

CONTENTS

	Page no.
<i>Supervisor's certificate</i>	i
<i>Acknowledgement</i>	ii
<i>Motivation</i>	iii
<i>Abstract</i>	iv
Survey Of The Current Scenario	
Chapter 1 : Introduction	1
1.1 Survey of the current scenario	2
1.2 Where does Arsenic come from ?	2
1.2.1 Natural processes	2
1.2.2 Reduction theory	2
1.2.3 Oxidation theory	4
1.3 Sources of Arsenic	4
1.3.1 Major Arsenic Arsenic minerals	4
1.3.2 Rock forming minerals	5
1.3.3 Earth crust	6
1.4 Arsenic toxicology	6
1.4.1 Health effects	7
1.5 Levels of Arsenic in India	7
1.6 Levels of Arsenic in North-eastern states	8
1.7 Levels of Arsenic in Assam	8
1.8 Why nanomaterials are superior compared to Existing materials.	9
1.9 Why Iron Oxide nanomaterial is chosen	10
1.10 Maghemite (γ Fe ₂ O ₃) nanoparticles	10
1.11 Titanium dioxide (TiO ₂) nanoparticles	12



1.12 References	13
Chapter 2 : Preparation procedures	15
2.1 Ball milling method	16
2.2 Chemical method	17
2.4 Discussion	18
2.5 Conclusion	19
2.6 References	20
Chapter 3 : Fourier transform infra-red spectroscopy	21
3.1 Introduction	22
3.2 Experimental details	22
3.3 Results	23
3.4 Discussion	24
3.5 Conclusion	24
3.6 References	26
Chapter 4 : Study on structural characterization of	
γ-Fe₂O₃ and TiO₂ Nanoparticles through	
X-Ray diffraction	27
4.1 Introduction	28
4.2 Experimental details	28
4.3 Theoretical methods	31
4.4 Results	33
4.5 Discussion	34
4.6 Conclusion	34
4.7 References	35
Chapter 5: Transmission Electron Microscopy	37
5.1 Introduction	38
5.2 Experimental details	40
5.3 Results	41
5.4 Discussion	43
5.5 Conclusion	43
5.6 References	44

Chapter 6 : Study of optical properties of γ- Fe_2O_3 and TiO_2 nanoparticles through UV-Visible absorbance and Photoluminescence spectroscopy	45
6.1 UV-Visible spectroscopy	46
6.2 Results	49
6.3 PL spectroscopy	50
6.4 Forms of PL	50
6.5 Results	52
6.6 Discussions	53
6.7 Conclusion	54
6.8 References	55
Chapter 7 : Removal of Arsenic from drinking water using γ- Fe_2O_3 and TiO_2 nanoparticles	56
7.1 Introduction	57
7.2 Arsenic level in North Eastern states	57
7.3 Why nanomaterials are superior compared to Existing materials	58
7.4 Atomic adsorption spectroscopy	59
7.5 Experimental details	61
7.6 Results	62
7.7 Magnetic separation	68
7.8 Discussions	69
7.9 Conclusion	70
7.10 References	72
Chapter 8 : Study of magneto-optic switching property of Maghemite Nanoparticles(γ- Fe_2O_3)	73
8.1 Introduction	74
8.2 Experimental details	74
8.3 Results and discussions	75
8.4 Conclusion	79
8.5 Reference	80
Summary of the work done	81
Future prospects	84