

## Electrochemical detection of some water soluble and fat soluble vitamins by using bare pencil graphite electrode

Tolga Saruhan<sup>1\*</sup>, Perihan Adun<sup>2</sup>, İhsan Erol Özçil<sup>1</sup>

<sup>1</sup>American University of Cyprus, Faculty of Business and Economics, Department of Tourism Management.

<sup>2</sup>Near East University, Faculty of Engineering, Department of Food Engineering.

\*Corresponding author: Tolga Saruhan American University of Cyprus, Faculty of Business and Economics, Department of Tourism Management, Cyprus. Email ID: [tolgasaruhan@gmail.com](mailto:tolgasaruhan@gmail.com).

Received: November 08, 2022, Manuscript No. tsac-22-79320; Editor assigned: November 11, 2022, PreQC No. tsac-22-79320 (PQ); Reviewed: November 11, 2022, QC Notsac-22-79320 (Q); Revised: November 13, 2022, Manuscript No tsac-22-79320 (R); Published date: November 27, 2022. DOI:10.37532/0974-7419.2022.22(11).223

### Abstract

Vitamins are a group of organic compounds needed in small quantities by the body to perform its essential functions like growing, regulating metabolism and maintain a healthy immune system. In recent years, substantial efforts have been focused on development of simplified, fast and cost-effective approaches for vitamin analysis. Aim of this study was electrochemical detection of some water and fat-soluble vitamins individually and simultaneously by using bare Pencil Graphite Electrode (PGE). Vitamins of C, B<sub>1</sub>, B<sub>6</sub>, B<sub>12</sub>, A, D<sub>3</sub>, and E were selected and electrochemically analyzed in pharmaceutical perperates. Simultaneous analysis of water-soluble vitamins by using DPV with PGE can be promising technique for the determination of vitamin C and B<sub>6</sub> or vitamin B<sub>1</sub>, B<sub>12</sub> and B<sub>6</sub>. In the case of fat-soluble vitamins, resolution between vitamin D<sub>3</sub> and E was not satisfactory. However, vitamin A and D or vitamin A and E could be detected in a single run. Limit of detection of the selected vitamins were quite low (4-548 µg/ml).

**Keywords:** Fat-soluble vitamins; water-soluble vitamins; vitamin analysis; electrochemical methods; differential pulse voltammetry; and Pencil Graphite Electrode

### Introduction

There are thirteen vitamins important for human nutrition and these can be divided into two groups according to their solubility [1]. Most of the vitamins are absolutely essential in human nutrition, because the tissues in the human body cannot synthesize them [2]. There are two notable exceptions that are vitamin D and niacin. The cutaneous synthesis of vitamin D depends on adequate exposure of the skin to sunlight; niacin synthesis depends on adequate intake of tryptophan, which is protein-bound amino acid precursor [3]. While various diseases can occur when vitamins are taken below Recommended Daily Intake Dose (RDI) and toxic effects can be seen above these RDI amounts.

- Using bare – PGE in DPV can be considered a simple, fast, cost-effective and sensitive method in detection of vitamins.
- It is also environmentally friendly, since no need to use organic solvents for the analysis of fat-soluble vitamins.
- Fat soluble and water-soluble vitamins have different pH dependence.
- Vitamin A, D<sub>3</sub> and E could not be analyzed in a single run with the method, since vitamin D<sub>3</sub> and E oxidation signals were

**Citation:** Saruhan T\*, Adun P, Özçil I. Electrochemical detection of some water soluble and fat soluble vitamins by using bare pencil graphite electrode. Anal Chem Ind J. 2022;22(11):223.