



20. Pasta gelation studies using the Tritec Bath chamber

Instrument: Tritec 2000 Dynamic Mechanical Analyser
Sample: Spagetti
Geometry: Single Cantilevered Bending
Frequencies (Hz): 1.0

Effect of humidity on Pasta

The following experiments show an alternative use of the Bath system as a humidity chamber for studying the effect of moisture on dried Pasta as supplied by the food industry as a convenience product. This material is normally prepared by boiling the Pasta for several minutes until the product has softened. The first experiment was to simply perform a

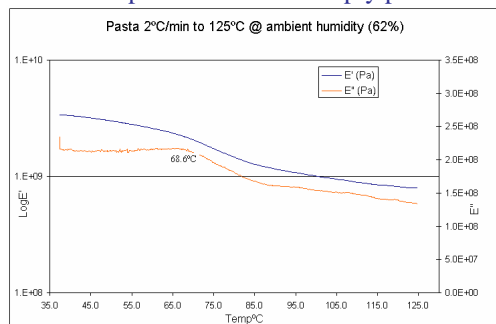


Fig.1

traditional thermal scan of the Pasta using the standard DMA oven. The sample was analysed at 1 Hz. The heating rate was 2°C/min from ambient to 125°C. The ambient humidity on the day of the experiment was 62%. The result is shown in Fig.1.

The key events are what appears to be a 'glass transition' that commences around 68°C and with a mid point around 80°C.

The next experiment was to repeat the thermal scan but using the Bath instead of the standard oven. The Bath was used as a chamber to provide 100% humidity. The sample was **not** immersed in water.

The result is shown in Fig.2.

Examination of the data obtained at 100% humidity indicates that there is still a 'glass

transition' apparent at approximately 66°C onset and 77°C mid point. These values

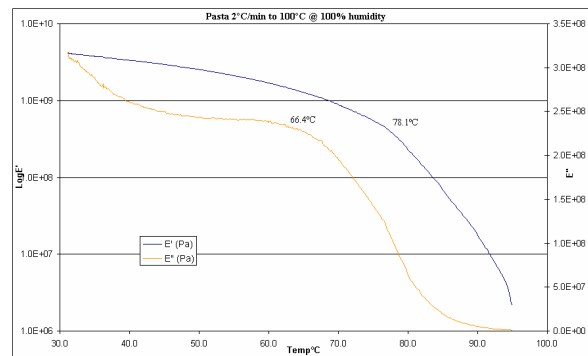


Fig.2

appear to be slightly lower than those obtained at ambient humidity. This infers a slight plasticisation of the material with the higher humidity. Another interesting effect is the behaviour of the E' data. Note that this clearly drops at a distinctly different rate at the Tg mid point (77.1°C). This infers a second effect tied to Tg occurs at this temperature.

The picture becomes clearer with the final experiment, again with the Bath as an environmental chamber and with the sample being analysed at 100% humidity. This time, instead of a thermal scan, the sample is analysed by ramping to 50°C and then held isothermally for 75 minutes. The results of this experiment are shown in Fig.3



20. Pasta gelation studies using the Tritec Bath chamber

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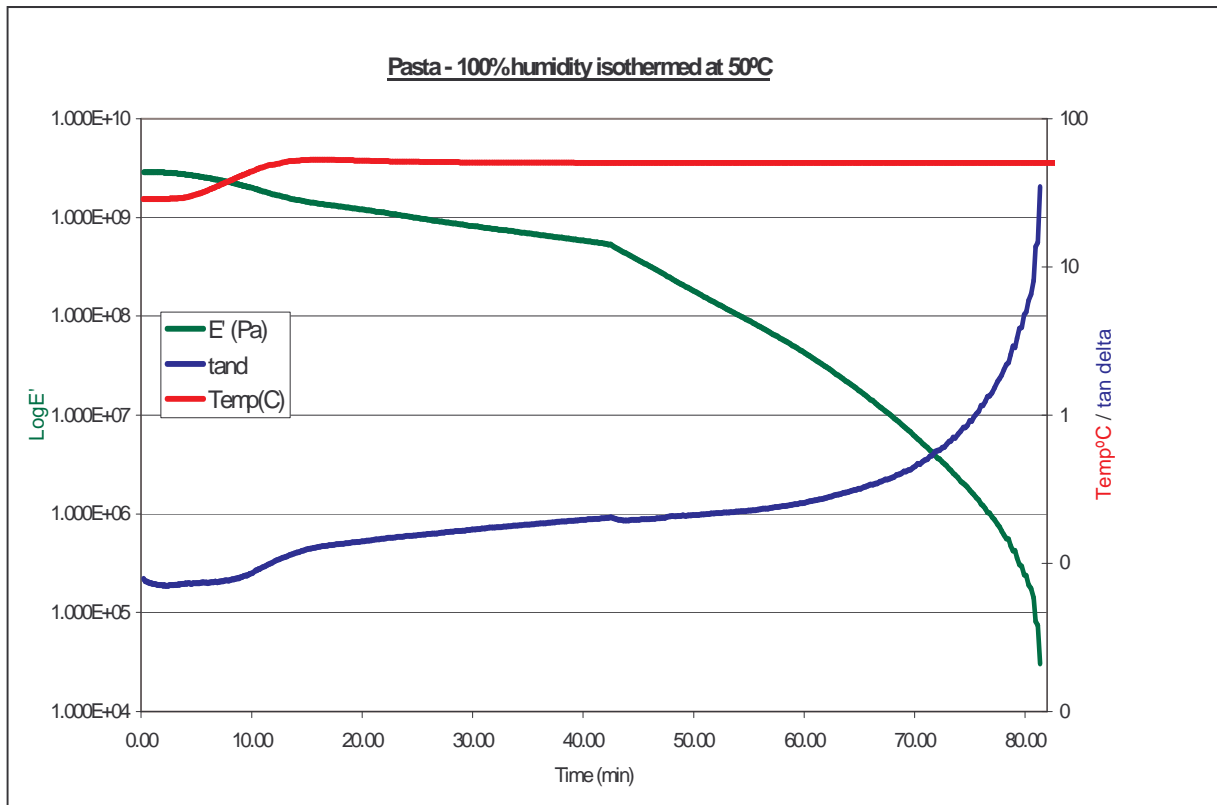


Fig.3

The data here shows the onset of the 'Tg' but as the Pasta sample was held below the onset temperatures found in the previous experiments, we see only a slow decay of the E' data until 40 minutes has passed. At this point we see a clear and sudden change in the rate of decay of the E' data and a corresponding increase in tan delta. This appears to indicate that the sample is 'plasticised' by the environment to the point where the 'Tg' mid point is reached after 40 minutes. At this point, the sample starts to 'gel' and soften at a steady rate. The same effect can be seen in Fig.8 at around 78°C in the E' data. We are seeing in effect, the same process in the sample.