Overview:
A leading manufacturer of tortilla chip snack foods wants to increase its current shelf life from 16 weeks to 36 weeks. Testing will include an accelerated shelf life study to analyze packaging material changes and the impact of M.A.P. Nitrogen gas flush.

The manufacturer supplied product samples packaged in various film structures plus samples that have been nitrogen gas flushed in one particular film.

Testing Proposal:
1) All samples were stored at accelerated/elevated temperature & humidity conditions, approximately 110F and 90% - 100% RH for a period of about 5 – 6 weeks. Test samples were pulled from storage weekly and tested for the following:
   a) Water Activity
   b) Texture
   c) Oxidation of Fats
   d) Oxygen Head Space content
   e) Moisture Content
   f) Human Sensory for taste, odor, color and appearance

2) The data collected determined the rates of change for each test parameter at the accelerated conditions. This data was used to accurately predict the rates of change at lower storage conditions and subsequent shelf life codes were established.
Shelf Life:

To predict the end of shelf life, a $Q_{10}$* value was determined. For this product the $Q_{10}$ value was 2.19 based on rates of moisture change at 45°C and 25°C. Texture measurements and sensory evaluation indicate that end of shelf life is reached at a moisture level of 2.5%. At this moisture level the chips were tough, chewy, and had a stale taste. Based on this end of shelf life parameter the predicted shelf life at 25°C (ambient) was calculated and is shown in the Table 1 below.

Table 1. Predicted shelf life at 25°C.

<table>
<thead>
<tr>
<th>Film</th>
<th>Shelf life (wks) at 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Clear Film</td>
<td>16.8</td>
</tr>
<tr>
<td>B NON MAP</td>
<td>64.6</td>
</tr>
<tr>
<td>B MAP</td>
<td>86.0</td>
</tr>
</tbody>
</table>

*Q10 is defined as the factor by which the reaction rate increases when the temperature is raised by ten degrees.

Links for more information:
Consulting & Testing Services: [www.mocon.com](http://www.mocon.com)