



Sulfonated Graphene Oxide Catalyzed Transformation of Pyrazole-Oxazolidine Derivatives and their Antimicrobial Activities

V. MURALI KRISHNA MADASU^{1,✉}, MANURI BRAHMAYYA^{2,*}, S. DEEPTHI^{2,✉}, A. HARINATH^{3,✉}, LAKSHMI REKHA BUDDIGA^{4,✉}, J. CHANDRA SEKHARA RAO^{5,✉}, M. PADMA^{1,*}, PRAVEEN CHOPPARA^{6,✉}, D. SAMSONU^{7,✉} and A. VENKATESWARA RAO^{8,✉}

¹Department of Engineering Chemistry, AU College of Engineering, Andhra University, Visakhapatnam-530003, India

²MLR Institute of Technology, Laxman Reddy Avenue, Dundigal Police Station Road, Hyderabad-500043, India

³Department of Chemistry, C.M. Science College, Lalit Narayan Mithila University, Dharbanga-846004, India

⁴Department of Humanities & Science, CMR Technical Campus ((Autonomous Engineering College), Medchal, Hyderabad-501401, India

⁵Department of Physics, Government Degree College, Rajam-532127, India

⁶Department of Chemistry, Pithapur Rajah's Government College (A), Kakinada-533001, India

⁷School of Chemistry, Andhra University, Visakhapatnam-530003, India

⁸Advanced Functional Materials Research Centre, Department of Physics, Koneru Lakshmaiah Education Foundation, Guntur-522502, India

*Corresponding authors: E-mail: manuribrahmayya@mlrit.ac.in; mpadma.aueng@gmail.com

Received: 1 October 2025

Accepted: 22 November 2025

Published online: 31 December 2025

AJC-22236

In this work, biologically active novel (*E*)-5-((1-phenyl-3-(4-*R*-phenyl)-1*H*-pyrazol-4-yl)methylene)-3-(4-chlorophenyl)oxazolidine-2,4-dione derivatives are synthesized and characterized. Initially, 5-azanyl(4-chlorophenyl)carbamate (**3**) was obtained from 4-chloroaniline (**1**) via carbonation with CO₂ (**2**) in liquid ammonia, followed by O-carboxymethylation with sodium 2-chloroacetate to afford sodium 2-(((4-chlorophenyl)carbamoyl)oxy)acetate (**4**). Subsequently, compound **4** was cyclized to yield 3-(4-chlorophenyl)oxazolidine-2,4-dione (**5**) using sulfonated graphene oxide (SGO) as metal free nanocatalyst. Later, benzohydrazide (**6**) was condensed with various types of carboxylic acids (**7**) in presence of glacial acetic acid to obtain (*E*)-(4-*R*-phenyl)ethylidene hydrazone (**8**). It is further treated with POCl₃ at 80 °C for 4 h to obtain substituted pyrazole derivatives (**9a-h**). Finally, substituted pyrazole derivatives (**9a-h**) treated with sulfonated graphene oxide (SGO) catalyzed product 3-(4-chlorophenyl)oxazolidine-2,4-dione (**5**) to obtain targeted heterocyclic molecules **10a-h**. This protocol demonstrates significant advantages in efficiency, ecological sustainability and catalyst reusability. Furthermore, the synthesized 1,3-oxazolidine-2,4-dione derivatives were evaluated for their antibacterial properties. The findings highlight the catalytic potential of SGO in the synthesis of 1,3-oxazolidine-2,4-dione derivatives as well as in broader applications in green organic transformations.

Keywords: Hydrazine, Nano catalysis, Carbon dioxide, Cyclization, Heterocycles, Antibacterial activities.