DETERMINATION OF ANTIFOULING BIOCIDES IRGAROL AND DIURON IN SEAWATER FROM PORT REGION LOCATED AT NORTHEAST OF BRAZIL - MARANHÃO

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Introduction: Antifouling paints are usually applied on boat hulls, ships and small vessels to prevent the growth of fouling organisms, including bacteria, macroalgae, mussels, barnacles and invertebrates. Most of antifouling coatings are based on self-polishment system containing biocides which are slowly released in the environment being toxic for aquatic organisms [1]. The antifouling agent Irgarol 1051 and other pesticides for multiple uses such as Diuron, Chlorothalonil, and Dichlofluanide are among the substances most often used in antifouling paints in several countries. Irgarol 1051 (2-methylthio-4-tert-butylamino-6-cyclopropylamino-s-triazine) is a triazine-based herbicide. It is a photosystem-II (PSII) inhibitor that acts on the electron transport system in photosynthesis in chloroplasts. Its half-life in seawater is about 100 days and the major degradation product is 2-methylthio-4-tert-butylamino- 6-amino-s-triazine (also known as M1 or GS26575)[2]. The herbicide Diuron (N-(3,4-dichlophenyl)-N,N-dimethyl urea) is also used as organic booster biocide in some antifouling paint formulations also used for a broad-spectrum herbicide in agriculture and for non-agricultural applications such as vegetation control in industrial sites and along power lines, roads, railways and buildings. Diuron is more persistent than Irgarol in seawater with a reported half-life ranging from 43 to 2180 days at pH 7 and 25 ºC. The pesticide action occurs by inhibition of photosynthesis limiting the production of high-energy compounds such as adenosine triphosphate (ATP) used on various metabolic processes [2,3]. Maranhão at northeast of Brazil has an important Port Complex which is ranked among the most deep on Brazilian coast. The region is also rich of mangroves and dry land forests, most of them of unknown biodiversity [4]. Due to this and regarding the hard enhanced port movement in last past years, this work intents to develop a simultaneous determination of Irgarol 1051 and Diuron in seawater at port region in São Luiz (MA), also studying toxicological effects upon some marine organisms.

Methodology: Determination of Irgarol and Diuron in filtered (0.45 μm) seawater is based on the methodology developed by Gatidou et al. (2005), preconcentrating the interest compounds in SPE cartridges of reversed-phase (C-18). Extracts are analyzed by HPLC-DAD using analytical column of C–18 and gradient mobile phase containing acetonirile and MilliQ grade water, 70:30 in 15 min, at 1.4 mL min-1. Detection and quantification are made at a wavelength of 224 nm using DAD. The toxicity from Diuron and Irgarol are evaluated by an acute test with marine species of crustaceous, *Artemia* sp, verifying mortality / immobility of Nauplius (II and III), following the method by Vanhaecke et al (1981), with organisms exposition on different concentrations of irgarol and diuron in reconstituted seawater (35 g L-1).

Results: Preliminary results were the establishment and validation of the analytical conditions for quantification of irgarol and diuron.

References

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