International Symposium on
Setting their Table: Women and the Periodic Table of Elements
Feb. 11-12, 2019 - Murcia (Spain)

United Nations Educational, Scientific and Cultural Organization
2019 IYPT International Year of the Periodic Table of Chemical Elements

Chlorine, an essential element in the synthesis of novel oxazoline, thiazoline, pyrazoline and isoxazoline derivatives, involving cathodic cleavages of carbon-chlorine bonds as key steps

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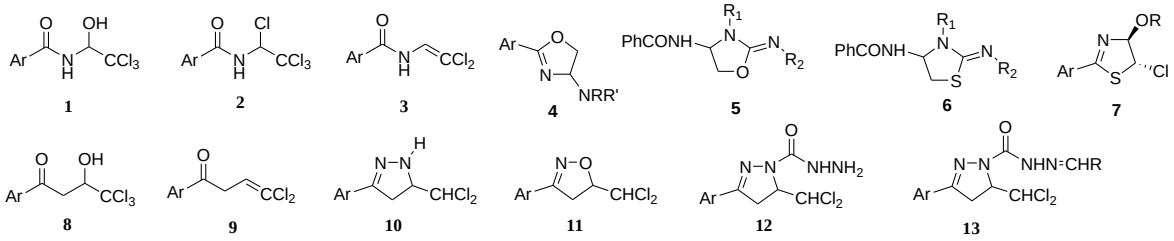
Topic: Old Elements, New Technologies: how to improve the quality of life

Abstract:

Chlorine is the most abundant and inexpensive halogen element. Electronegativity and reactivity of chlorine are both intermediates between those of fluorine and bromine. Ethanol, as well as acetaldehyde, reacts with molecular chlorine gas in aqueous media undergoing near quantitative conversions to chloral hydrate [$Cl_3CCH(OH)_2$], which is well known for its sedative and hypnotic activity among other therapeutic properties. It is dehydrated by concentrated sulphuric acid providing chloral anhydrous, which is a multipurpose reagent for organic synthesis.[1] Chloral anhydrous was found to be able to react with amides and benzophenones to give chloralamides and chloralacetophenones, respectively, bearing a trichloromethyl group of great electrosynthetic potential.[2] This communication deals with our preparative methods starting from chloral, in order to obtain previously unknown oxazoline, thiazoline and pyrazoline derivatives of chemical and biological interest by applying sequences of chemical and key electrochemical reactions.

Chlorination of chloralamides**1** led to N-(1,2,2,2-tetrachloroethyl)amides**2**, whose electrochemical reduction gave N-(2,2-dichlorovinyl)amides **3**. Compounds **2** and **3** were used as intermediates to prepare 4-amino-2-aryl-2-oxazolines **4**, 2-arylimino-1,3-oxazolidines **5** (thioanalogues**6** included), and 4-alkoxy-2-aryl-5-chloro-2-thiazolines **7**. Chloralacetophenones**8**, were transformed to 2,2-dichlorovinylacetophenones **9**, which were intermediates in preparing 3-aryl-5-dichloromethyl-2-pyrazolines **10** of high therapeutic potential, 3-aryl-5-dichloromethyl-2-isoxazolines **11**, and pyrazolines **12**,**13**, containing hydrazide-hydrazone moieties, which exhibit anti-leukemia activity.



Acknowledgements: We gratefully acknowledge the financial support of the Fundación Séneca of the ComunidadAutónoma de la Región de Murcia

References

1. Luknitskii, F. I. Chem. Rev. 1975, 75, 259.
2. Peters, D. G. In OrganicElectrochemistry; Lund, H., Baizer, M. M. Eds.; Marcel Dekker: New York, 1991; Chap 8.

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