **3g.**IR (KBr in cm^{-1}): υ= 3493 (-NH), 1616 (-C=N), 1512 ($-NO_2$)

The IR spectra of compounds 3b, 3d, and 3g indicate the formation of the Schiff base product by the absence of the carbonyl group (1700 cm^{-1}) band and the appearance of strong band in the region of (1616-1620 cm^{-1}). Hence, this band indicates that the formation of hydrazones derivatives.

RESULTS AND DISCUSSION

To optimize the reaction conditions, 2,4-dinirtophenyl hydrazine and benzaldehyde as a model reaction to examine the effect of various solvents, such as water, acetone, methanol and ethanol with citric acid as catalytic materials. The best solvent effect was observed in ethanol and hence, we have used ethanol as solvent for the synthesis of hydrazones as derivatives.



Scheme 2 Model reaction

Table 1 Effect of various solvent

Entry	Solvent[a]	Yield[b] %
1	Water	50
2	Acetone	80
3	Ethanol	94
4	Methanol	81

[a]All reactions were carried out using citric acid at room temperature. [b]Isolated yields.

After optimization of solvent effect, the reaction was performed employing various acid catalysts such as H_2SO_4, HNO_3, acetic acid and citric acid. It was noted that none of the catalyst other than citric acid was promising for considerable yields. Best catalytic activity was performed citric acid as a catalyst in ethanol as a solvent.

Table 2 Effect of various catalysts

Entry	**Catalyst**	**Yields (%)[a]**
1	H_2SO_4	85
2	HNO_3	81
3	Acetic acid	80
4	Citric acid	94

Reaction conditions: 2,4-dinirtophenyl hydrazine (1 mmol), benzaldehyde (1 mmol) catalyst (0.1 gm) and ethanol 15 ml. [a] Isolated yields

To explore the scope and generality of the present method, variety of different substituted aromatic aldehydes and ketones possessing electron rich and electron deficient groups gave good to excellent yields (89-96 %) and reaction were completed within 2-6 min in ethanol at room temperature (Table 3).

Table 3 Citric acid catalyzed synthesis of hydrazones Schiff bases

Entry	**R**	**R[1]**	**Time (min)[a]**	**Yields (%)[b]**	**M.P. (°C)**
3a	C_6H_5	H	3	94	240-242
3b	*p*-ClC_6H_4	H	4	92	254-256
3c	*p*-$OCH_3C_6H_4$	H	5	91	230-232
3d	*o*-OHC_6H_4	H	4	90	238-240
3e	*p*-$NO_2C_6H_4$	H	2	96	239-241
3f	CH_3	CH_3	4	91	126-128
3g	C_6H_5	CH_3	5	90	135-137
3h	C_6H_5	C_6H_5	6	89	237-239

[a]Reaction conditions: 2,4-dinirtophenyl hydrazine (1 mmol), benzaldehyde (1 mmol) catalyst (0.1 gm) and ethanol 15 ml. [b]Isolated yields

CONCLUSION

In conclusion, we have synthesized hydrazones Schiff bases using simple and convenient method with a short reaction time and easy work up. Present method offers remarkable advantages such as non-toxic, non-corrosive and an inexpensive reaction condition.

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REFERENCES

1] M Deodhar, S Bairagi, Coumarin Schiff bases as antimicrobial agents Lambert Academic Publishing, 2010.
2] Z H Chohan, S K Shenazi, Metal Based Drugs 4(6) pp 327, 1997.
3] F Armbruster, U Klingebiel, M Noltemeyer Naturforsch 61b pp 225, 2006.
4] O S Sentruk, S. Sert, U Ozdemir Naturforsch. 58b pp 1124, 2003.
5] A E Amr, A M Mohamed, A A Ibrahim Naturforsch 58b pp 861, 2003.
6]H Mohrle, G Keller Naturforsch 58b 885, 2003.
7] J Chakraborty, R K Singh, B Samanta, C R Choudhary , S K Dey Naturforsch 61b pp 1209, 2006.
8] V Lozan , P G Lassahn, C Zhang, H Lang Naturforsch 58b pp 1152, 2003.
9] C T Zeyrek, A Elmali, Y Elerman Naturforsch 61b pp 237, 2006.
10] D K Dey, B Samanta, A Lycka, L Dahlenburg Naturforsch 58b pp 336, 2003.
11] M Katyal , Y Dutt, Talanta pp 151 1975.
12] M Mohan , M P Gupata, L Chandra, N L jha, Inorg. Chim. Acta pp 151, 1988.
13]L H Terra, A M C Areias, I Gaubeur Spectroscopy Letter pp 257, 1999.
14] f h Allen, O Kennard, D G Watson, L Brammer & R Taylor Journal Chem. Soc. Perkin Trans 1987.
15] K K Bedia, O Elciro, U Seda, K Fatma, S Nathaly, R Secim & A Dimoglo Eur. J . Med. Chem pp 1253 2000.
16] A Haran, J Gairin & G Commerges Inorg.Chim. Acta pp 213 1980.
17] H M El-Table, F A El-Saied and M I Ayad Synth. React. Inorg. Met. Org. Synth. Chem pp 1189 2002.
18] Dicer Sebla Indian J. Chem pp 1335 1996.
19]I Suez, S O Dehkoen, M R Hoffmann Sci. Technol pp2080 1994.
20] L H Teraa, I Gauber, M E V Suezajha Spectroscopy Letters pp 257 1999.