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التوثيق الالكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالاصل

Study for The Efficiency of Different Methods of Mercury Preconcentration Techniques in Aquatic Environmental Samples

A Thesis
Submitted to
Chemistry Department, Faculty of Science
Alexandria University
In Partial Fulfillment for The M.Sc. Degree
In Chemistry

By

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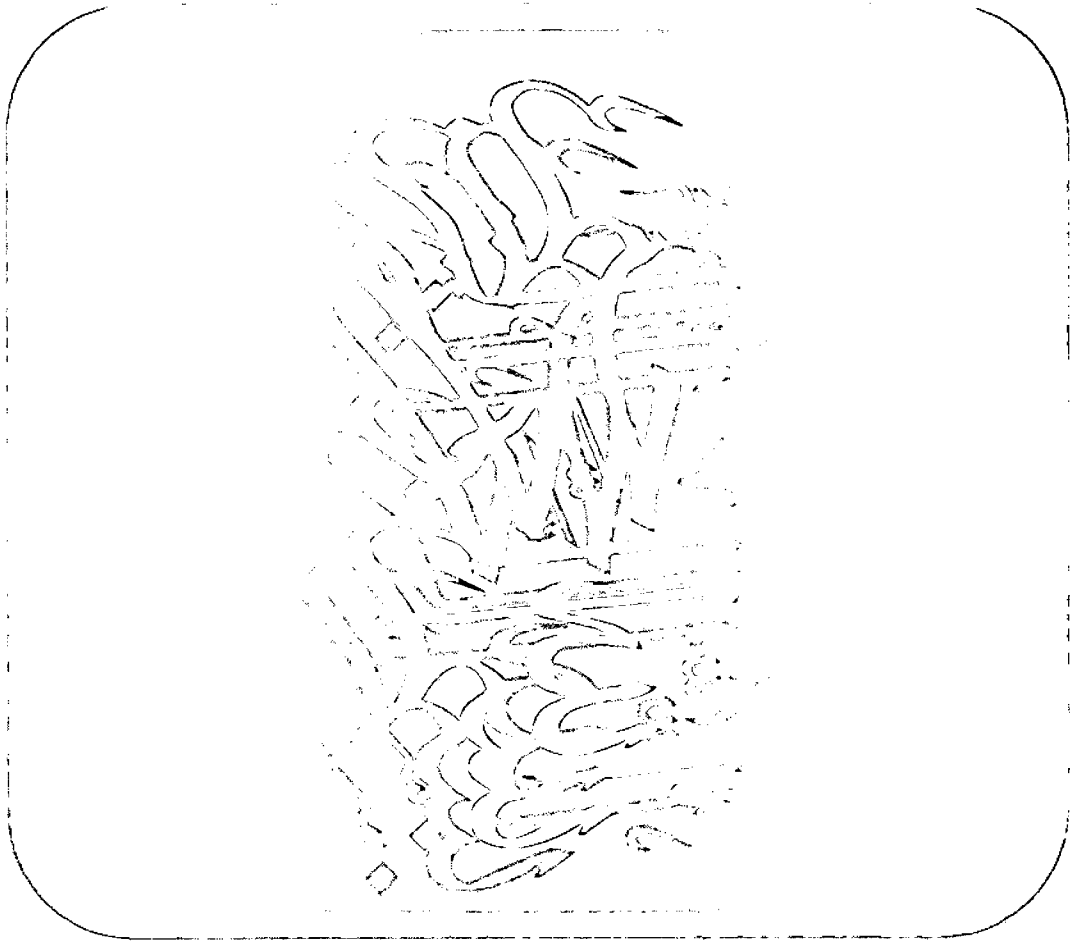

To my Parents

To my husband

Helmy

To my lovely girls:

Madeha

&

Maryam

Acknowledgment

The first and the last great to ALLAH, for all the gifts and success that were always given to me throughout my life.

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Contents

Summary

Summary

Mercury is a well known environmental pollutant and is very toxic in very low concentration. The present study is concerned with the evaluation of some methods of the hard problem of preconcentration of mercury from aqueous samples due to the very low levels of mercury in environment which are difficult to be detected directly.

This study in the present thesis is divided into 3 chapters.

Chapter I: is an introductory part divided into two sections.

Section A: deals with different properties of mercury such as

General properties, sources to the marine environment, Hg species, toxification, detoxification, bioaccumulaiton, toxicity, Hg distribution in atmosphere and aquatic systems, Hg in industry, policies dealing with Hg pollution, Hg threshold limit value (TLV), fate of mercury in aquatic systems and an example for the determination of mercury in Egypt.

Section B: A review of preconcentration of mercury from aquatic samples and the methods of mercury determination.

Chapter II: deals with the experimental part and study area.

Section (1): Experimental part.

This includes the study of different trials with many chelating agents such as: Diphenylthiocarbazone (Dithizone) (DZ), Sodium diethyldithiocarbamate (NaDDC) and Ammonium pyrrolidine dithiocarbamate (APDC) and loading them on the supporting materials XAD-2 or XAD-4. Then using them as Hg preconcentrating agents.

The trials aimed to reach the most optimum conditions leading to the best recovery of Hg from aquatic samples putting in consideration the economicity of the chemicals used.

The factors tested in this experimental part are:

A: For Dithizone

pH, acid normality of Hg solution, rate of elution, changing the eluent and its acid normality, changing of the particle size of the solid support, washing the resin before using, time of contact, change of loading ratio between dithizone and "two amberlite XAD series" and possibility of reuse of the resin.

B: For NaDDC and APDC

pH, changing of the eluent, rate of elution and the possibility of reuse of the resin.

Section (2):

Application of the best conditions attained from the previous part for concentration of samples collected from different locations including:

A- Sea water

i- Five samples from Mersa Matrouh.

ii- Four samples one from Betach and three from El Mex Bay.

iii- Seven from Alexandria central Beaches and Main Waste Disposal site.

iv- Ten samples from Abu Kir Bay at different depths.

B- Fresh water

Six samples along Mahmoudia canal and one sample from tap water.

C- Outlet of factories

Seven samples from outlet and drains of some factories (Alexandria – Behaira region).

Chapter III Results and discussion

The results are classified into 3 sections:

Section (1) shows the results of the factors affecting the efficiency of dithizone loaded on XAD-2 or XAD-4 as mercury preconcentrating agent.

The optimum conditions are pH of 1.5, normality of Hg solution between 1 to 3, rate of elution 5 ml/minute, 25 ml 9N HCl as the best eluent, the more the particle size of the solid support the higher efficiency of recovery, washing the resin with 4N HCl give best recovery, time of contact 30 min, the best loading ratio between dithizone and XAD amberlite series is 5 mg dithizone to 2 g XAD and Dithizone coated macroreticular resin beads in once used them the beads can be either discarded or recoated.

Section (2) shows the results of factors affecting the efficiency of NaDDC and APDC loaded on XAD-2 as mercury preconcentrating agents. The successive trials led to the conclusion that the best conditions of preconcentration are pH 4, 25 ml of 4N HNO_3 as best eluent at rate 5 ml/min. time of contact 30 minuets, and there is the possibility of reuse of the resin.

Section (3) Application of the best methods of recovery attained in the previous sectors with dithizone as Hg preconcentrating agent (recovery nearly 80%) on environmental samples collected from different areas. The efficiency of the method for extraction of samples from sea water at considerobly clean area (Mersa Matrouh-Betach) ranged between 76