CAL2K – APPLICATION NOTE
C1.3 : Coal

ASTM D5865-90
ISO 1928:1995

Introduction

This application note focuses on the determination of the calorific value of coal in accordance with the above International Standards (ASTM and ISO).

Background

Determining the calorific value (CV) of coal is the most widespread use of calorimeters. The CV value of coal is used as one of the parameters for determining the quality of coal.

Equipment Required

The following is a list of the equipment required to conduct this application.

- CAL2K system and accessories (eg: crucibles, firing cotton, benzoic acid)
- CAL2k vessel
- CAL2k filling station
- CAL2k cooler
- Balance

Sample preparation

The coal and coke used for the determination of calorific value shall be the analysis sample, ground to pass a test sieve with an aperture of 212 µm. In some circumstances, it has been shown that a maximum particle size of 250 µm is acceptable for low and medium rank coals.

The sample shall be well mixed and in reasonable moisture equilibrium with the laboratory atmosphere. The moisture content shall either be determined on samples weighed within a few hours of the time that samples are weighed for the determination of calorific value, or the sample shall be kept in a small, effectively closed container until moisture analyses are performed, to all appropriate corrections for moisture in the analysis sample.

Determination of the moisture content of the analysis sample shall be carried out by one of the methods specified in ISO 331 and ISO 687.

Method

The vessel must be calibrated and checked before any determinations can be carried out. (See separate application note).

Running a CV

- Clean the crucible
- Ensure balance pan is clean
- Place crucible on balance pan
- Weigh sample into crucible, ensure not to spill onto the pan
- Transfer mass to CAL2k Calorimeter
- Fit firing cotton to firing wire
- Insert crucible into outside electrode
- Ensure cotton touches sample
- Screw down cap
- Fill with Oxygen using the CAL2k Filling station
- Place vessel into CAL2k chamber
- Select SID and MASS
- Close lid and wait until "done" appears
- Record the result
- Open lid
- Remove vessel
- Defill using defiling cap
- Place vessel in cooler and close doors
- When doors open remove vessel
- Open vessel, clean electrodes, cap and body
- Use a paper towel to clean the inside of the vessel body
- Clean crucible
- Ready to start another determination

Results

Using the CAL2K Calorimeter, these are a typical set of results obtained:

Coal

	Mass	Result MJ/kg
0.5040	29.469	
0.4928	29.478	
0.4988	29.454	
0.4989	29.491	
0.4988	29.503	
0.5014	29.453	
0.4900	29.467	
0.4989	29.459	
0.4950	29.501	
0.5008	29.479	

Average:	29.475 MJ/kg
Standard Deviation:	0.0183 MJ/kg
% Relative standard deviation:	0.0621%

Conclusion

Determining the calorific value of coal is the most common application of the CAL2k system. Coal is mined and used throughout the world and CV determinations are required accordingly.