APPLICATION NOTE | DDS CALORIMETERS

C1.5 ALTERNATIVE METHOD FOR CALORIFIC MEASUREMENT OF FOOD SAMPLE – KZN UNIVERSITY CODE : B52 SEEDS

INTRODUCTION

Many institutions are doing research and development on food. The aim is to improve the nutritional value of the food. The parameters may be to compare different foods or different manufactures or to generically improve the food. Other aspects may be to improve the digestion and energy absorption of animal feeds.

Part of the research involves determining the calorific value of the food. The calorific value of a particular food is the same as the energy content of that food.

The food can be for either human or animal consumption.

Institutions performing this type of research include:

- Animal and Dairy research
- Department of Agriculture
- Universities
- Technicons
- Government or private food industries

SAMPLE PREPARATION

Many food 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 inside a gelatine capsule. The capsule ignites easily thus causing the sample to ignite while confirming 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 calorimeter.

SPIKE METHOD

Turn spiking "ON" on the calorimeter. 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 calorimeter.

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 Moves" of the calorimeter.
4. Tare the balance again with the capsule on the pan.
5. Open the capsule and fill with sample, close the capsule, clean off excess sample on the outside and replace on balance pan.
6. Transfer (manually or automatically) the mass of the sample to the calorimeter.
7. **Please note: If the calorific value is very low (less than 10MJ/kg) then 2 or more capsules may be required per determination.**
8. Insert the capsule into the crucible, ensuring that the firing cotton touches the capsule.
9. Continue the determination in the normal manner.
10. 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.
11. The result displayed already has the energy value of the capsule removed from it.
12. After every determination clean the inside of the vessel and the crucible before starting the next determination.

RESULTS

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RESULT	MASS	SID	DATE	BN	INIT DRIFT	FIRING TEMP	AMBIENT TEMP	RS	FINAL TIME
20.266	0.2583	135	5/11/2005	1	0.0009	20.6	21.0	OK	3.1
20.228	0.2694	137	5/11/2005	1	0.0010	21.3	21.4	OK	3.1
20.426	0.2826	138	5/11/2005	2	0.0017	20.5	21.7	OK	3.1
20.388	0.2571	139	5/11/2005	1	0.0010	21.3	21.8	OK	3.1
20.445	0.3075	141	5/11/2005	2	0.0006	21.9	22.3	OK	3.1
20.049	0.2966	142	5/11/2005	2	-0.0012	25.4	22.6	OK	3.1
Average MJ/Kg = 20.300									

CONCLUSION

The calorific value of almost any food type can be determined. Calorific value analysis of a food type is one of many results required to determine the nutritional value of any food for either human or animal consumption.