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**PREPARATION AND CHARACTERIZATION OF NOVEL
SORBENT MATERIALS FOR THE SELECTIVE
EXTRACTION OF SOME ENVIRONMENTAL POLLUTANTS**

By

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ABSTRACT

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This thesis includes the preparation of chemically modified polyurethane foam (PUF) functionalized with different organic ligands e.g. acetoacetanilide (AAA), ethyl cyanoacetate (ECA) or 2-aminothiazole (2-AT) to extract inorganic species (especially heavy metal ions) such as Ni(II), Zn(II) and Cd(II) via applying the off-line solid phase extraction(SPE) procedure.

The work presented in this thesis is divided into seven chapters.

Chapter 1: Introduction

This chapter shows the direct relationship between several kinds of human diseases and health with specific pollutant when exists in the natural resources. Also, the reasons why SPE technique such as rapid, selective sample preparation, purification and provides the sample clean-up, recovery and concentration necessary for accurate quantitative analysis are mentioned. Therefore, it is a challenge for analytical chemist to find out simple, sensitive, less expensive and safe method for determination of such kinds of environmental pollutants.

Chapter 2: Review of Literature

It includes literature review about the phenomenon of pollution, its sources, treatment and classification of pollutants. There are some literatures which relate between some diseases caused nickel, zinc and cadmium heavy metals and their harmful effect on, specially, human and animal lives and the presence of some pollutant for natural sources.

A review about the adsorption process to solid surfaces and the factors that may affect this phenomenon are included. This has led us to discuss in some details the solid phase extraction technique and its utility in analytical applications with special reference to the different kinds of commonly used solid sorbents.

Furthermore, some information about the PUF material under modification used in this work, including properties, and its analytical applications as an extractor in SFE technique have been reported. The properties of PUF as versatile sorbent, its superiority as a good sorbent over other materials are discussed. Because of its unique chemical and physical properties, it is very attractive and promising sorbent. Finally, the reasons why this material is different from other polymers are mentioned.

Chapter 3: Aim of the work

In chapter 3, we point out the aims of this study as short notes.

Chapter 4: Materials and Methods

Through this chapter, the information about instruments, chemicals, and reagents used in this work were involved. Also, the methods of preparation of the modified PUFs were reported in addition to the extraction methodology employed in this work.

Chapter 5: Results and Discussion

This chapter is divided into three sections:

Section (A) discuss the results obtained for the sorption of Ni(II), Zn(II) and Cd(II) ions with acetoacetanilide functionalized PUF (AAA-PUF) and ethyl cyanoacetate functionalized PUF (ECA-PUF) sorbents.

Section (B) we discuss the results obtained for the sorption of Ni(II), Zn(II) and Cd(II) ions with 2-AT-PUF sorbent.

Also, the characteristics of the achieved AA-PUF, ECA-PUF and 2-AT-PUF sorbents have been reported. Then, the study of chemical parameters such as pH, shaking time, capacity, interfering ions and hydrochemical parameters such as sample flow rate eluent concentration and eluent volume which affects the extraction process of Ni(II), Zn(II) and Cd(II) ions by the novel sorbents.

Section (C) involves the applications of the developed sorbents for preconcentration of tested metal ions from various real samples (Qaroun Lake

water, Tap water, Black Tea, Spinach and Parsley leaves) collected from Fayoum City. To close, this section involves comparison between the three modified foams and comparison of the results obtained by these novel sorbents with other reported sorbents.

Chapter 6: Summary and Conclusions

The conclusions of the present study were reported and explained. Besides, the recommendations for further work are addressed.

Chapter 7: References

Finally, all references utilized in this work are written.