

Green Corrosion Inhibitors from Natural Sources and Biomass Waste

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ABSTRACT

Over the past decade, green chemistry has been giving emphasis to the potentialities of protecting the environment and the human health in an economically beneficial manner through specific fundamental scientific methodologies, designing chemicals, chemical technologies and commercial products with the aim of avoiding toxics and reducing wastes. The field of metallic material degradation, which is generally faced using environmentally unfriendly organic compounds, has found a fertile research field in green chemistry. In fact, the use of inhibitors is a well-known strategy when metal corrosion needs to be controlled, prevented or retarded. However, the addition of organic molecules as corrosion inhibitors is still an open issue due to environmental toxicity concerns and the demand of green corrosion inhibitors is hence growing. Green inhibitors are attracting great interest in the corrosion field thanks to their biodegradability, ecological acceptability and renewability. Their valorization expands possible applications in industrial fields other than 'waste to energy' in the perspective of circular economy. In this context, the importance of working on extracts from biomasses and bio-wastes, due to the abundance of phytochemical constituents, is clear. The starting matrix has the advantages of being low-cost, readily available and coming from renewable sources. Although a lot of experimental work has been done and many research papers have been published in the field, still there is a lack in the scientific approach, resulting often phenomenological and rarely ever theoretical and mechanistic. In addition, the purity and compositions of the extracts exhibit a remarkable variety, depending on the adopted processing technologies. This review is meant as a constructive criticism to highlight the weak points and deficiencies of the green inhibitors field as to re-evaluate the literature and address the future research in the field that still lacks in rationalization.

Keywords: Green Chemistry; Metal protection; Corrosion Inhibitors; Natural Products; Biomass waste.