

Nano TiO₂/SiO₂: An Efficient and Reusable Catalyst for the Synthesis of α -aminophosphonates

Hanmant M. Kasralikar

Department of Chemistry

Lal Bahadur Shastri Mahavidyalaya, Dharmabad, Maharashtra, India

hanmantkasralikar@gmail.com

Abstract: Nano TiO₂/SiO₂ acts as a Lewis acid, which is Nano TiO₂ supported on SiO₂ was found to be an effective and reusable catalyst for the Kabachnik–Fields reaction of benzhydrylamine, substituted benzaldehyde and dialkyl phosphites using ethyl alcohol as solvent, when stirred for 1hr at room temperature. Conversion of 88-94% were obtained.

Keywords: TiO₂/ SiO₂ Nonocatalyst, Kabachnik–Fields reaction, α -aminophosphonates

REFERENCES

- [1]. V. P. Kukhar, H. R Hudson, "Aminophosphonic and Aminophosphinic Acids: Chemistry and Biological Activity," *Applied organometallic chemistry*, Vol.14, pp.514-515, 2002 .
- [2]. A. Mucha, P. Kafarski, L. Berlicki, " Remarkable Potential of the α -Aminophosphonate/ Phosphinate Structural Motif in Medicinal Chemistry" *Journal of Medicinal Chemistry*, Vol. 54, 5955–5980, 2011.
- [3]. H. R. Hudson, R.J. Lee, " A Brief Review of the Anticancer Activity of α -Aminophosphonic Acid Derivatives and a Report on the in Vitro Activity of Some Dialkyl α -Aryl-(or Heteroaryl)- α -(Diphenylmethylamino) Methanephosphonates", *Phosphorus, Sulfur Silicon Relat. Elem*, Vol.189, pp 1149–1155, 2014.
- [4]. A. Tajti, G. Keglevich, "The Importance of Organophosphorus Compounds as Biologically Active Agents," *In Organophosphorus Chemistry*, pp 53–65, 2018.
- [5]. A. Mucha, P. Kafarski, L. Berlicki, "Remarkable Potential of the Aminophosphonate/Phosphinate Structural Motif in Medicinal Chemistry," *Journal of Medicinal Chemistry*, vol. 54, pp5955–5980, 2014 .
- [6]. P. Kafarski, B. Lejczak, "Biological Activity of Aminophosphonic Acids," *Phosphorus Sulfur Silicon Relat. Elem*. Vol. 63, pp193–215, 1991.
- [7]. P. Kafarski, "Aminophosphonic Acids of Potential Medical Importance," *Current Medicinal Chemistry Agents*, Vol. 1, pp 301–312, 2001.
- [8]. L. Berlicki, P. Kafarski, " Computer-Aided Analysis and Design of Phosphonic and Phosphinic Enzyme Inhibitors as Potential Drugs and Agrochemicals," *Current Organic Chemistry*, Vol. 9, pp1829–1850, 2005.
- [9]. B. Lejczak, P. Kafarski, "Biological Activity of Aminophosphonic Acids and Their Short Peptides," *In Topics in Heterocyclic Chemistry—Phosphorous Heterocycles I*, Vol. 20, pp.31–63, 2009.
- [10]. P. Kafarski, M.G.V Gorniak, I. Andrasiak, "Kabachnik-Fields Reaction Under Green Conditions—A Critical Overview," *Current Green Chemistry*. Vol. 2 218–222, 2015.
- [11]. G. Keglevich, A. Szekrényi, " Eco-Friendly Accomplishment of the Extended Kabachnik-Fields Reaction; A Solvent- and Catalyst- Free Microwave-Assisted Synthesis of α - aminophosphonates and α -Aminophosphine Oxides," *Letters in organic chemistry*, Vol. 5, pp 616–622, 2009.
- [12]. B.C. Ranu, A. Hajra, "A simple and green procedure for the synthesis of α -amino-phosphonate by a one-pot three-component condensation of carbonyl compound, amine and diethyl phosphite without solvent and catalyst. *Green Chem.* **2002**, 4, 551–554.
- [13]. M.M. Kabachnik, E.V. Zobnina, I.P. Beletskaya, " Catalyst-Free Microwave-Assisted Synthesis of α -Aminophosphonates in a Three-Component System: R₁C(O)R₂-(EtO)₂ P(O)H-RNH₂," *Synlett*, pp 1393–1396, 2005.

- [14]. X.J.Mu, M.Y. Lei, J.P. Zou, W. Zhang, "Microwave-assisted solvent-free and catalyst-free Kabachnik–Fields reactions for α -amino phosphonates," *Tetrahedron Letter*, Vol. 47, pp 1125–1127, 2006.
- [15]. M. Zahouily, A. Elmakssoudi, A. Mezdar, A. Rayadh, S. Sebti, "Uncatalysed Preparation of α -Amino Phosphonates under Solvent Free Conditions," *Journal of Chemistry Research* pp 324–327, 2005.
- [16]. I. Prauda, I. Greiner, K. Ludányi, G. Keglevich, "Efficient Synthesis of Phosphono- and Phosphinoxidomethylated N-Heterocycles under Solvent-Free Microwave Conditions," *Synthetic. Communication*, vol. 37, pp 317–322, 2007.
- [17]. G. Keglevich, A. Szekrenyi, M. Sipos, K. Ludányi, I. Greiner, "Synthesis of cyclic aminomethyl phosphonates and aminomethylarylphosphinic acids by an efficient microwave-mediated phospho-mannich approach," *Heteroatom Chemistry*, Vol. 19, pp 207–210, 2008.