## List of Figures

<table>
<thead>
<tr>
<th>Fig No.</th>
<th>Title</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig 2.1</td>
<td>Use of Phenol in different industries</td>
<td>13</td>
</tr>
<tr>
<td>Fig 2.2</td>
<td>Peripheral pathways for aerobic metabolism of aromatic Compounds</td>
<td>27</td>
</tr>
<tr>
<td>Fig 2.3</td>
<td>Central pathways for catechol metabolism</td>
<td>28</td>
</tr>
<tr>
<td>Fig 2.4</td>
<td>Peripheral Pathways transforming some aromatic compounds to Benzoyl CoA under anaerobic conditions</td>
<td>30</td>
</tr>
<tr>
<td>Fig 2.5</td>
<td>Peripheral pathways transforming some aromatic compounds to Phloroglucinol and Resorcinol under anaerobic conditions</td>
<td>31</td>
</tr>
<tr>
<td>Fig 2.6</td>
<td>The central benzoyl CoA pathway for anaerobic aromatic degradation</td>
<td>32</td>
</tr>
<tr>
<td>Fig 2.7</td>
<td>The central phloroglucinol/resorcinol pathways for anaerobic aromatic degradation</td>
<td>33</td>
</tr>
<tr>
<td>Fig 2.8</td>
<td>Pathway for the oxidation of toluene to benzoate coupled to Fe (III) reduction</td>
<td>36</td>
</tr>
<tr>
<td>Fig 2.9</td>
<td>Initial reactions of anaerobic degradation by Desulfobacterium sp.</td>
<td>37</td>
</tr>
<tr>
<td>Fig 2.10</td>
<td>Phenol degradation by denitrifying Pseudomonas sp.</td>
<td>43</td>
</tr>
</tbody>
</table>
Mechanism of chemical Birch reduction of benzene and biological Birch reduction of benzoyl-CoA

Schematic diagram of the experimental setup of sequential batch reactor

Enrichment Procedure for Chemoheterotrophs

Phenol removal efficiency

Anoxic degradation of phenol by different enriched cultures

Phenol removal kinetics with different media compositions

Anoxic Degradation of different phenol concentrations by enriched culture

Anoxic growth curve for phenol degradation

Growth of acclimated denitrifying cultures on different concentrations of phenol

Specific growth rate versus substrate concentration

Determination of $\mu_{\text{max}}$ by semi-continuous approach

SEM photographs of granules at different magnifications
Fig 6.11 Phenol degradation rate for anoxic granules 124
Fig 6.12 Specific phenol utilization rate by anoxic 125
granules
Fig 6.13 Phenol degradation by anoxic granules (U.V. 127
spectra)
Fig 6.14 Phenol removal by anoxic sludge under 129
anoxic and aerobic conditions in 5
consecutive cycles
Fig 6.15 Effect of easily assimilable carbon on phenol 131
removal by anoxic granules
Fig 6.16 HPLC profile of m-cresol degradation by 135
phenol adapted granules
Fig 6.17 HPLC profile of p-cresol degradation by 136
phenol adapted granules
Fig 6.18 HPLC profile of phenol degradation by phenol 137
adapted granules
Fig 6.19 HPLC profile of p-hydroxy benzoic acid 138
degradation by phenol adapted granules
Fig 6.20 Removal of Phenol in the presence of p- 142
Hydroxy benzoic acid by phenol adapted
granules
Fig 6.21 Removal of p-Hydroxy benzoic acid in 143
presence of Phenol by phenol adapted
granules
Fig 6.22 Removal of Phenol and p-cresol in combination by phenol adapted granules

Fig 6.23 Removal of Phenol and m-cresol in combination by phenol adapted granules

Fig 6.24 Removal of Catechol in presence and absence of phenol by phenol adapted granules

Fig 6.25 Illustration of sequential batch reactor, biotreatment technology

Fig 6.26 Experimental conditions for operating SBR at different cycle lengths

Fig 6.27 Phenol removal in different cycle lengths

Fig 6.28 Nitrate removal in different cycle lengths

Fig 6.29 COD removal in different cycle lengths

Fig 6.30 Nitrite accumulation in different cycle lengths

Fig 6.31 HPLC profile for the utilization of phenolics by phenol adapted granules in SBR