## CONTENTS

<table>
<thead>
<tr>
<th>Synopsis</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>xv</td>
</tr>
</tbody>
</table>

### CHAPTER I INTRODUCTION 1-26

1.1 Local Effects in the $\delta^{18}O$ of Foraminifera 5-6

1.2 $\delta^{18}O$ Cycle in the Ocean Cores: Causative Mechanism 7-8

1.3 Carbon Isotope Records of Climatic Change 8-12

1.4 Review of Earlier Work in the Northern Indian Ocean 12-24

1.5 Plan of the Present Study 24-26

### CHAPTER II EXPERIMENTAL TECHNIQUES 27-53

2.1 Collection of Sediment Cores 28-30

2.2 Separation of Foraminifera and Estimation of the Coarse Fraction 30-31

2.3 Extraction of CO$_2$ from Foraminiferal Calcite 31-39

2.4 Mass Spectrometric Measurements, Their Analytical Precision and Reproducibility 39-46

2.5 Effect of Sample Pretreatment on $\delta^{18}O$-$\delta^{13}C$ Values 46-51
## Estimation of Calcium Carbonate

### Radiochemical Analysis of Sediments for U-Th Series Isotopes

### 14C Measurements

### RESULTS AND DISCUSSION

#### Geochronological Studies of the Sediment Cores

1. **Determination of Accumulation Rates from $^{14}$C and $^{818}$O Stratigraphy**
   - Pages 55-57
2. **Determination of Accumulation Rates based on $^{230}$Th(excess) Method**
   - Pages 57-63
3. **Intercomparison of Sedimentation Rates Calculated by Different Methods**
   - Pages 63-67

#### Oxygen Isotope Studies of the Ocean Cores

1. **Sample Variability and Reliability of Isotopic Data as Climatic Indicators**
   - Pages 67-75
2. **Long Term $^{818}$O Stratigraphy**
   - Pages 75-77
3. **Modification of $^{818}$O Cycles and Amplitudes**
   - Pages 77-78
II.2.4 Mechanisms for Modifications of $\delta^{18}O$ Amplitude

II.2.4.a Bioturbation or benthic mixing

II.2.4.b Dissolution and $\delta^{18}O$ amplitude

II.2.5 The Holocene-LGM $\delta^{18}O$ Amplitude

II.2.5.a Modern hydrological conditions of Northern Indian Ocean related to foraminiferal $\delta^{18}O$

II.2.5.b Climate during the last glacial maximum

II.2.6 High Resolution $\delta^{18}O$ Study of the Cores from the Arabian Sea and the Equatorial Indian Ocean

II.2.6.a Uranium analysis and bottom conditions

II.2.6.b Reliability of the $^{14}C$ ages

II.2.6.c High resolution $\delta^{18}O$ studies in SK-20-185 and its climatic implication

II.2.6.d Comparison with the high resolution stratigraphy of SK-20-186

II.2.6.e Mechanism of freshwater intrusion at the site of SK-20-185 during LGM
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.3</td>
<td>Carbon Isotope Studies of the Ocean Cores</td>
<td>114-134</td>
</tr>
<tr>
<td>III.3.1</td>
<td>Calcium Carbonate and Palaeoproductivity</td>
<td>117-124</td>
</tr>
<tr>
<td>III.3.2</td>
<td>Upwelling, Productivity and $\delta^{13}C$</td>
<td>124-127</td>
</tr>
<tr>
<td>III.3.3</td>
<td>Chronology of Productivity Change in the Arabian Sea</td>
<td>127-130</td>
</tr>
<tr>
<td>III.3.4</td>
<td>Periodicities in the Climatic Indices and their Interrelationship</td>
<td>131-134</td>
</tr>
<tr>
<td>CHAPTER IV</td>
<td>CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK</td>
<td>135-139</td>
</tr>
<tr>
<td>IV.1</td>
<td>Conclusions</td>
<td>135-137</td>
</tr>
<tr>
<td>IV.2</td>
<td>Recommendations</td>
<td>138-139</td>
</tr>
<tr>
<td>References</td>
<td></td>
<td>140-164</td>
</tr>
</tbody>
</table>