INTRODUCTION

A metal’s heat capacity (Cp) is an important technical specification. It is especially true for heat transfer simulation, whether it concerns the metal’s production, transformation or use. You can use high temperature calorimetry to accurately measure the variations of Cp with temperature.

EXPERIMENT

CALVET DC was used with its heat flux DSC module.
Sample : steel
Atmosphere: helium
Sample size : diameter 5.0 mm, height =15 mm.
The sample was placed in a platinum crucible + alumina sleeve.
The alumina sleeve protects the sample from alloying with the platinum crucible. The platinum crucible is used to catch the sample’s radiations at high temperature. Indeed, alumina is transparent to radiations at high temperature.
The determination of Cp requires three successive heating:
- without any sample
- with a piece of alumina, used as a standard reference material
- with the steel sample
The three heating have been run from ambient up to 1550°C at 10 K/min.

RESULTS AND CONCLUSION

The heat capacity of the steel sample was calculated from the experimental curves.
The Cp could be calculated also in the liquid state at 1550°C.

<table>
<thead>
<tr>
<th>Temp. / °C</th>
<th>Cp / J·g⁻¹·K⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0.50</td>
</tr>
<tr>
<td>4000</td>
<td>0.58</td>
</tr>
<tr>
<td>6000</td>
<td>0.73</td>
</tr>
<tr>
<td>9000</td>
<td>0.63</td>
</tr>
<tr>
<td>1000</td>
<td>0.65</td>
</tr>
<tr>
<td>1200</td>
<td>0.68</td>
</tr>
<tr>
<td>1400</td>
<td>0.75</td>
</tr>
<tr>
<td>1550</td>
<td>0.80</td>
</tr>
</tbody>
</table>

IMPROVED HEAT CAPACITY AND HEAT MEASUREMENTS WITH THE CALVET DC

- heat flux DSC up to 1600°C – for accurate heat capacity, heat, and glass transition measurements
- drop calorimetry up to 1500°C – for accurate heat capacity, heat of dissolution and heat of formation measurements

VARIED ATMOSPHERE CONDITIONS
possible with multiple carrier and reactive gas options

CONVENIENCE AND ECONOMY

with one instrument and furnace for TGA, TG-DSC, TGDTA, DSC, DTA, and TMA up to 1600°C