



TECHNICAL APPLICATION  
INFORMATION



**Use of H&F Pectins  
to Increase Temperature Stability  
in Gummy Sweets**

## USE OF H&F PECTINS TO INCREASE TEMPERATURE STABILITY

### **Gummy Sweets**

Gummy sweets with long, chewy texture are very popular especially in Europe and Northern America, but they also find a growing market in Asia, Southern America and the Middle East. Sucrose, glucose-fructose-syrup, colourings and flavourings as well as gelatine to provide texture are components of these sweets. Especially in warmer climatic regions the low melting temperature of gummy sweets which are purely gelatine based can result in stability problems during storage and transportation.

By combining gelatine and pectin, the melting temperature of these products can be increased. As the use of pectin for increasing temperature stability influences the texture of the products, it is very important to use the optimal type of pectin as well as to choose the optimal pectin dosage in order to reach the desired temperature stability and to maintain the gelatine typical texture as far as possible.

Gelatine sweets can be produced with as well as without the addition of acid thus covering a pH-range from 3.0 to 6.0. Depending on the pH-value of the products, appropriate type of pectin have to be chosen. The most often used gelatine type for gelatine sweets is type A.

When combining gelatine type A and pectin it is less important from which raw material the gelatine is produced. The best results regarding texture and temperature stability are obtained by using gelatine type A produced from pork skin.

For pure gelatine products mainly high Bloom gelatine types (250 - 280°Bloom) are used to reach a firmness as high as possible. The melting temperature is only slightly influenced by the selected Bloom. For the combination of gelatine with pectin the best results for gelled products have been obtained with a medium Bloom of 200°.

### **Gelatine/Pectin Gummy Sweets**

In the following gelatine / pectin combinations a gelatine type A made from pork skin with a gelling strength of 200°Bloom is used. A pure gelatine formulation with 7% gelatine (250°Bloom) was compared with a gelatine / pectin combination with a total dosage of 6% in which the pectin dosage is 0.15 – 0.60%.

Herbstreith & Fox KG		Recipe
<b>6% Gelatine / Pectin Combination</b>		
Product <b>Pectin Classic CS 502 / AS 511</b>		
<u>Gelatine/pectin solution</u>		<b>Manufacturing</b>
xg Gelatine type A (200°Bloom)		
yg Pectin		A Mix gelatine, pectin and 20g sucrose and stir in 190g water (95°C), let swell in a waterbath at 80°C for 30 minutes.
20g Sucrose, crystalline		B Prepare sugar solution, boil until 825g are reached and cool down to approx. 100°C.
190g Water (95°C)		C Add gelatine/pectin solution.
<u>Sugar solution</u>		D Add colourings and flavourings.
440g Glucose-fructose-syrup (9% fructose, 31% glucose, 38% maltose)		E Add citric acid solution and deposit in dried starch.
380g Sucrose, crystalline		F Let gel for approx. 20 hours at 25°C.
30g Water		
Colourings, flavourings		
25ml Citric acid solution 50%		
Soluble solids:	78%	
pH-value:	3.0 - 3.3	

### Increasing Melting Temperature / Influence on Texture

With higher pectin dosages the melting temperature of the products increases from 38°C up to 50°C (with 0.6% pectin dosage). The firmness of the products increases – depending on the type of pectin – more or less thus reaching a higher

firmness with 0.6% Pectin Classic CS 502 and 5.4% gelatine 200°Bloom than with 7% gelatine 250°Bloom, the gum elasticity of the products however decreases. A higher gum elasticity with slightly lower firmness can be reached with Pectin Classic AS 511 in the same dosage.

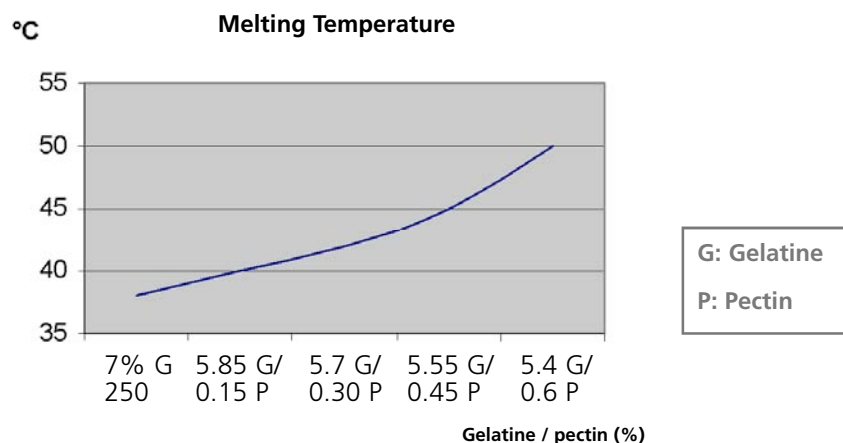


Fig. 1: Increasing the melting temperature of gelatine products

Gum sweets after 7 days: Storage at 50°C for 24 hours



Fig. 2: 7.0% Gelatine type A 250°Bloom



Fig. 3: 5.4% Gelatine type A 200°Bloom  
0.6% Pectin Classic CS 502

### Texture Assessment / Firmness and Gum Elasticity

The texture assessment is done using the Texture Analyser TA-XT2i after 24 hours at 20°C.



#### Firmness and Gum Elasticity

Method:	hold for defined time
Measurement:	force in compression
Gauging member:	cylinder d=12.5mm
<b>Phase 1</b>	
Distance:	15mm
Speed:	1mm/s
Measurement force 1	= Firmness (PE)
<b>Phase 2</b>	
Holding time:	60s
Measurement force 2:	
Force 2/force 1*100	= Gum elasticity (%)

Fig. 4: Texture Analyser TA-XT2i

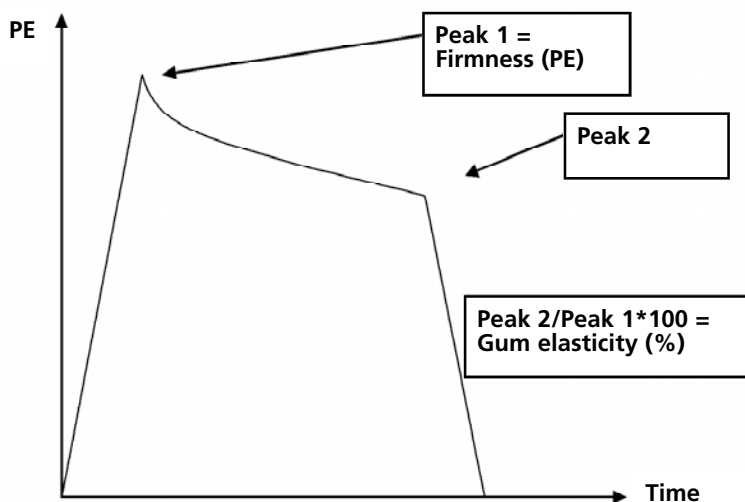


Fig. 5: Gradient from Texture Analyser TA-XT2i

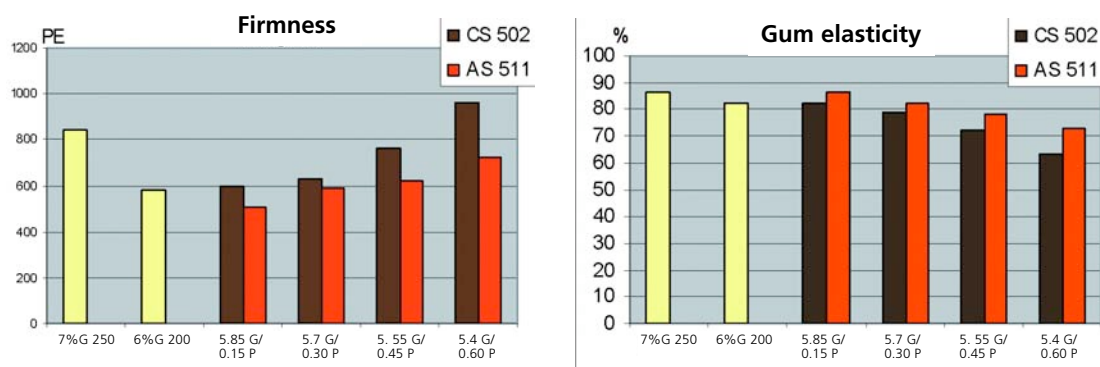


Abb. 6 + 7: Change of texture (firmness and gum elasticity) with increasing pectin dosage; Pectin Classic CS 502 compared with Pectin Classic AS 511

Gelatine	Firmness	Gum elasticity			T <sub>Melt</sub>
7.0% Gelatine 250°Bloom	840PE	86.3%			38°C
6.0% Gelatine 200°Bloom	580PE	82.6%			38°C
	Classic CS 502		Classic AS 511		
Gelatine/Pectin 6%	Firmness	Gum elasticity	Firmness	Gum elasticity	T <sub>Melt</sub>
5.85% Gelatine 200°Bloom 0.15% Pectin	597PE	82.2%	512PE	86.2%	40°C
5.70% Gelatine 200°Bloom 0.30% Pectin	630PE	78.6%	590PE	82.4%	42°C
5.55% Gelatine 200°Bloom 0.45% Pectin	760PE	72.3%	620PE	78.4%	45°C
5.40% Gelatine 200°Bloom 0.60% Pectin	960PE	63.4%	725PE	72.6%	50°C

With a pectin dosage of 0.7% and more the melting temperature increases to more than 50°C. The texture of the products is dominated more and more by the pectin, and with a pectin dosage of 1.2% or more the gelatine typical texture is hardly still recognizable. That means the gum elasticity becomes lost, the firmness increases continuously with increasing pectin dosage.

Gelatine	Firmness	Gum elasticity	T <sub>Melt</sub>
7.0% Gelatine 250°Bloom	840PE	86.3%	38°C
5.4% Gelatine 200°Bloom 0.6% Pectin Classic CS 502	960PE	63.4%	50°C
4.8% Gelatine 200°Bloom 1.2% Pectin Classic CS 502	1577PE	18.2%	>70°C
4.2% Gelatine 200°Bloom 1.8% Pectin Classic CS 502	2024PE	16.4%	>70°C
3.6% Gelatine 200°Bloom 2.4% Pectin Classic CS 502	2593PE	15.5%	>70°C
2.5% Pectin Classic CS 502	3560PE	11.4%	>70°C

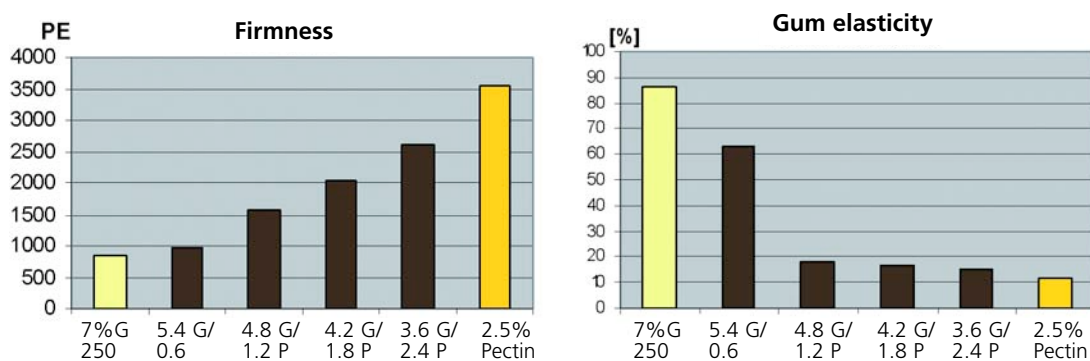


Fig. 8 + 9: Change of texture (firmness and gum elasticity) with increasing pectin dosage: Pectin Classic CS 502

#### H&F Pectins to increase melting temperature

Recommendations for gummy sweets with temperature stability up to 50°C

Product	pH-value	H&F Pectin	Dosage Gelatine / Pectin
Fruit gums	pH 3.0 - 3.7	Classic CS 502 Classic AS 511	5.40% / 0.60%
Liquorice gums / Foamed candy	pH 3.8 - 5.5	Classic CS 025-A	5.40% / 0.60%

Herbstreith & Fox KG	Recipe
<b><i>Fruit gums with low pH-value</i></b>	
Product <b>Pectin Classic CS 502 / AS 511</b>	
6g Pectin (= 0.6%) 400g Sucrose, crystalline 440g Glucose-fructose-syrup (9% fructose, 31% glucose, 38% maltose) 54g Gelatine type A (200°Bloom) 220g Water Colouring, flavouring 25ml Citric acid solution 50%  Soluble solids: 77 - 78% pH-value: 3.0 - 3.2  <u>Liquorice gum with high pH-value:</u>  Pectin Amid CS 025-A	<b>Manufacturing</b> A Mix gelatine, pectin and 20g sucrose and stir in 190g water (95°C), let swell in a waterbath at 80°C for 30 minutes. B Mix the remaining amounts of water and sucrose with glucose-fructose-syrup, boil until 825g are reached and cool down to approx. 100°C. C Add gelatine/pectin solution. D Add colouring and flavouring. E Add citric acid solution. F Fill into pre-heated (approx. 100°C) insert and deposit in form powder starch. G Let gel for approx. 20 hours at 25 °C.

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<b><i>Liquorice gum with high pH-value</i></b>	
Product <b>Pektin Amid CS 025-A</b>	
6 g Pektin (= 0,6 %) 380 g Saccharose, kristallin 440 g Glukose-Fruktose-Sirup (9 % Fruktose, 31 % Glukose, 38 % Maltose) 54 g Gelatine Type A (200°Bloom) 220 g Wasser 20 g Lakritzpulver 1,5 g Aktivkohlepulver  TS-Gehalt: 77 - 78 % pH-Wert: 4,8 - 5,0	<b>Herstellung</b> A Gelatine, Pektin und 20 g Saccharose mischen und in 190g Wasser (95°C) einrühren und im Wasserbad bei 80°C für 30 Minuten quellen lassen. B Restmenge Wasser, Saccharose und Glucose-Fruktose-Sirup mischen, auf 785g auskochen und auf ca. 100°C abkühlen lassen. C Lakritzpulver und Aktivkohle mit 20 g Wasser mischen und auf 80°C erhitzen. D Lakritz-Mischung zugeben. E Gelatine-Pektin-Lösung zugeben. F In auf ca. 100°C vorgeheizten Gießtrichter füllen und in Formpuderstärke gießen. G Für ca. 20 Stunden bei 25° C gelieren lassen.