Insoluble oxide product formation and its effect on coke dissolution in liquid iron

Michael Wallace Chapman
University of Wollongong


This paper is posted at Research Online.
NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.
Appendix X - Generic A → Product $n$th order reactions

The change in melt composition can be represented by the generic rate equation

$$\frac{\text{d}[A]}{\text{d}t} = -k[A]^n$$

Where $[A]$ represents a solute in the melt

$k = \text{generic rate constant}$

$n = \text{order of reaction}$

The integrated form of the general rate equation can be represented as a $0^{\text{th}}$, $1^{\text{st}}$ and $2^{\text{nd}}$ order as given in Table X-1

<table>
<thead>
<tr>
<th>$n$</th>
<th>Integrated form of rate equation</th>
<th>$k$ evaluated as</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$[A] = [A_o] - kt$</td>
<td>slope of $[A]$ vs time</td>
</tr>
<tr>
<td>1</td>
<td>$\ln[A] = \ln[A_o] - kt$</td>
<td>slope of $\ln[A]$ vs time</td>
</tr>
<tr>
<td>2</td>
<td>$\frac{1}{[A]} = \frac{1}{[A_o]} + kt$</td>
<td>slope of $1/[A]$ vs time</td>
</tr>
</tbody>
</table>

![Generic nth order plots](image)

Figure X-1 Generic nth order plots for the coke dissolution data in the Fe-2%[C] melt at 1500°C. a) Generic 0th order, b) Generic 1st order and c) Generic 2nd order