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Binding of Chlorfenvinphos and Malathion with DNA and their Detection using New Sensitive luminescent Tb (III) Complex Probe

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Abstract

In this work, the interaction of new luminescent terbium-N(acetoacetyl)-3-allyl-2-hydroxybenzaldehyde hydrazone complex in a metal ligand ratio 1:2 in ethanol was studied with different pesticides, using fluorescence technique. The results indicate that the pesticides chlorfenvinphos and malathion exhibit quenching effect on the characteristics emission peak for Tb(III) at $\lambda = 545$ nm. The luminescence variations values using the probe Tb(III)(HBH)₂ fit Stern–volmer equation, where the detection limits are 4.53 and 9.59 $\mu\text{mol/L}$ for chlorfenvinphos and malathion, respectively. The thermodynamic parameters associated with the interaction of the complex with the two pesticides were calculated, where the reaction is spontaneous through the obtained negative values of free energy change ΔG , and the process is of exothermic nature with decrease in entropy. Hence the nature of forces acting between the complex and pesticide molecules are Vander Val's and hydrogen bond. Also, it was found that the quenching mechanism is static type. Effect of some relevant interferents on the detection of pesticides has been investigated. The new sensing complex was applied to the determination of the pesticides in different real water samples (tap, river, and waste water) with precise recovery. Also, the

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