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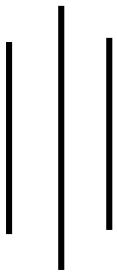
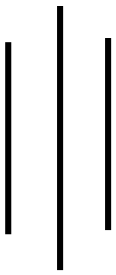
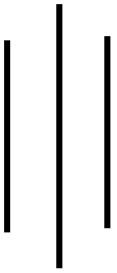


A Dissertation Submitted to the Central Department of Chemistry in partial fulfillment of requirements for the Master's Degree of Science in Chemistry



By

Sabita Aacharya



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The dissertation entitled

Adsorption of Arsenic(III) Using Iron(III)-Loaded Modified Sugarcane Begasse

Submitted by

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has been accepted as a partial fulfillment of the requirements for the Master's Degree in Chemistry

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FOREWORD

The dissertation entitled "**Adsorption of Arsenic(III) using Iron(III)-loaded Sugarcane Begasse"** submitted by **Sabita Aacharya** for the M.Sc. Degree in Chemistry has been carried out under my supervision in the academic year 2007-2008. During the research period she had performed her work sincerely & satisfactorily. No part of this thesis has been submitted for any other degree.

.....

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I am also thankful to my friends and colleagues whose inspiring interest and ceaseless enthusiasm for the topic explored in this thesis has meant a great deal to me. Finally, I dedicate this work to my parents.

Sabita Aacharya

ABSTRACT

Arsenic is a toxic element and may be found in natural water as well as industrial wastes. Leaching of As from industrial wastes into ground water may cause significant contamination which requires proper treatment before its use as a drinking water. The chemistry of As and its natural occurrence in some water resources combine to create a potent, widespread human health risk, requiring management and removal from drinking water. The present study describes the removal of As(III) from water. Of the available conventional techniques, adsorption is the most versatile and effective separation technique and utilizes agricultural and natural waste as adsorbent. The study mainly focuses on the removal of As(III) on Fe(III) loaded modified Sugarcane begasse in batch studies as a function of pH, dosage of adsorbent and contact time. Kinetics revealed that the uptake of As(III) ion by rapid and equilibrium time was independent of initial As(III) concentration and the adsorption process followed a pseudo second-order kinetics equation. The As(III) was strongly dependent on pH and dosage of adsorbent. The adsorption isotherm best fit the Langmuir equation as compared to Freundlich.

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ABBREVIATIONS

ppm	=	parts per million
ppb	=	parts per billion
nm	=	Nanometer
L	=	Litre
µg/L	=	Micro gram per litre
mg/L	=	Milligram per litre
mg/g	=	Milligram per gram
g/L	=	Gram per litre
A%	=	Adsorption efficiency
W	=	mass of the adsorbent in gram
ml	=	millilitre
C_i	=	initial concentration of metal in mg/L
C_e	=	Equilibrium concentration of arsenic in mg/L

q_t	=	Amount adsorbed at time t in mg/g
q_e	=	Amount adsorbed at equilibrium time in mg/g
PHe	=	Equilibrium pH
AC	=	Activated carbon
AM	=	Ammonium molybdenum
GAC	=	Granulated activated carbon
As (III)	=	Trivalent arsenic
As(V)	=	Pentavalent arsenic
SB	=	Sugarcane Begasse
D	=	Distribution factor for adsorption in L/g
V	=	Volume of metal solution in ml
W	=	Weight of adsorbent in gram
K	=	Adsorption capacity