Contents

Foreword —— V		
About	the authors —— IX	
Chapte	er 1	
Paradi	gm of removing toxic heavy metals using low-cost adsorbents —— 1	
Introd	uction —— 1	
1.1	Heavy metals: a menace to environment and human health —— 1	
1.2	Heavy metal removal: a brief overview —— 3	
1.3	Adsorption: state-of-the-art —— 5	
1.4	Review of various low-cost adsorbents in recent years — 7	
	References —— 12	
Chapte	er 2	
-	val of heavy metals using mineral-based adsorbents —— 17	
	uction —— 17	
2.1	Preparation of adsorbent —— 18	
2.2	Various process parameters —— 19	
2.3	Right choice of adsorbent —— 20	
2.4	Methods of removing heavy metals using low-cost adsorbents — 2	
	References —— 57	
Chapte	er 3	
	val of heavy metals using low-cost bioadsorbents —— 63	
	uction —— 63	
3.1	Biosorption of metals —— 63	
3.2	Fruit cortex/peel as adsorbent —— 65	
3.3	Leaves as bioadsorbent —— 67	
3.4	Sawdust and bark as adsorbent — 70	
3.5	Rice husk as adsorbent —— 70	
3.6	Peat moss adsorbent —— 72	
3.7	Nut shell as adsorbent —— 74	
3.8	Egg shell as adsorbent —— 76	
3.9	Agricultural/forestry waste as adsorbent —— 76	
3.10	Animal shell as adsorbent —— 80	
3.11	Microbes as adsorbent —— 81	
3.12	Bone waste as adsorbent —— 84	
	References —— 90	



VIII — Contents

Cha	pter	4
-----	------	---

Removal of heavy metals using low-cost biochars —— 95 Introduction —— 95

- 4.1 Biochar from forestry and agricultural waste 95
- 4.2 Biochar from dairy manure 100
- 4.3 Algal biochar 101
- 4.4 Biochar from oil cake carbon 103
 References 108

Index —— 111