Supplementary Information (SI) for RSC Advances.
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Supplementary Information

Piperazine-Grafted Magnetic Graphene Oxide as a Sustainable Heterogeneous Catalyst for Solvent-Free Biginelli Reaction

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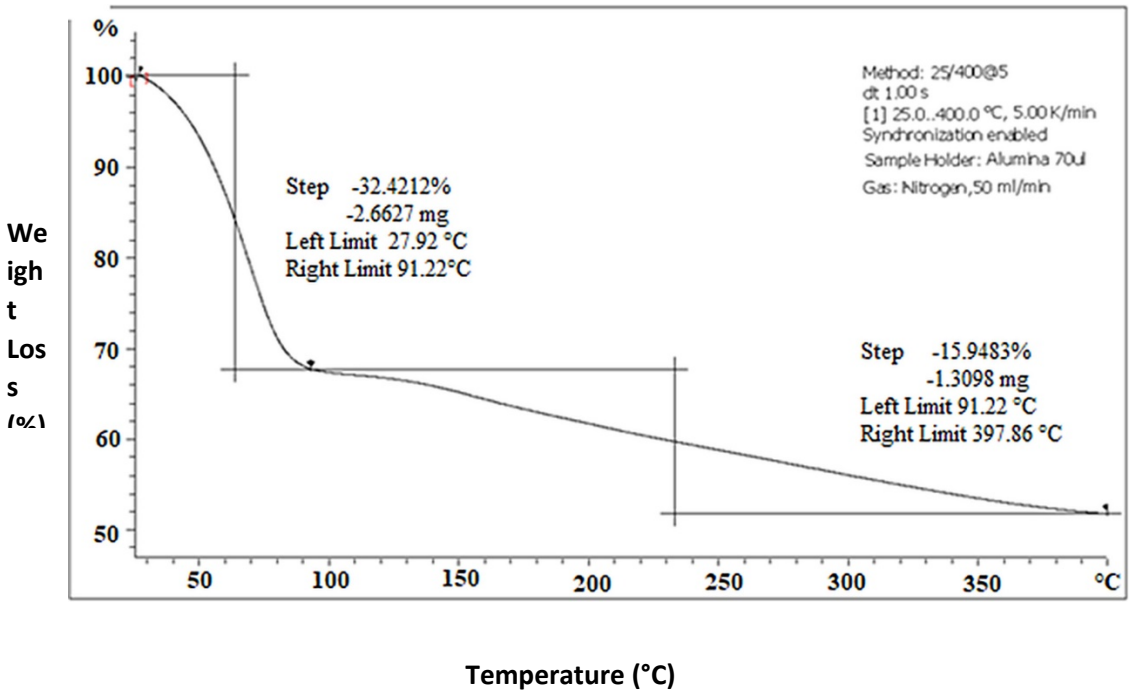

Figure 1. TGA curve of catalyst Fe_3O_4@GO-NH.

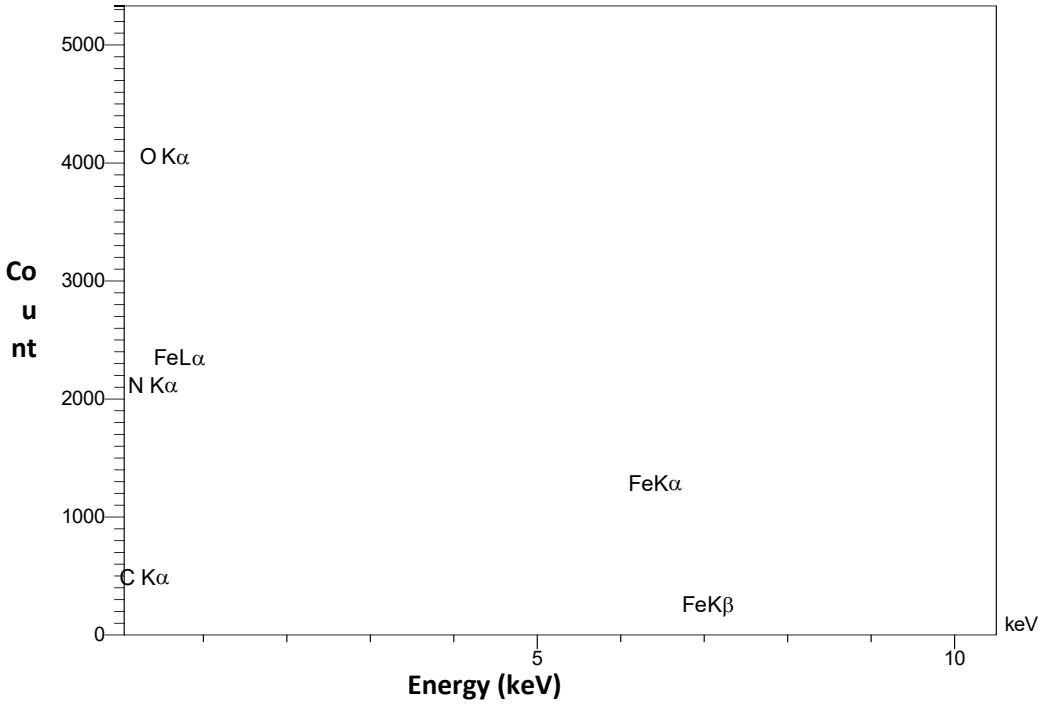

Figure 2. EDX spectrum of catalyst Fe_3O_4@GO-NH.

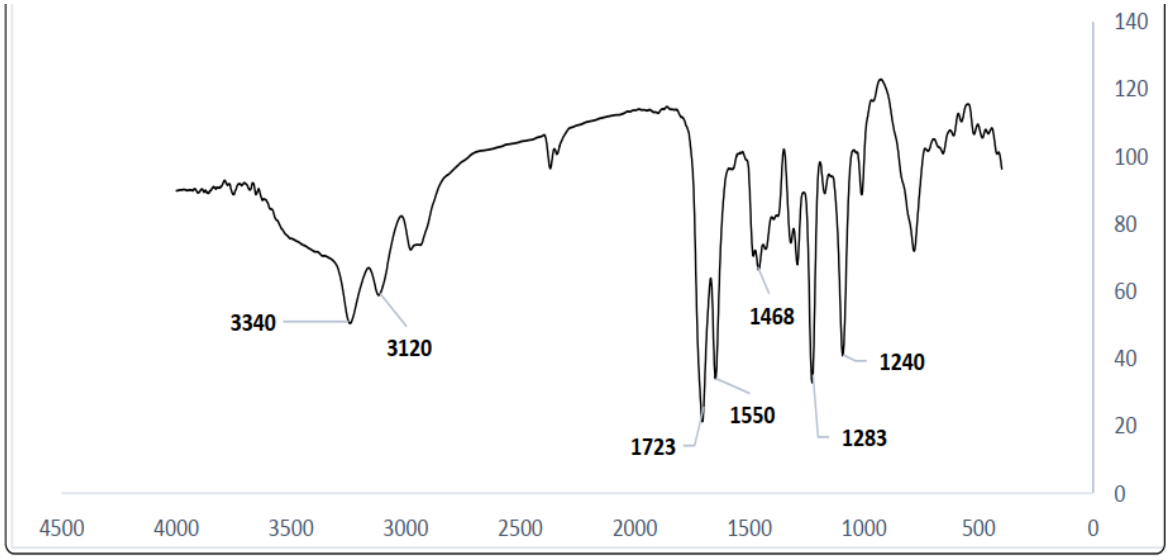

Figure 3. FTIR spectrum of Ethyl 4-(4-bromophenyl)-6-methyl-2-oxo-1, 2, 3, 4-tetrahydropyrimidine-5-carboxylate (**2b**).

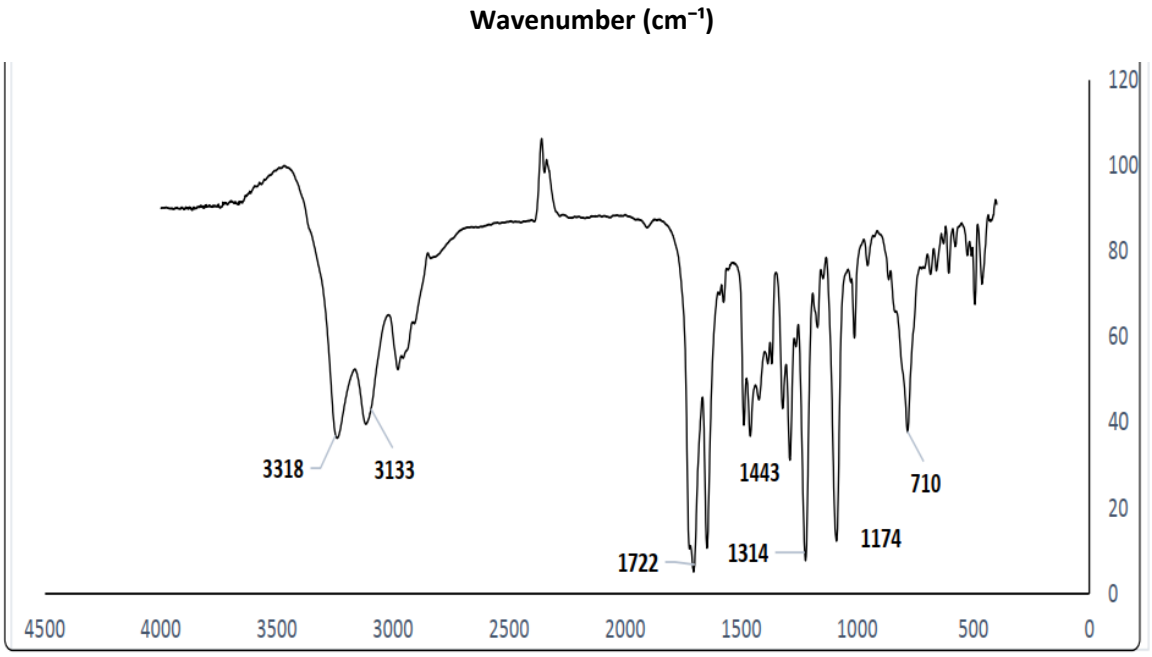

Figure 4. FTIR spectrum of Ethyl 4-(4-chlorophenyl)-6-methyl-2-oxo-1, 2, 3, 4-tetrahydropyrimidine-5-carboxylate (**2c**).

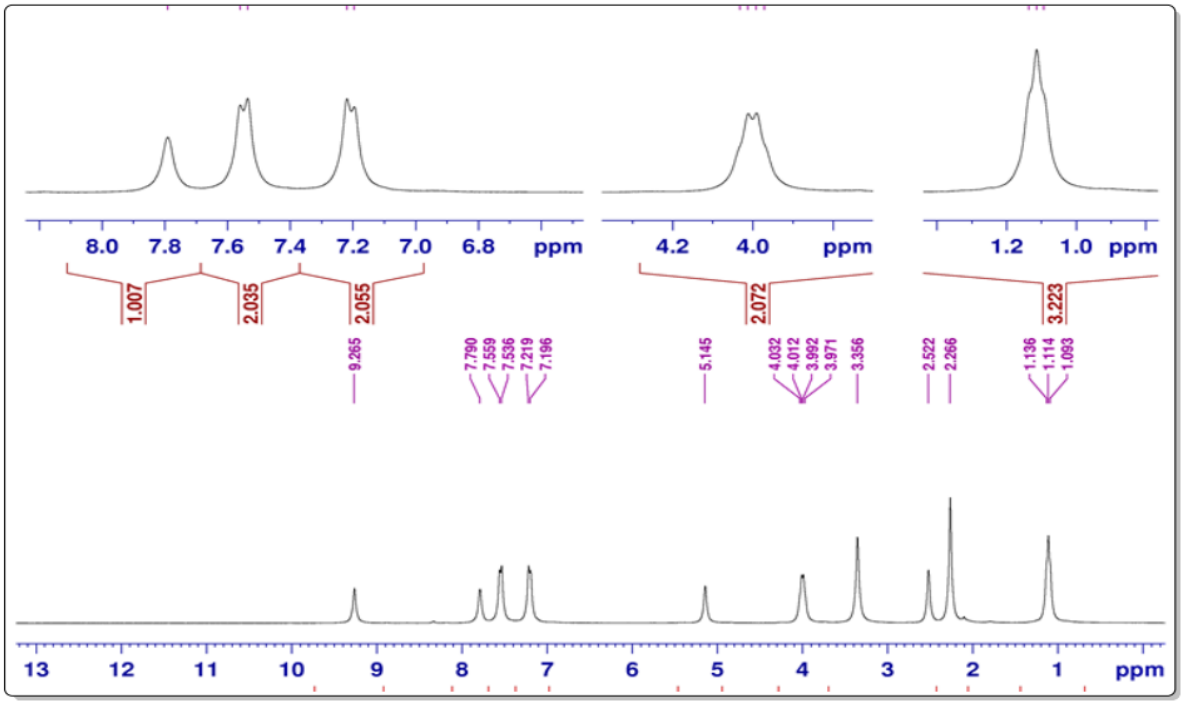

Figure 5. [1]H NMR spectrum of Ethyl 4-(4-bromophenyl)-6-methyl-2-oxo-1, 2, 3, 4-tetrahydropyrimidine-5-carboxylate (**2b**).

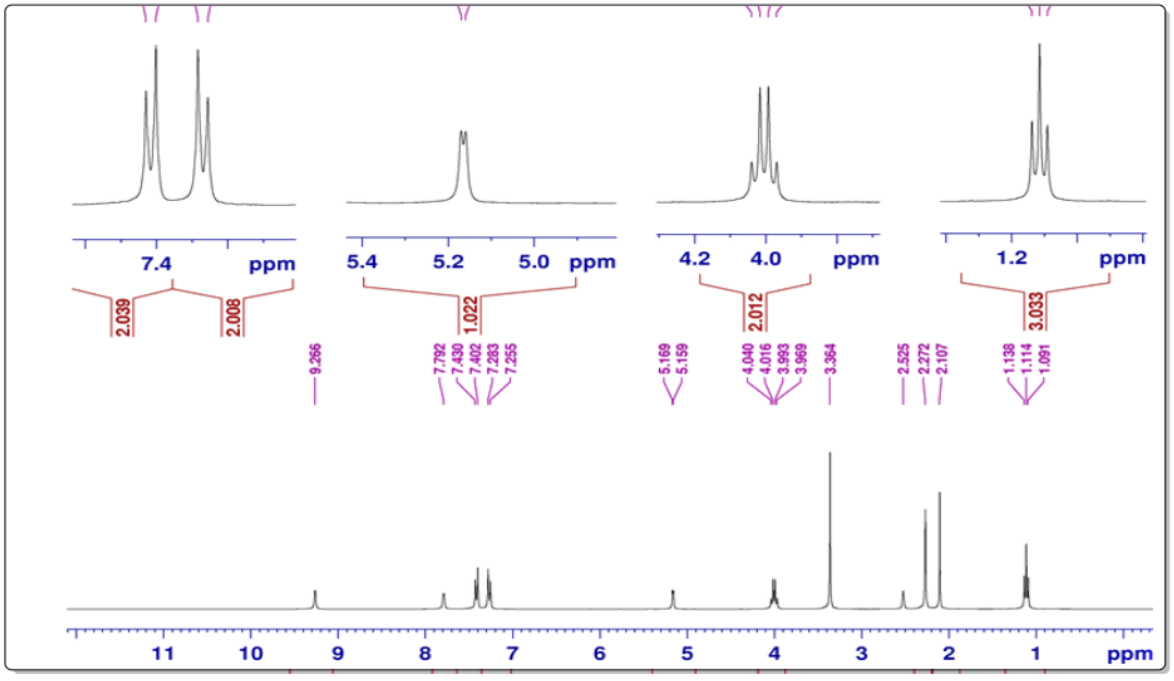

Figure 6. [1]H NMR spectrum of Ethyl 4-(4-chlorophenyl)-6-methyl-2-oxo-1, 2, 3, 4-tetrahydropyrimidine-5-carboxylate (**2c**).

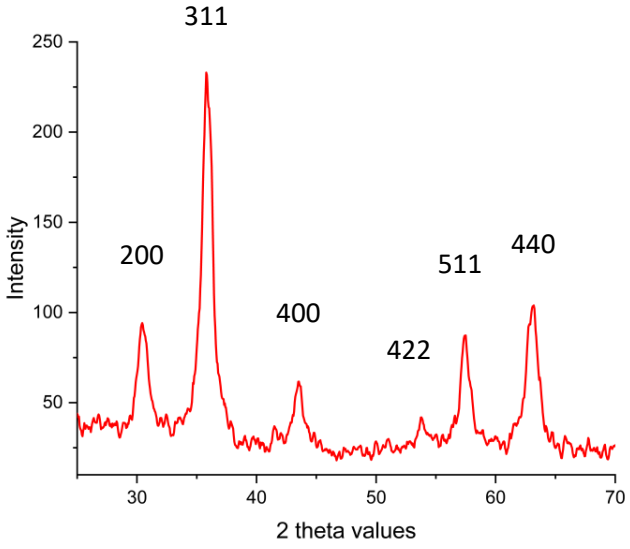

Figure 7. XRD pattern of Fe_3O_4. The diffraction peak positions match well with JCPDS 00-003-0863 for magnetite.

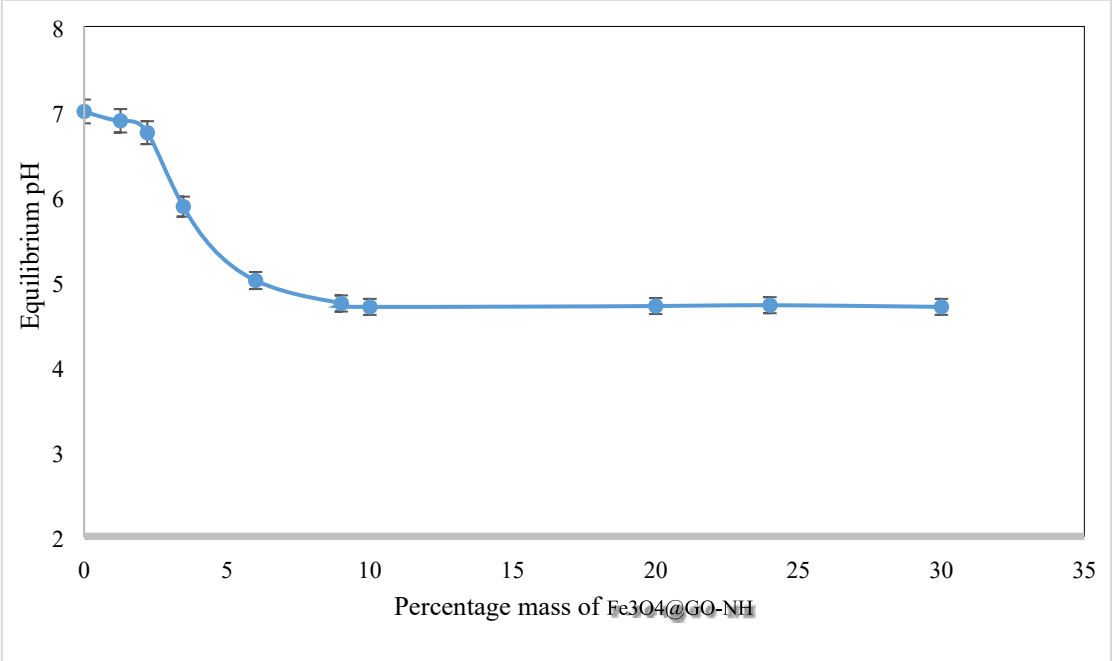

Figure 8. Influence of Fe_3O_4@GO-NH mass fraction on the equilibrium pH of the suspension in 0.01 M KCl at 25 ± 2 °C. The plateau at pH 4.70 represents the PZC value. Error bars indicate standard deviation of the mean (±SD).

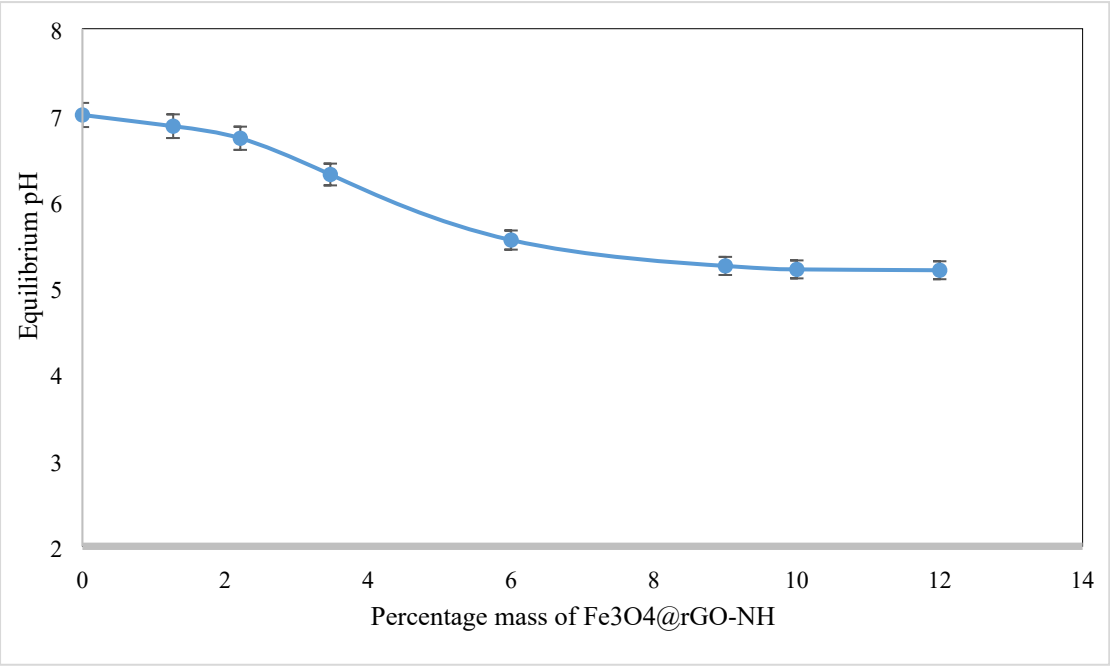

Figure 9. Influence of Fe_3O_4@rGO-NH mass fraction on the equilibrium pH of the suspension in 0.01 M KCl at 25 ± 2 °C. The plateau at pH 5.21 represents the PZC value. Error bars indicate standard deviation of the mean (±SD).