APPLICATION NOTE | DDS CALORIMETERS

C1.8 COSMETIC PRODUCTS
SAMPLE – LIQUID HAIRSPRAY

INTRODUCTION
This application note focuses on burning cosmetic products such as liquid hairspray, shampoos, lotions etc. The reason behind such analysis is determine the chemical safety characters such as flammability, explosion and others. The reason behind this analysis is for airline inspection and the limitations enforced by the authorities to liquid substances which are allowed on airlines.

EQUIPMENT REQUIRED
The following list of equipment will be required to conduct this application:

- DDS Calorimeter System
- Crucibles
- Firing Cotton
- Syringe
- Cellophane Tape
- Scalpel

OVERVIEW
The procedure is similar to that for ordinary fuel oils (see Application Note – C1.2).

The mass and Calorific Value (CV) of the cellophane tape are used as a spike value and this is automatically deducted from the result.

The firing cotton is placed on top of the cellophane.

PROCEDURE


1. Calibrate the vessel using 0.5g benzoic acid tablets.
2. Verify calibration using 0.5g benzoic acid tablets.
3. Place the clean crucible on the balance and tare.
4. Remove the crucible and cover it with cellophane tape, ensuring a firm seal around the edge.
5. Cut the excess tape from around the edge using a scalpel.
6. Make a small, bent flap on the top of the cellophane cover with a piece of cellophane tape. This will later cover the hole made by the syringe.
7. Place the crucible with the cellophane covered flap on the balance. Record the new weight (for spiking).
8. Enter this weight into “Spike Mass” and the calorific value of the cellophane tape (see Note 1, below) into “Spike Value”.
9. Turn spiking “ON”.
10. Now press “Tare” on the balance.

11. Use a syringe with a needle to insert the sample (liquid hairspray) into the crucible. Insert the needle through the cellophane. Ensure the hole from the insertion will be covered by the flap.
12. Gently press down the flap so that the insertion hole is covered.
13. Place the crucible onto the holder of the outer electrode and ensure that the firing cotton lies on top of the cellophane and touches the cellophane flap.
14. When pressurizing the vessel check that the sample has not spontaneously combusted by checking that the temperature of the vessel has not increased (do this by feeling the temperature with your fingers around the exterior of the vessel wall).
15. Continue to run the determination as a normal sample.
16. When the result is displayed the spiking factor from the cellophane tape has already been deducted.

Note 1:

Determination of the Calorific Value (CV) of cellophane tape

1. Roll up approximately 0.5g of tape and place in a crucible. Weigh this accurately, and run as a normal sample, ensuring the firing cotton touches the tape.
2. Repeat 5 (five) times.
3. Use the average of the 5 (five) readings as the Calorific Value of the cellophane tape.

For example:

Weight	Result (MJ/kg)
0.6824	39.027
0.5199	38.763
0.5234	38.776
0.5318	38.801
0.5257	38.854
	38.844 Average

RESULTS

SID	SPIKE MASS	SAMPLE MASS	RESULT
Hairspray	0.3740	0.6073	28.725
	0.0355	0.4736	25.489
	0.0383	0.6163	26.016
	0.0378	0.5561	27.455
	0.0364	0.5010	26.536
	0.0521	0.5025	21.096
	0.0560	0.5469	22.932
	0.0575	0.4559	22.976
	0.0517	0.6324	24.041
	0.0563	0.5630	25.327
Average MJ/Kg = 25.059			

CONCLUSION

Determining the calorific value of cosmetics such as liquid hairspray and shampoo is valuable in various industries and can be analyzed using a DDS bomb calorimeter. The liquid hairspray showed a high calorific value an average of 25.059MJ/Kg, which confirms that this substance can be highly flammable.