



Hygroscopicity of Japanese Green Tea Powder

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This Application note describes the use of DVS technique for the stability study of food powders.

Introduction

The water uptake in food products is key to determining their stability. In many cases, excess water uptake will lead to caking, dissolution or even mould growth. The Dynamic Vapour Sorption (DVS) machine enables real time measurements to be undertaken of the water sorption kinetics on food materials over a wide range of relative humidities (from 0% RH to 98% RH) and temperatures .

Method

The samples were analysed on a DVS Advantage automated vapour sorption instrument at 25°C. The samples were initially dried for 3 hours under a continuous flow of air to establish the dry mass. The relative humidity was increased from 0% to 80% RH and then decreased in a similar manner.

Results

Some typical water sorption data for a Japanese green tea powder “kumono shiro maccha” is outlined in figure 1.

The blue line indicates the relative humidities requested and the red line shows the percentage changes in mass due to either water migration into the sample or out of it. The kinetics of

moisture sorption are very well shown by this type of test.

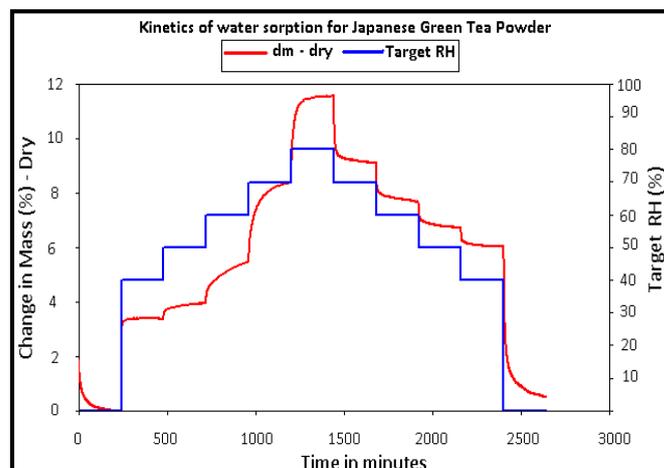


Figure 1. Kinetics of water vapour sorption for green tea powder at 25°C

During the 80% RH step, the green tea takes up nearly 12% moisture but gives virtually all this back during the final 0% RH stage.

The data can be converted to water sorption isotherms and this is shown below in figure 2. The water sorption isotherms show the substantial hysteresis in the product: it takes up water at any given relative humidity much more quickly than it is released. An understanding of the hysteresis phenomenon can help with prediction of the shelf life of the product.



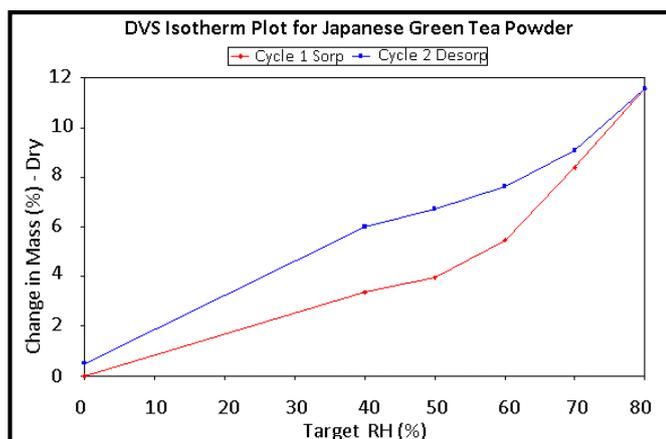


Figure 2 Water sorption isotherms for green tea powder at 25 °C

An additional feature with the DVS instrument is the video camera accessory. This is positioned underneath the sample and is used to take high quality video pictures of the product while it is exposed to the relative humidities. It is an excellent way to characterise product stability during the relative humidity cycle and can reveal problems with product stability such as agglomeration.

Conclusion

This short study on the stability of Japanese green tea powder shows how the DVS can be used to characterise the stability of this type of food powder.

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