

Heat capacity of a steel

INTRODUCTION

A metal's heat capacity (C_p) is an important technical specifications. 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 C_p 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.

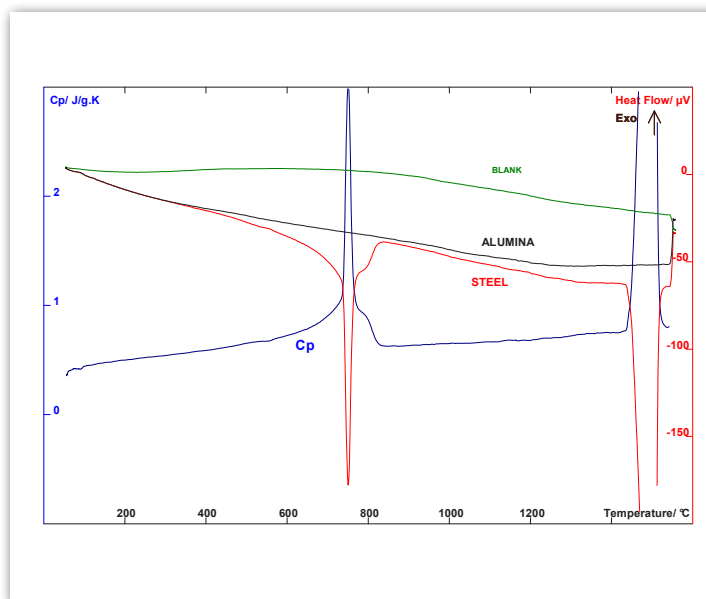
The sample was placed in a platinum crucible + alumina sleeve.

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 C_p 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 C_p could be calculated also in the liquid state at 1550°C.

Temp. / °C	C_p / J.g ⁻¹ .K ⁻¹
2000	0.50
4000	0.58
6000	0.73
9000	0.63
1000	0.65
1200	0.68
1400	0.75
1550	0.80

CALVET DC

20°C to 1500°C



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

VARIETY OF 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