Synthesis and application of chitosan supported vanadium oxo in the synthesis of 1,4-dihydropyridines and 2,4,6-triarylpyridines via anomeric based oxidation

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Fig. S1. The FT-IR spectrum of 2,6-dimethyl-4-(2,6-difluorophenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 4)
Fig. S2. The $^1$H NMR spectrum of 2,6-dimethyl-4-(2,6-difluorophenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 4)
Fig. S3. The $^{13}$C NMR spectrum of 2,6-dimethyl-4-(2,6-difluorophenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 4)
Fig. S4. The FT-IR spectrum of 2,6-dimethyl-4-(4-cyanophenyl)-1,4-dihydropyridine-3,5-dimethyl carboxylate (Table 3, entry 8)
Fig. S5. The $^1$H NMR spectrum 2,6-dimethyl-4-(4-cyanophenyl)-1,4-dihydropyridine-3,5-dimethyl carboxylate (Table 3, entry 8)
Fig. S6. The $^{13}$C NMR spectrum 2,6-dimethyl-4-(4-cyanophenyl)-1,4-dihydropyridine-3,5-dimethyl carboxylate (Table 3, entry 8)
Fig. S7. The FT-IR spectrum of 2,6-dimethyl-4-(3-ethoxy-4-hydroxyphenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 11)
Fig. S8. The $^1$H NMR spectrum of 2,6-dimethyl-4-(3-ethoxy-4-hydroxyphenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 11)
Fig. S9. The $^{13}$C NMR spectrum of 2,6-dimethyl-4-(3-ethoxy-4-hydroxyphenyl)-1,4-dihydropyridine-3,5-diethyl carboxylate (Table 3, entry 11)
Fig. S10. The FT-IR spectrum of 2,4,6-tris(4-methoxyphenyl)pyridine (Table 6, entry 4)
Fig. S11. The $^1$H NMR spectrum of 2,4,6-tris(4-methoxyphenyl)pyridine (Table 6, entry 4)
Fig. S12. The $^{13}$C NMR spectrum of 2,4,6-tris(4-methoxyphenyl)pyridine (Table 6, entry 4)
Fig. S13. The FT-IR spectrum of 2,6-bis(4-chlorophenyl)-4-(3-hydroxyphenyl)pyridine (Table 6, entry 5)
Fig. S14. The $^1$H NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3-hydroxyphenyl)pyridine (Table 6, entry 5)
Fig. S15. The $^{13}$C NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3-hydroxyphenyl)pyridine (Table 6, entry 5)
Fig. S16. The FT-IR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3-nitrophenyl)pyridine (Table 6, entry 8)
Fig. S17. The $^1$H NMR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3-nitrophenyl)pyridine (Table 6, entry 8)
Fig. 18. The $^{13}$C NMR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3-nitrophenyl)pyridine (Table 6, entry 8)
Fig. S19. The FT-IR spectrum of 2,6-diphenyl-4-(3,4-difluorophenyl)pyridine (Table 6, entry 11)
Fig. S20. The $^1$H NMR spectrum of 2,6-diphenyl-4-(3,4-difluorophenyl)pyridine (Table 6, entry 11)
Fig. S21. The $^{13}$C NMR spectrum of 2,6-diphenyl-4-(3,4-difluorophenyl)pyridine (Table 6, entry 11)
Fig. S22. The FT-IR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3,4-difluorophenyl) pyridine (Table 6, entry 12)
Fig. S23. The $^1$H NMR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3,4-difluorophenyl) pyridine (Table 6, entry 12)
Fig. S24. The $^{13}$C NMR spectrum of 2,6-bis(4-methoxyphenyl)-4-(3,4-difluorophenyl) pyridine (Table 6, entry 12)
Fig. S25. The FT-IR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,4-difluorophenyl)pyridine (Table 6, entry 13)
Fig. S26. The $^1$H NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,4-difluorophenyl)pyridine (Table 6, entry 13)
Fig. S27. The $^{13}$C NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,4-difluorophenyl)pyridine (Table 6, entry 13)
Fig. S28. The FT-IR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,5-difluorophenyl)pyridine (Table 6, entry 14)
Fig. S29. The $^1$H NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,5-difluorophenyl)pyridine (Table 6, entry 14)
Fig. S30. The $^{13}$C NMR spectrum of 2,6-bis(4-chlorophenyl)-4-(3,5-difluorophenyl)pyridine (Table 6, entry 14)
Scheme 1. Aromatization of 1,4-dihydropyrano-[2,3-\(c\)]-pyrazole derivatives via an anomic based oxidation (ABO) mechanism [21].
Scheme 2. Aromatization of 2,4,6-triarylpyridine derivatives \textit{via} an anomic based oxidation (ABO) mechanism [21].
Scheme 3. The synthesis of 2-amino-3-cyanopyridines by ABO [21].
Scheme 4. ABO mechanism at the synthesis of 2-substituted benz-(imida, oxa and othia)-zoles [21].
Scheme 5. Stepwise anomeric based oxidation mechanism for the aromatization of dihydropyridines [21].
Scheme 6. ABO mechanism for the final step in the synthesis of 2-amino-3,5-dicarbonitrile-6-sulfanylpyridines using \{[1,4-Pyrazine-NO_2][C(NO_2)_3]_2\} [21].
Scheme 7. ABO mechanism for the final step in the synthesis of 2-amino-4-aryl-6-(arylamino)pyridine-3,5-dicarbonitriles using [TEATCM] or [TEATNM] as a catalyst [21].