ACTIVATION ANALYSIS OF Se IN BIOLOGICAL SAMPLES
THROUGH $^{75}\text{Se}$ AND $^{77}\text{mSe}$


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Received 26 June 1990
Accepted 10 July 1990

A method is described to separate trace amounts of selenium in biological samples without using a carrier. This method is based on the adsorption on active carbon of the complex ion formed with APDC /ammonium salt of 1-pyrrolidine carbodithioic acid/ at pH 1. The efficiency of the radiochemical separation described is measured by using carrier-free $^{75}\text{Se}$ labelled solutions of sodium selenite at selenium concentrations from $3.5 \times 10^{-8}$ to $3.5 \times 10^{-11}$ g ml$^{-1}$. The results were between 95% and 98% with statistical variations from 2% to 10%. The determination of selenium can be made following this separation either through $^{75}\text{Se}$ in the traditional way, or through $^{77}\text{mSe}$ if the separation is performed prior to irradiation. The detection limits on the available conditions were 0.01 ppm for $^{75}\text{Se}$ and 0.1 ppm for $^{77}\text{mSe}$. When the analysis is performed through $^{75}\text{Se}$ /$t = 120$ d/, the statistical error is notably smaller because the counting time may be considerable, whereas through $^{77}\text{mSe}$ /$t = 17.5$ s/ it is higher than 20%. de-
pending on the concentration and the available neutron flux. However, the advantages of gaining time and the fact of performing the trace separation from a non radioactive material, make both procedures competitive as useful tools for the research on the function of Se in vertebrates.

INTRODUCTION

Selenium trace concentration in superior vertebrates has been studied mainly in relation with diseases such as muscular dystrophy in calves, exudative diathesis and pancreatic fibrosis in chickens and hepatosis dietetica in pigs. In addition, it has been considered as a cancer protective element. Its action seems to be related to that of vitamin E, but the fact that beyond a limit concentration it is toxic, makes its measurement even more important.

During recent years several excellent papers have appeared on the activation analysis of selenium either purely instrumental or including some radiochemical separation\textsuperscript{1-9}, as well as some other very sensitive analytical methods such as atomic absorption and X-ray fluorescence spectrometries\textsuperscript{10,11}.

However, the aim of the present work is to describe a method that is very simple and allows to reach the highest sensitivity and accuracy for a set of given experimental conditions. Also it allows the choice between a long irradiation time and a very short one, according to the available facilities and required accuracy.