



Relative persistence herbicides in soil samples

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Abstract:

This article explains the difference in persistence of herbicides based on electrochemical reduction on the surface of carbon nano tubes paste electrode by employing A selective and sensitive adsorptive stripping voltammetry and reduction pattern determined by using cyclic voltammetry. Borate buffer used as supporting electrolyte which is useful to amplify the conductivity during experiment. estimations were made by standard addition method.

Key words: Herbicides, Adsorptive Stripping Voltammetry, carbon nano tubes paste electrode.

Introduction:

Role of agrochemicals is unavoidable now a days for amplifying yields to compensate the growing population there is necessity to minimize the damage to the environment .Being agrochemicals has collateral effects[1-5] application should be selective that is based on the persistence and effect on biodiversity.

It is necessary to recognize the herbicides which are easily decomposed and with meager impact on biodiversity. In this connection we have chosen voltammetry which is best analytical method with high sensitivity.

Experimental

a) Equipment

The electrochemical measurements were carried out with Metrohm model 101 potentiostat and galvanostat. carbon nano tubes paste electrode are used as working electrode. Ag/AgCl reference electrode and a platinum wire used as auxiliary electrode. The electrodes joined the cell through holes in its Teflon cover. All of the potentials given in this work were measured with respect to this reference system. Electrochemical experiments were carried out in a voltametric cell at room temperature. A magnetic stirrer was used during the accumulation step. The Eli co Li-129 model glass calomel combined electrode was employed for measuring pH values.

b) Chemicals and samples

All reagents used were of analytical reagent grade. Double distilled water is used throughout the analysis. In the present investigation, universal buffers in the pH range 2.0 to 6.0 are used as supporting electrolytes and prepared

using 0.2 M boric acid, 0.05 M citric acid and 0.1 M tri sodium orthophosphate solutions. Pesticide samples are obtained from saral agro, India, Ltd.

Result and Discussion

Well defined peak obtained for each sample is useful for the analysis of soil samples. The optimum pH to get well defined peak for the detection is found to be 5.0. The peak current is found to vary linearly with the concentration of the herbicide over the range $1.03 \times 10^{-5} \text{M}$ to $1.04 \times 10^{-9} \text{M}$. The lower detection was limit found to be $1.02 \times 10^{-9} \text{M}$. The correlation coefficient and relative standard deviation (for 5 replicates) obtained using the above procedure.

Recovery experiments

A stock solution ($1.0 \times 10^{-3} \text{M}$) of each sample is prepared in methanol. In voltammetric cell, 1 mL of standard solution is taken and 9 mL of the supporting electrolyte (pH 4.0) is added to it. Then the solution is deaerated with nitrogen gas for 10 min. after obtaining the voltammogram, small additions of standard solution are added and the voltammograms are recorded under similar experimental conditions. The optimum conditions for analytical estimation at pH 5.0 are found to be pulse amplitude of 30 mV, applied potential of -0.45V and scan rate 40 mVs^{-1} .

Samples are collected from fields which sprayed by the herbicides under investigation 48 hours after spraying the herbicides. These samples subjected to standard extraction procedure [6] Aliquots of soil samples were taken to it buffer solution was added and analyzed as described above. The recoveries of samples obtained in soil samples ranged from 84.00 to 98.80% and the results are summarized in Table 1.0.

Table 1.0: Recovery of herbicides at working electrode in voltammetry.

sample	Amount added(μg)	Amount found(μg)	Recovery(%)	Standard deviation
Dinoterb	5.0	4.20	84.00	0.043
Dinoseb	5.0	4.60	92.00	0.056
Dinosam	5.0	4.94	98.80	0.033

Conclusion

The present part describes the detailed study of electrochemical reduction of herbicides from the results obtained from cyclic voltammetry, differential pulse adsorptive stripping voltammetry, millicoulometry and controlled potential electrolysis in methanol as solvent in the supporting electrolytes of pH ranging 2.0 to 6.0. To overcome partial load over current density and for improved electrode kinetics .carbon nano tubes paste electrode.By this approach we can say that the method employed for the determination of herbicides differential pulse adsorptive

stripping voltammetry is selective and sensitive and low consumption of sample and less tedious compare to chromatography and spectroscopy.

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