TABLE OF CONTENTS

Acknowledgement
Table of Contents
Abbreviations

<table>
<thead>
<tr>
<th>Chapter 1.</th>
<th>AN INTRODUCTION TO HALOGENATION OF ORGANIC COMPOUNDS USING NEW REAGENT SYSTEMS</th>
<th>XX-XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Iodination</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Bromination</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Chlorination</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>General procedure for the chlorination of aromatic compounds</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Monochlorination</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Dichlorination</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>Effects of surfactant</td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td>Effect of concentration of HCl</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Effect of concentration of NaClO₃</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Halogens facts</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Properties of halogens</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>Reactivity</td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>Oxidizing power</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Type of Halogenation</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Substitution Halogenation</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td>4.1.1</td>
<td>Aromatic Substitution</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td>Addition Halogenation</td>
<td></td>
</tr>
<tr>
<td>4.2.1</td>
<td>Oxyhalogenation</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Bromination as commercial process</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Brominated organic compounds</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td>Industrial-importance of some brominated compounds</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Chlorination (FACTS method)</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Industrial-importance of some chlorinated compounds</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Iodination</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Motivation/Objective</td>
<td></td>
</tr>
</tbody>
</table>

**Chapter 2. REVIEW OF LITERATURE: BROMINATING REAGENT SYSTEMS KNOWN IN CHEMICAL LITERATURE**

<table>
<thead>
<tr>
<th>2.</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>The bromination of activated aromatic substrates and acylation of alcohols using PEG KBr₃</td>
</tr>
<tr>
<td>2.2</td>
<td>N-Bromosuccinimide</td>
</tr>
<tr>
<td>2.3</td>
<td>Bromination of alkynes and alkenes</td>
</tr>
<tr>
<td>2.4</td>
<td>Synthesis of Arylboronic Esters</td>
</tr>
<tr>
<td>2.5</td>
<td>Hexamethylenetetramine–bromine (HMTAB)</td>
</tr>
<tr>
<td>2.6</td>
<td>Aprotic solvents and bromination</td>
</tr>
<tr>
<td>2.7</td>
<td>Oxibromination of selected pharmaceuticals</td>
</tr>
</tbody>
</table>
### 2.8 Photo-bromination reactions in sunlit saline surface waters

### 2.9 Bromide as reagent

#### 2.9.1 Vanadium and molybdenum as halogenating reagent

#### 2.9.2 Preparation of Venlafaxine (IX)

#### 2.9.3 Quinoxaliniunm bromochromate

#### 2.9.4 Preparation tefluthrin from 2, 3, 5, 6-tetrafluorodimethylolbenzene

#### 2.9.5 Lewis Acid

#### 2.9.6 NaBr and NaI, halogenating reagent for aromatics

#### 2.9.7 Terminal oxidant (H₂O₂)

### 3. Halogenating reagents

#### 3.1 Electrochemical bromination of germacrene D

#### 3.2 Synthesis of 2,3,4-trifluoro-5-iodo and 2,3,4-trifluoro-5-bromo benzoic acid

### Chapter 3. Synthesis of cetylpyridinium tribromide (CetPyTB) reagent by noble synthetic route and bromination of organic compound using CetPyTB

<p>| 1. | Abstract |
| 2. | Objective |
| 3. | Introduction |
| 4. | Results and Discussion |
| 5. | EXPERIMENTAL SECTION |
| 5.1 | Reagents and Analytics |
| 5.2 | Protocol for Optimization of CetPyTB during synthesis |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3</td>
<td>Procedure for Preparation of CetPyTB using Na$_2$MoO$_4$ and Hydrogen Peroxide</td>
</tr>
<tr>
<td>5.4</td>
<td>Influence of quantity of reagent on the end product yield and melting point of 3, 5-DBSA</td>
</tr>
<tr>
<td>6.</td>
<td>Spectral data ($^1$H NMR, Infrared and Mass Spectrometry) of brominated compounds</td>
</tr>
<tr>
<td>7.</td>
<td>Conclusions</td>
</tr>
</tbody>
</table>

**Chapter 4. OXIDATIVE CHLORINATION OF AROMATIC COMPOUNDS IN AQUEOUS MEDIA**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Abstract</td>
</tr>
<tr>
<td>2.</td>
<td>Objective</td>
</tr>
<tr>
<td>3.</td>
<td>Introduction</td>
</tr>
<tr>
<td>4.</td>
<td>Results and Discussion</td>
</tr>
<tr>
<td>4.1</td>
<td>Effect of surfactant</td>
</tr>
<tr>
<td>4.2</td>
<td>Effect of concentration of HCl</td>
</tr>
<tr>
<td>4.3</td>
<td>Effect of concentration of NaClO$_3$</td>
</tr>
<tr>
<td>4.4</td>
<td>Mechanism</td>
</tr>
<tr>
<td>5.</td>
<td>EXPERIMENTAL</td>
</tr>
<tr>
<td>5.1</td>
<td>Materials and instrumentation</td>
</tr>
<tr>
<td>5.2</td>
<td>Common chlorination procedures for aromatic compounds</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Monochlorination</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Dichlorination</td>
</tr>
<tr>
<td>6.</td>
<td>SPECTROSCOPIC DATA OF FEW CHLORINATED AROMATIC COMPOUNDS</td>
</tr>
<tr>
<td>7.</td>
<td>Conclusions</td>
</tr>
<tr>
<td>Chapter 5.</td>
<td>BROMINATION OF COMMERCIALLLY-SIGNIFICANT AROMATIC COMPOUNDS USING AN AQ. AlBr₃-Br₂ REAGENT SYSTEM AS A SUSTAINABLE FAST AND ECONOMICAL BROMINATING REAGENT</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**Section I.**

Ecologically-safe and Fast Bromination of industrially-significant Aromatic Compounds in water using an recyclable AlBr₃-Br₂ Reagent System as an Prompt and Sustainable Brominating Reagent

| 1. | Objective |
| 2. | Introduction |
| 3. | Result and Discussion |
| 3.1 | Reaction Mechanism |

| 4. | EXPERIMENTAL SECTION |
| 4.1 | All-Purpose |
| 4.2 | Unambiguous bromination process for synthesization of 2, 6-Dibromo-4- nitroaniline (II) |
| 4.3 | Method for Regenerating and Reprocessing of AlBr₃ (Recycle 1) |
| 4.4 | Procedure for Recycle 2, 3 and 4 |
| 4.5 | The Synthesis route for 2-Bromo-4-nitroaniline (1k) |
| 4.6 | The Synthesis path of 2, 4, 6- Tribromophenol (1d) |
| 4.7 | Investigational Route for Ultraviolet –Visible Assessments |

| 5. | The categorization data ($^1$H NMR, Infrared and Mass Spectroscopy) achieved for various representative compounds |
6. Conclusions

**Section II.** A Direct and simplistic Bromination of commercially-important Organic Compounds in aqueous media by Eco-friendly AlBr$_3$-Br$_2$ reagent system

1. Objective

2 Introduction

3. Result and Discussion

3.1 Reaction conditions screening

3.2 The impact on yield and dissolving purpose of DBNA by mole proportion of Br$_2$

3.3 Impact of AlBr$_3$-Br$_2$ mole proportion on yield and dissolving purpose of 2, 6-dibromo-4-nitroaniline (DBNA)

3.4 Stirring

4. EXPERIMENTAL

4.1 Reagents and analytics

4.2 A typical synthesis path of 2, 6-dibromo-4-nitroaniline

4.3 The filtrate was put something aside for the Later runs. The item was accomplished as yellow powder. (Recycle 1)

4.4 The Route for Recycle/Reutilize 2, 3 and 4

5. The classification information (1H NMR, Infrared and Mass Spectroscopy) accomplished for different delegate aromatics

6. Conclusions

**Chapter 6.** SUMMARY AND CONCLUSION

**BIBLIOGRAPHY**
<table>
<thead>
<tr>
<th>LIST OF PUBLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>