XXI Brazilian Meeting on Inorganic Chemistry
X Brazilian Meeting on Rare Earths
III Workshop on Theoretical Bioinorganic Chemistry
Belo Horizonte, September 12 - 15th 2024

Synthesis, characterization and biological activity of the europium complex with ligand $C_7H_6N_4O$, derived from tetrazole

Simone Rodrigues Silva[1] and Lucas Gabriel da Silva Andrade[1]

[1]Department of Chemistry, Federal University of Roraima, Boa Vista, Brazil
E-mail:simoner_rodrigues@hotmail.com

Thematic Area: Biological Inorganic Chemistry

Keywords: europium, tetrazole, synthesis

In medicine, europium has shown promise due to its biocompatibility and low toxicity. This element is used in contrast agents for magnetic resonance imaging (MRI) and is being investigated for applications in anticancer therapies and antibiotics. The versatility of europium, especially when combined with organic molecules, opens new possibilities for advanced medical treatments and precise diagnostics[1]. The search for new drugs to combat cancer is crucial, given the diversity and complexity of the disease, resistance to current treatments, and the significant side effects of conventional therapies. New medications aim for greater efficacy, fewer adverse effects, overcoming resistance, and personalized treatments. Theranostics, which combines diagnosis and therapy, is an emerging field that enables early detection, real-time monitoring, and targeted treatments, improving the precision and effectiveness in fighting cancer[2]. These innovations offer hope for better outcomes and quality of life for patients, making continuous research essential. In this study, a europium complex was synthesized, characterized, and evaluated for its activity against tumor cells. Solubility tests indicated that the complex dissolves in various solvents. The melting/decomposition temperature was assessed, and spectroscopic analyses, including infrared and UV-Vis, confirmed the metal-ligand bonding. Thermogravimetric and elemental analyses supported the proposed formula, while petrographic microscopy indicated crystal formation. This complex exhibits distinct properties from the ligand, and electrical conductivity and thermogravimetric analyses confirmed its structure. Cytotoxicity assays were conducted using human cell lines: SK-BR-3 (breast tumor), MCF-10A (non-tumoral breast), A549 (lung tumor), and MRC5 (non-tumoral lung of fetal origin). The compound showed high cytotoxic activity against tumor cells compared to a widely used drug. Further research is necessary to analyze the chemical properties of the compound and elucidate its structure.

Table 1. cytotoxic activity (IC_{50} μM) of europium compound and ligand (L5)

Cell lines	EuL5	L5
MCF-10A	60.264	>200
SK-BR-3	105.37	97.00
MRC-5	>200	>200
A549	119.28	114.97

Acknowledgments: UFRR, CNPq.

References

[1] Wang, *et al.*, Scientifc Reports, **14**, 778 (2024).
[2] Huclier-Markai *et al.*, Dalton Trans, **50**, 46 (2021).