



CAL2K – APPLICATION NOTE

C1.6 ALTERNATIVE ENERGY SOURCE SAMPLE – WOOD

INTRODUCTION

Many institutions are doing research and development on alternative energy source.

Alternative energy refers to energy sources, which are not based on the burning of fossil fuels or the splitting of atoms. The renewed interest in this field of study comes from the undesirable effects of pollution (as witnessed today) both from burning fossil fuels and from nuclear waste byproducts. Fortunately there are many means of harnessing energy, which have less damaging impacts on our environment.

Part of the research involves determining the calorific value (energy content) of the alternative energy source.

Institutions performing this type of research include:

- Universities
- Research Facilities
- Government or private industries

SAMPLE PREPARATION

Many samples once they have been ground into a powder will not easily press into tablets using a pellet press, because the fibres will not adhere to each other irrespective of the pressure exerted during the pelleting process.



An alternative method to ignite the sample without it splattering during the burning process is to place the powder (ground sample) inside a gelatine capsule. The capsule ignites easily thus causing the sample to ignite while confining the sample during the ignition phase.

The calorific value of each batch of gelatine capsules must be determined. This value along with the mass of the capsule is used in the spike application of the CAL2k.

The gases released when burning wood samples destroy the o-rings of the lid assembly. Depending on the type of sample this can occur even after one determination.



To prevent this, a special wood sample centre electrode **MUST** be used. Secondly the vessel pressure **MUST** be reduced from 3000KPa to 1500KPa.



SPIKE METHOD

Turn spiking "ON" on the CAL2k. A selection of 10 capsules must be analysed as normal samples. From the 10 results an average calorific value for the gelatine capsules can be determined. This value is then used as the spike value in the CAL2k.

When doing a spike determination, follow this procedure:

1. Tare the balance
2. Place the capsule on the balance pan
3. Enter the mass of the capsule into the "Spike Mass" of the CAL2k.
4. Open the capsule and fill with sample, close the capsule, clean off excess sample on the outside and replace on balance pan.
5. Transfer (manually or automatically) the mass of the sample and capsule to the CAL2k.
6. **Please note: If the calorific value is very low (less than 10MJ/kg) then 2 capsules may be required per determination.**
7. Insert the capsule into the crucible, ensuring that the firing cotton touches the capsule.
8. Continue the determination in the normal manner. Remember to fill the vessel with only 1500kpa of oxygen.
9. After a determination inspect the inside of the vessel for any signs of splattering and also check the crucible for any un-burnt sample. If there are signs of either then discard the result.
10. The result displayed already has the energy value of the capsule removed from it.
11. After every determination clean the inside of the vessel and the crucible before starting the next determination.
12. Also inspect all the o-rings for any signs of acid attack.



RESULTS

Wood (Sawdust)



RESULT	MASS	SID	DATE	BN	INIT DRIFT	FIRING TEMP	AMBIENT TEMP	RS	FINAL TIME
19.029	0.1715	70	09/01/2009	2	-0.0004	25.71	25.21	OK	3.1
18.916	0.1757	72	09/01/2009	2	0.0005	22.95	25.43	OK	3.1
19.346	0.1506	73	09/01/2009	1	0.0010	21.44	25.45	OK	3.1
19.037	0.1558	74	09/01/2009	2	0.0017	21.84	25.51	OK	3.1
18.553	0.1475	76	09/01/2009	1	0.0002	25.21	25.55	OK	3.1



Manufacturers of CAL2K/CAL3K Oxygen Bomb Calorimeters

19.130	0.1613	77	09/01/2009	1	0.0019	22.59	25.57	OK	3.1
Average MJ/Kg = 19.002									

CONCLUSION

The calorific value of almost any alternative energy source type can be determined. Calorific value analysis of this nature is one of many results required to determine the energy content of these substances.

