



Eco-friendly preparation of schiff bases by natural acid catalysts.

AR.Malviya^{1*}, Z. M. Gadhawala¹

1. Department of Chemistry, The H.N.S.B. Ltd. Science College Himmatnagar Gujarat, 383001

ABSTRACT

Recently it has been confirmed in a number of chemical transformation & organic synthesis that the use of green chemistry techniques are very useful to decrease reaction time & chemical waste. To illustrate these advantages in preparation of organic compounds, a variety of environmentally nice protocols have been considered. The most important thing of present research work is utilization of greener approach to preparation of Schiff bases with the utilization of fruit juices like natural acid catalysts. The produced compounds were resolved by T.L.C., melting points & IR analysis. We find this method of synthesis were offer high % of yield & suitable, prove highest efficiency held with no creation of effluence in small time, low cost, easy to run & safer to analyst.

Keywords: Chemical transformation, Chemical waste, Greener approach

*Corresponding Author Email: arunmalviya145@gmail.com
Received 04 September 2016, Accepted 12 September 2016

Please cite this article as: Malviya AR *et al.*, Eco-friendly preparation of schiff bases by natural acid catalysts.. American Journal of Pharmacy & Health Research 2016.

INTRODUCTION

Green Chemistry is useful to chemists in production & research & development of environmentally caring and capable products which might also have significant financial profits. Currently the organic synthesis without use of solvent is more popular¹ because almost solvents are either flammable or toxic & include much cost for synthesizes almost all organic compounds. This process improve purification and selectivity of synthesise compound than the conventional methods.² with the fruit juice here we have synthesized a variety of the Schiff bases. Due to time and cost effective, environmental friendly and not harmful properties we have mainly concentrate on using the fruit juice. As per literature many of organic preparations are distinguished in which natural catalyts similar to clay⁴⁻⁶, Phosphates⁷⁻⁸, gold⁷, animal bone⁹ are in use. The intention of current work is to identify most excellent method for the preparation of Schiff bases. In current work, Schiff bases have been synthesized with make use of microwave assisted method, natural acid catalyts (fruit juice) & conventional method. With the physical properties, thin layer chromatography, Melting point and Infrared spectra the characterization of every synthesized compound was done.

MATERIALS AND METHOD

The reagents and solvents which utilized for the synthesis of the Schiff bases were analytical grade and utilized with no purification.

Preparation of catalyts:

Sweet lime, orange and grapes like fruits were obtained locally and then sweet lime, orange was peeled off through knife and it's slices were crushed into juicer to obtain semisolid mass which was then pass through a filter with fibre to get liquid juice to utilized as catalyts. The grapes were hard-pressed into fruit mixture and filtered with cotton to get liquid juice.

Preparation of Schiff bases by usual method⁹:

1) Equal mole amount of Anisaldehyde (0.01mole) & p- Amino benzoic acid (0.01mole) in 1,4 dioxan (100 ml) was heat up to refluxed for 1 hrs. After completion of reflux excess of 1,4 dioxan was distilled out & cooled the solid materials which separated out with filtration & recrystallized with 95 % ethanol.

2) Equal mole amount of Salisaldehyde (0.01mole) & p- Amino benzoic acid (0.01mole) were soluble in 200 ml methanol and a small number of drops of glacial acetic acid were added. The mixture was heated at 70-80°C for 10-12 hrs with use of water bath. The resulting solution

mixture was cooled to 25-30 °C & then poured it on crushed ice. The precipitates was filtered off and washed with aqueous solution of NaHSO₃ & crystallized with hot methanol.

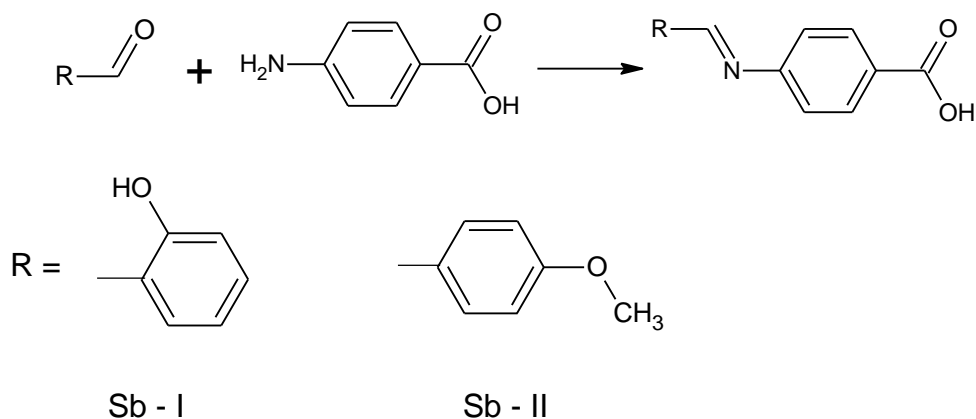
Preparation of Schiff bases via Microwave assisted method¹⁰:

The preparation of Schiff bases was accomplish from PABA (0.01 mol) and substituted aldehyde (0.01mol) with the catalytic amount of glacial acetic acid was heated in microwave from 5 min at 450 W. Recrystallization of the product was done with methanol.

Preparation of Schiff bases with natural acid catalysts (fruit juice) method:

The Equal mole amount of p- Amino benzoic acid (0.01 mol) with substituted benzaldehyde (0.01 mol) was taken in beaker. In those reaction mass natural acid catalyst i.e. orange juice were added in different amounts (0.5 ml, 1 ml, 1.5 ml, 2.0 ml, and 2.5 ml) and then maintain for 5-10 minutes. Additionally every reaction mass was stirred for 2 - 4 min. at 25-30°C. After completion of reaction pale orange solid product was come out which was washed by distilled water and purified with recrystallization by minimum quantity of ethanol. The same process is repeated in sweet lemon juice and aqueous extract of grapes. M.P of the compounds were measured with open capillary method which was further recognized and with the help of TLC and confirmed with using mass spectra.

REACTION SCHEME



RESULTS AND DISCUSSION

It has seen that the condensation of an amine and carbonyl compound were lead to the manufacture of Schiff bases because of the excellent electrophilic property of carbonyl group and good nucleophilic property of amine group correspondingly. Usually, in the current study the protonation of heteroatom was finished with fruit juice's natural acid which mainly contain citric acid. Due to this acid, acidic nature & a desired pH obtained for synthesized Schiff bases

by condensation reaction. The data proved the very less amount of acid catalysts are effectively catalyzing the preparation of Schiff bases with good quality and superior yield of the products.

Table 1: Comparative yields of 4-[(E)-(4-methoxyphenyl)methylidene]amino}benzoic acid (Sb I) and 4-[(E)-(2-hydroxyphenyl)methylidene]amino}benzoic acid (Sb II) in the presence of different catalysts.

Title S. No	Name of catalyst	Volume of catalyst (ml)	Percentage yield (Sb I)	Percentage yield (Sb II)
1	Grape juice	0.5	95.58	92.32
2	Sweet lemon juice	0.5	91.67	88.87
3	Orange juice	0.5	89.71	88.50

Table 2: yields of 4-[(E)-(4-methoxyphenyl)methylidene]amino}benzoic acid (Sb I) which obtained by different volume of natural catalysts

Title S. No	Volume of catalyst (ml)	Product yield obtained with grapes juice		Product yield obtained with sweet lemon juice		Product yield obtained with orange juice	
		Product Yield (gm)	Percentage yield	Product Yield (gm)	Percentage yield	Product Yield (gm)	Percentage yield (%)
1	0.5	2.44	95.58	2.34	91.67	2.29	89.71
2	1.0	2.2	88.53	2.23	87.36	2.20	86.18
3	1.5	2.15	84.22	2.16	84.61	2.15	84.22
4	2.0	2.09	81.87	2.08	81.48	2.08	79.52
5	2.5	1.95	76.39	2.04	79.91	1.80	70.51

Table 3: Yields of 4-[(E)-(2-hydroxyphenyl) methylidene]amino}benzoic acid(Sb II) which obtained by different volume of natural catalysts

Title S. No	Volume of catalyst (ml)	Product yield obtained with grapes juice		Product yield obtained with sweet lemon juice		Product yield obtained with orange juice	
		Product Yield (gm)	Percentage yield%	Product Yield (gm)	Percentage yield%	Product Yield (gm)	Percentage yield%
1	0.5	2.229	92.32	2.144	88.87	2.135	88.50
2	1.0	2.059	85.35	2.081	86.19	2.012	83.40
3	1.5	2.025	83.94	2.011	83.29	1.910	79.17
4	2.0	1.945	80.56	1.882	78.01	1.830	75.80
5	2.5	1.701	70.51	1.724	71.41	1.650	68.39

Table 4: Physical characteristics of the compounds.

S. No.	Products Name and chemical formula	Product color	Product smell	Physical state	Solubility	Melting point	Rf	FTIR data : (KBrcm ⁻¹)
1	4-{{(E)}-(4-methoxyphenyl)methylidene}amino}benzoic acid	Off Water	Disagreeable	Crystalline solid	Insoluble in water , soluble in methanol, ethanol, chloroform	156°C	0.43	-OH (str) : 3417 -C=O(str) : 1629.85 -N=C (str) : 1581
2	4-{{(E)}-(2-hydroxyphenyl)methylidene}amino}benzoic acid	Pale Orange	Disagreeable	Crystalline solid	Insoluble in water , soluble in methanol, ethanol, chloroform	260°C	0.41	-OH (str) : 3417 -C=O(str) : 1681 -N=C (str) : 1581

ACKNOWLEDGEMENT

We are grateful to the authority of The H.N.S.B. Ltd. Science College, Himatnagar for make available research facility.

REFERENCES:

1. (a) 1.0, Metzger, *Angew. Chem. Int Ed.*, 1998, 37, 2975, (b) C.J. Li, T.H. Chem, *Tetrahedron*, 1999, 55, 11149.
2. G. W. V. Cave, C. L. Raston and J. L. Scott, Recent advances in solventless organic reactions towards benign synthesis with remarkable versatility. *Chemical Communications*, 2001, 21: 2159–2169.
3. G. W. V. Cave, C. L. Raston and J. L. Scott, Recent advances in solventless organic reactions towards benign synthesis with remarkable versatility. *Chemical Communications*, 2001, 21: 2159–2169.
4. Z. Cimerman, S. Miljanic and N. Galic, Schiff bases derived from aminopyridines as spectrofluorometric analytical reagents. *Croatica chemical acta*, 2000, 73(1): 81-95.
5. M. N. Ibrahim, K. J. Hamad and S. H. Al-Joroshi, Synthesis and characterization of some Schiff bases. *Asian journal of chemistry*, 2006, 18(3): 2404-2406.
6. G. Vanangamudi, S. P. Sakthinathan, R. Suresh, V. Mala, K. Sathiyamoorthi, D. Kamalakkannan, K. Ranganathan, S. J. Joseph and G. Thirunarayanan, Synthesis, Spectral Correlations and Biological Evaluation of Some Aryl (E)-N-Benzylidene-3-nitrobenzenamines. *Int J scientific research in knowledge*, 2013, 1(11): 472-483.
7. R. P. Pawar, S. D. Tupare, D. V. Bhagat and A. D. Satish *International Journal of Chemical Sciences*, 2012, 10(4): 1837-1843.
8. N. R. Chamarthi, N. Thalla, S. R. Devineni and B. N. Parimi, *A Facile. Der pharma chemical*, 2012, 3(4): 808-816.
9. J. Serb, *Chem. Soc*, 2005, 70(10) 1155-1161
10. Scholar Research Library, *Archives of Applied Science Research*, 2012, 4(2) : 1075



AJPHR is
Peer-reviewed
monthly
Rapid publication
Submit your next manuscript at
editor@ajphr.com / editor.ajphr@gmail.com