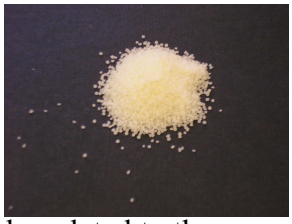
TRITON TECHNOLOGY

Application Note

Dextrose encapsulated Lemon Flavour



Summary

Flavours systems can be supplied in encapsulated forms as well as liquids. The flavour can then be released either by addition of water or by heat. The stability of the encapsulated flavour can be related to the amorphicity of the dextrose used for the encapsulation. The DS6000 DETA technique provides a very effective methodology for studying relaxation processes found in these systems.

Introduction

Dielectric **Thermal** Analysis (DETA) is a powerful analytical tool for studying relaxation processes in materials or behaviour of polar species within a material. The glass transition (Tg) is a key process in any material, and can be observed with ease by DETA for many materials. This technique provides very revealing information about these relaxations through the tan δ vs temperature data. The form of the material can be anything from a thin film, sheet material, powder or a liquid.

Dielectric measurements are the electrical analogue of dynamic mechanical measurements. The mechanical stress is replaced by an alternating voltage across the sample (a.c.field) and the alternating strain becomes the stored charge (Q) in the sample. The sample in effect behaves as a simple capacitor. Q is always measured as its derivative dQ/dt = a.c.current.

The dielectric data is obtained from phase and amplitude measurements of current and voltage to resolve the components ε^* = Capacitance with sample/Capacitance with an identical air gap.

As in DMA, tan δ is the ratio of the loss factor(e″) to the storage component (e′ , dielectric constant or permitivity) . Tan δ is plotted against temperature and glass transition is normally observed as a peak since the material will absorb energy as it passes through the glass transition. The size of this peak quantifies the amount of amorphous material present in the sample.

Equipment

DS6000 DETA
1L Dewar

Experimental Conditions

Sample: Dextrose encapsulated Lemon Flavour

Geometry: Cup and Plate electrodes
33mm x 0.689mm

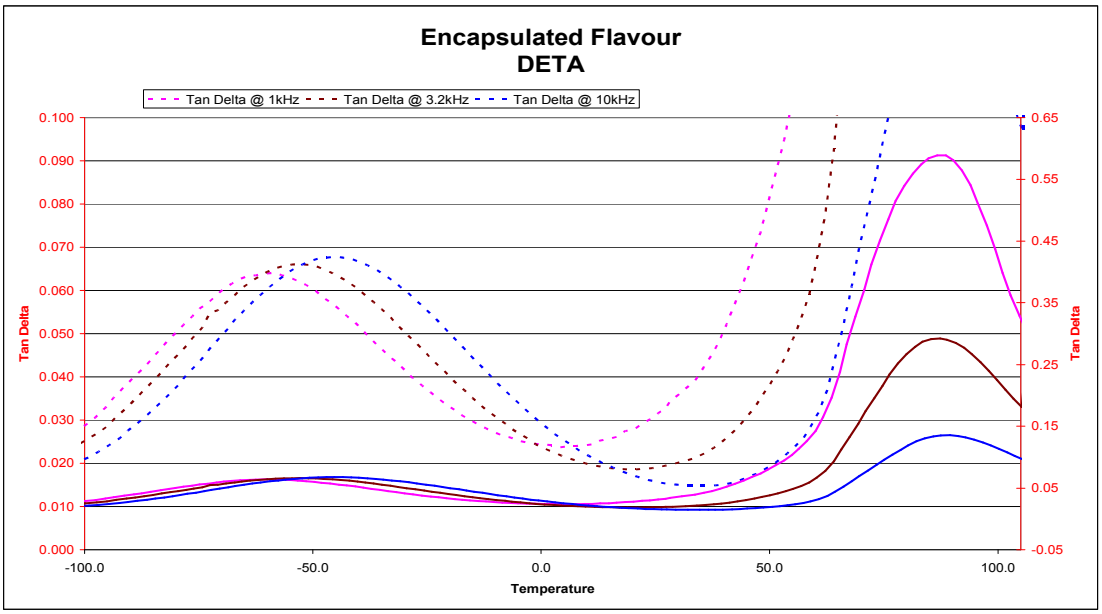
Frequency 1.0, 3.2, 10 kHz

Heating Rate 2ºC/minute

Experimental

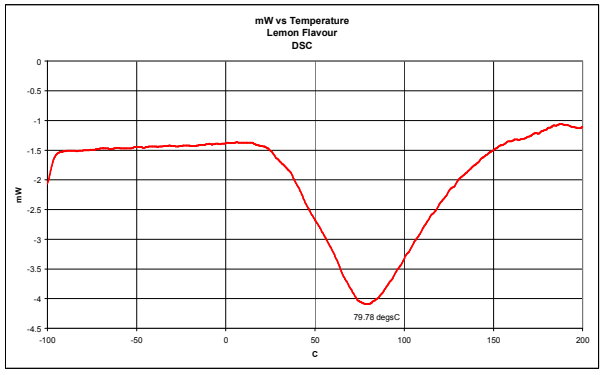
Approximately 150mg of the dextrose powder was placed in the cup electrodes of the DS6000 DETA. The sample was run from -100ºC to 100ºC at 3ºC/minute.

Results and Conclusion



The above figure provides another illustration of the capability of the DETA technique to handle powdered materials. The melting of the Dextrose can clearly be seen at around 80°C and is distinguished by the none frequency dependant behaviour. At around -50°C a relaxation is detected. It is unclear if this is a secondary relaxation or a Tg.

A common technique such as DSC is often used. The same sample run on a DSC produced the data shown to the right. No Tg was found by DSC, but there clearly is a melt with a maximum around 80ºC and these ties up well with the DETA data. It is clear that a relaxation process is present from DETA data although the spacing of the frequency shifts mean that it is not certain if the process is a Glass Transition (Tg) or a beta process. Further work is required to resolve this.



TRITON TECHNOLOGY
3 The Courtyard, Main Street, Keyworth, Nottinghamshire, NG12 5AW, United Kingdom
www.triton-technology.co.uk, Tel. +44 (0) 115 937 5555, Fax. +44 (0) 115 937 6581