Organic Chemistry
ISSN: 0974-7516

Organic Chemistry: An Indian Journal

Perspective | Vol 20 Iss 1

Antimicrobial and Antifungal Activity of Palladium Rare Metal Complexes with Quinoline Derivative

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Received: November 18, 2024, Manuscript No. TSOC-24-152807; **Editor assigned:** November 20, 2024, PreQC No. TSOC-24-152807 (PQ); **Reviewed:** December 04, 2024, QC No. TSOC-24-152807; **Revised:** January 19, 2026, Manuscript No. TSOC-24-152807 (R); **Published:** January 26, 2026, DOI:10.37532/0974-7516.2026.20(1).001

Introduction

The combination of some rare metal ions with biologically important kynurenic acid ligand to form coordination compound is an important area of current research. Less explored biologically important, kynurenic acid ligand is allowed to react with solution of some rare metal perchlorates and attempt has been made to synthesize solid kynurenic acid complexes. These kynurenic acid complexes are subjected to U.V-visible spectroscopy, IR spectroscopy, mass spectra, TGA analysis, elemental analysis etc. Antimicrobial activity of these complexes has been evaluated by standard methods and attempts have been made to correlate structural characteristics with properties of these kynurenic acid complexes.

Description

Antibacterial activity

This part deals with the *in vitro* screening of newly prepared compounds for antibacterial activity [1,2]. The species *S. aureus*, *E. coli*, *S. pyogenes* and *P. aeruginosa* have been taken for the antibacterial activities. Agar-cup method was employed for the *in vitro* screening for antibacterial activity [3-5]. The results of the compounds synthesized for antibacterial screening are mentioned in following Tables 1 and 2.

TABLE 1. **Antibacterial activity of standard drugs.**

Standard drugs				
Minimum inhibition concentration (µg/ml)				
	E. coli	***P. aeruginosa***	***S. aureus***	***S. pyogenes***
Drug	**MTCC 443**	**MTCC 1688**	**MTCC 96**	**MTCC 442**
Gentamycin	0.05	1	0.25	0.5
Ampicillin	100	-	250	100
Chloramphenicol	50	50	50	50
Ciprofloxacin	25	25	50	50
Norfloxacin	10	10	10	10

Citation: Patel HR, Chaudhari HD. Antimicrobial and Antifungal Activity of Palladium Rare Metal Complexes with Quinoline Derivative. Org Chem Ind J. 2026;20(1):001

TABLE 2. **Antibacterial activity of kynurenic acid and its complexes.**

Antibacterial activity					
Minimum inhibition concentration (µg/ml)					
Sr	**Code**	***E. coli***	***P. aeruginosa***	***S. aureus***	***S. pyogenes***
No	**No**	**MTCC 443**	**MTCC 1688**	**MTCC 96**	**MTCC 442**
1	Kyna ligand	100	250	250	200
2	Pd-kyna	103	210	258	195

Comparison of antimicrobial activity of synthesized compounds with that of standard antimicrobial drugs reveals that the complexes show moderate to good activity against all four bacterial strains, however by and large lower than the standard [6].

Antifungal activity

This part deals with the *in vitro* screening of newly prepared complexes for antibacterial activity [7]. The species *C. albicans, A. niger, A. clavatus* have been taken for the antifungal activities. Agar-cup method was used for the *in vitro* screening for antifungal activity. The results of the compounds synthesized and taken for antifungal screening are mentioned in as under Tables 3 and 4.

TABLE 3. **Antifungal activity of standard drugs.**

Minimal inhibition concentration (µg/ml)			
Drugs	***C. albicans***	***A. niger***	***A. clavatus***
	MTCC 227	**MTCC 282**	**MTCC 1323**
Nystatin	100	100	100
Greseofulvin	500	100	100

TABLE 4. **Antifungal activity of kynurenic acid and its complexes.**

Antifungal activity table				
Minimal fungicidal concentration (µg/ml)				
Sr	**Code**	***C .albicans***	***A. niger***	***A. sclavatus***
No	**No**	**MTCC 227**	**MTCC 282**	**MTCC 1323**
1	KYNA ligand	1000	500	500
2	Pd-KYNA	650	1050	1040

Comparison of antimicrobial activity of complexes with that of standard antimicrobial drugs reveals that the synthesized complexes show moderate to good activity against all three fungal strains; however, they are in no way better for the purpose in comparison with standard [8,9].

Conclusion

Kynurenic acid is an important biological molecule with important physiological functions. In order to peep into its biological role and also to understand its complexing tendency and to explore some biochemical properties of its complexes, in the present work, Complexes of kynurenic acid with palladium metal ion was prepared, characterized for structure and studied for catalytic as well as antimicrobial activities. These results were encouraging as this bio active kynurenic acid molecule has good tendency of complex formation, as well as excellent catalysis and has moderate antibacterial activities. At many places, they were found to be excellent catalysts that can enhance reaction rates for selected redox and C-C coupling type organic chemical reactions.

Acknowledgement

Authors thank to Hemchandracharya North Gujarat University, Patan, India for supply chemical, A grade glass were and wonderful

laboratory provide. We are thankful to Central Instrumental Maintenance Facilities (CIMF) Laboratory Hemchandracharya North Gujarat University, Patan, India to facilities of Spectral analysis. We are thankful to Rajani laboratory Surat, India to facilities of antimicrobial and antifungal activity.

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