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DVS Application Note 23

# The Water Sorption Properties of Ramyun Noodles

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***This paper demonstrates the application of DVS equipped with a video microscope to characterise the stability of food materials at different humidities.***

## Introduction

The measurement of water uptake in oriental noodles is vital for determining their stability and eating quality. In many cases, excess water uptake will lead to poor texture, dissolution or even mould growth. The Dynamic Vapour Sorption (DVS) machine permits real time measurement of the water sorption kinetics on food materials over a wide range of relative humidities (from 0%RH to 98%RH) and temperatures (from 5°C to 50°C). This information can be used to help in the rational design of food products.

## Method

The samples were analysed on a DVS Advantage automated vapour sorption instrument at 25ºC. 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 Korean brand of Raymun Oriental Style Noodle are shown in the results section. These are dried noodles and consist of wheat flour, palm oil, potato starch and salt.

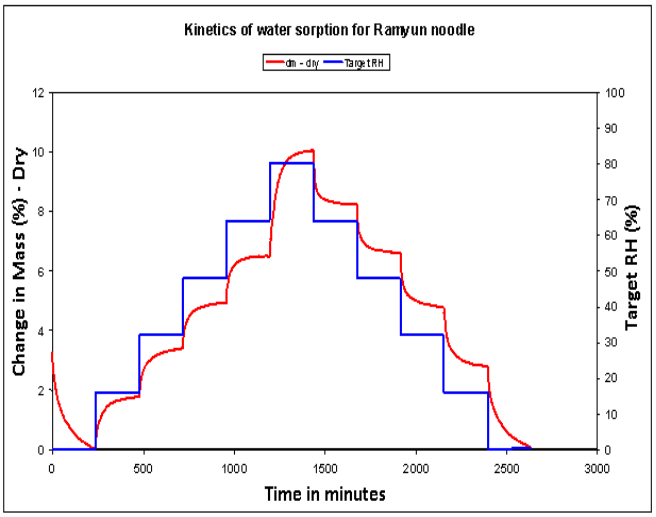


Figure 1. Kinetics of water vapour sorption for Korean Ramyun noodle at 25°C.

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. This type of test very well shows the kinetics of moisture sorption. The initial moisture content was at least 3% as shown by the first dehydration step. During the 80% RH stage, the previously dried noodle took up nearly 10% moisture but gives all of this back during the final 0% RH stage.





The data can be converted to water sorption isotherms as shown below in Figure 2. The water sorption isotherms show the very substantial hysteresis in the product: it takes up water at any relative humidity much more quickly than it gives it up. An understanding of the hysteresis phenomenon can help with prediction of the shelf life of the product and also the rehydration properties. This data could be used to illustrate the impact of different ingredients on the water pickup of noodles.

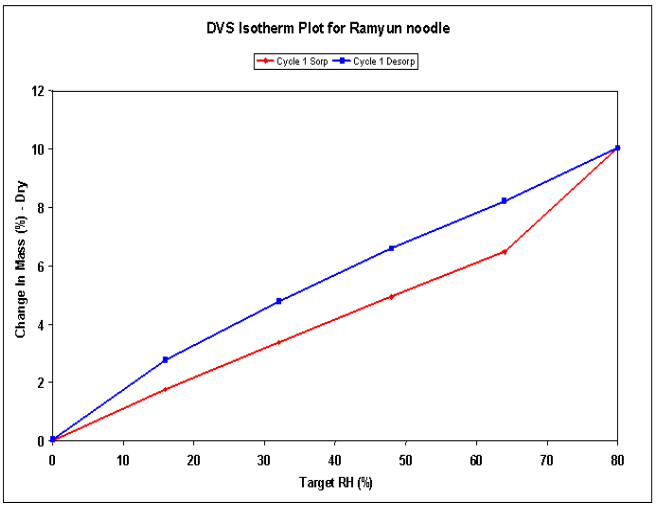


*Figure 2. Water sorption isotherms for Korean Ramyun noodle at 25℃.*

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 selected relative humidity environments. It is an excellent way to characterise product stability during the relative humidity cycle and can reveal problems with product stability such as premature swelling or the kinetics of rehydration. An example of this type of output is shown below in Figure 3.


*Figure 3. Video microscopy output on Korean Ramyun noodles at 0%RH and 25℃.*

Figure 3 shows clearly the sharp edges of the lightly crushed noodle at 0%RH. Although there is no swelling at 0% RH (or at 80% RH: not shown), this phenomenon would be clearly seen with the video camera.

## Conclusion

This short study on the stability of dried Korean noodle shows how the DVS can be used to characterise the stability of this type of food product.

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