

CONTENTS

Aim of the work

CHAPTER I INTRODUCTION

	Page
1.1 General	1
1.2 Environmental pollutants	1
1.2.1 Hazardous wastes	2
1.2.1.1 Types of hazardous wastes	3
1.2.1.1.1 Industrial wastes	3
1.2.1.1.2 Radioactive wastes	7
1.3 water pollution	11
Impact of industrial activities of the environment.	12
Water Pollutants	13
1.4 Air pollution	17
1.5 Treatment methods	17
1.5.1 Industrial waste treatment	17
1.5.1.1 Dye- waste treatment	18
1.5.1.2 Hazardous waste treatment	20
1.5.1.3 Removal of heavy metals	25
1.5.2 Radioactive waste treatment	29
1.5.2.1 Ion exchange	29
1.5.2.2 Solvent extraction	31
1.5.3 Wastewater treatment	32
1.6 Natural exchangers	35
1.6.1 Straw	37
1.6.1.1 Cellulose	37
1.6.1.2 Hemicellulose	38

1.6.1.3 Lignin	39
1.6.2 Wood	40
1.6.3 Soil	41
1.6.4 Zeolite	44
1.7 Adsorption process	45
1.7.1 Freundlich isotherm	46
1.7.2 Langmuir isotherm	47
1.8 Desorption process	49
1.9 Chemistry of elements related to the present study	50
1.9.1 Heavy elements	50
1.9.1.1 Cobalt	50
1.9.1.2 Chromium	51
1.9.1.3 Lead	52
1.9.2 Fission products	54
1.9.2.1 Europium	54
1.9.2.2 Cesium	57

Chapter II

EXPERIMENTAL

2.1 Chemicals and reagents	59
2.2 Straw and sugarcane samples	61
2.3 Elements	61
2.3.1 Radioactive tracers	61
2.3.1.1 Radioactive $^{152+154}\text{Eu}$ and its preparation	62
2.3.1.2 Radioactive ^{60}Co and its preparation	63
2.3.1.3 Radioactive ^{137}Cs and its preparation	63
2.4 Instrumentation	63

2.5 Determination of moisture content of straw	65
2.6 Adsorption – desorption studies	65
2.6.1 Adsorption studies	65
2.6.1.1 Factors affecting the uptake behavior in the present study.	65
2.6.1.2 Determination of the adsorption of some radionuclides from their mixtures.	66
2.6.1.3 Adsorption – desorption recycling studies	66
2.6.1.4 Industrial wastewater treatment	66
2.6.2 Desorption studies	67

CHAPTER III

RESULTS AND DISCUSSION

3.1 Determination of V/m ratio	68
3.2 Determination of moisture content	69
3.3 Sorption/ Desorption studies of Cr(VI)	69
3.3.1 Effect of pH	71
3.3.2 Effect of contact time	71
3.3.3 Effect of ion concentration	74
3.3.4 Desorption studies of Cr(VI)	74
3.4 Studies on Pb(II)	76
3.4.1 Effect of pH	79
3.4.2 Effect of contact time	79
3.4.3 Effect of ion concentration	80
3.4.4 Effect of competing ion concentration	80
3.4.5 Desorption studies of Pb(II)	83
3.4.6 Adsorption – Desorption recycling studies of Pb(II)	86

Studies on Radioactive Isotopes.	88
3.5 Adsorption/ Desorption studies of Co(II)	88
3.5.1 Effect of pH	88
3.5.2 Effect of contact time	90
3.5.3 Effect of carrier concentration	90
3.5.4 Desorption studies of Co(II)	93
3.6 Studies on Eu(III)	93
3.6.1 Effect of pH	93
3.6.2 Effect of HCl and Oxalic acid	96
3.6.3 Effect of contact time	96
3.6.4 Effect of carrier concentration	99
3.7 Studies on Cs(I)	102
3.7.1 Effect of pH	102
3.7.2 Effect of contact time	104
3.7.3 Effect of carrier concentration	106
3.7.4 Desorption of Cs(I)	106
3.7.5 Separation of Eu(III) from Cs(I)	108
3.8 Sorption studies of Eu(III), Co(II) and Cs(I) from their mixtures	108
3.8.1 The desorption studies of Eu(III), Co(II) and Cs(I) from their mixtures	120
3.9.1 Studying the adsorption of Pb(II) from industrial wastewater	127
3.9.2 Studying the adsorption of Cr(VI) from industrial wastewater	127
3.10 Infrared studies on the used straw (IR spectra)	129
VI- SUMMARY	131
V- REFERENCES	135
IV- ARABIC SUMMARY	146