WACKER

CREATING TOMORROW'S SOLUTIONS

INFO SHEET I CHEWING GUM I CAPIVA® S

CAPIVA® S RESINS FOR A NEW GENERATION OF GUM BASE

Less is More: Simplified Gum Bases with Processing and Performance Advantages

Gum base is the water-insoluble constituent of chewing gum, and the carrier for sugar, sweeteners and flavoring. With CAPIVA® S, WACKER has developed a range of new solid polyvinyl acetate resins that simplify gum-base manufacture while improving gum-base performance. CAPIVA® S gum bases can be manufactured more efficiently and feature improved flavor release. Moreover, chewing gums are less sticky and benefit from improved shelf-life.

Simplified Gum Base

Conventional gum bases are complex systems relying on the interplay of a variety of specialized ingredients to ensure the desired performance. Elastomers and rosins play a critical role, but are challenging to formulate and process. With CAPIVA® S, a simplified gum base can be produced without the use of elastomers and rosins.

Reduced Complexity

CAPIVA® S reduces the complexity of gum-base manufacturing while reducing the overall number of formulations. With no elastomer, there is no need for the associated relatively technically demanding processing steps (elastomer preparation, grinding and high-shear mixing). This significantly speeds up the process. Moreover, without the need for elastomer grinding, the gum base can be prepared without fillers. Talc or $CaCO_3$ can be added as needed later during chewing gum manufacture. This helps to reduce the overall number of gum-base formulations.

Enhanced Flavor Profile

The enhanced hydrophilic character of CAPIVA® S and the absence of elastomers improve the flavor release from the gum base. Furthermore, without elastomers and rosins, the gum base will generally display less off-taste. Therefore, the amount of flavor used in the chewing gum formulation can be reduced, i.e. less flavor is needed to achieve the same perception.

Reduced Stickiness

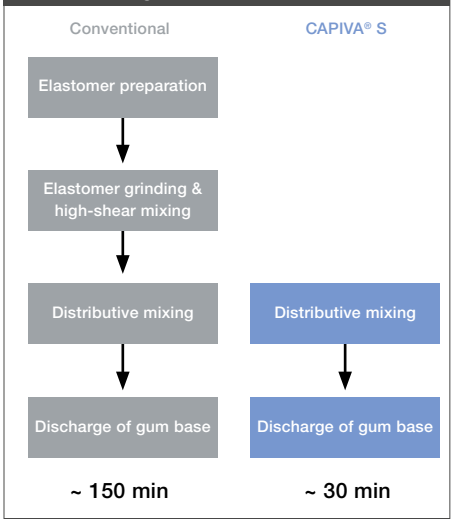
With CAPIVA® S, rosin-free gum base can be produced. Rosins are a major contributor to stickiness. A CAPIVA® S gum base displays significantly reduced surface adhesion to manufacturing equipment, reducing the work for discharging and cleaning. Furthermore, the final chewing gum formulated with a CAPIVA® S gum base is less sticky and can be removed from surfaces more easily.

More Cost Efficient

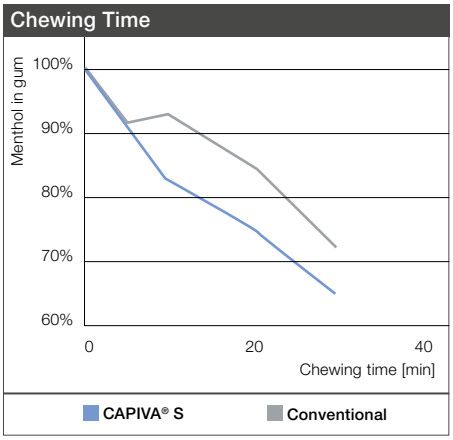
CAPIVA® S contributes to cost efficiency in several ways:

- Higher throughput due to reduced processing time
- No need for high-shear mixers due to elastomer-free formulations
- Fewer gum-base formulations due to filler-free formulations
- Less flavor needed due to improved flavor release and reduced off-taste
- Faster discharging and cleaning due to less stickiness of gum base

Manufacturing Process



Chewing Time



Sugar-free chewing gums based on sorbitol/maltitol were prepared with 1% (w/w) menthol flavor. Conventional gum base containing elastomers (butyl rubber and polyisobutylene) and rosins or an elastomer-/rosin-free CAPIVA® S gum base was used. Menthol content in chewed gum samples (5/10/20/30 min) were analyzed and quantified using GC.

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Guide Formulation Gum Base for Sugar-Free Chewing Gum

	Ingredient	Characteristics	Parts
(A)	CAPIVA® S08	VAc/VL copolymer	52.8
(B)	Triacetin	Glycerine triacetate	5.0
	Talc	Food grade	20.0
(C)	Microcrystalline wax, hard	Solidification point: 72 °C Needle penetration: 18	7.0
	Acetylated monoglycerides (ACETEM)	Emulsifier	2.5
(D)	Microcrystalline wax, soft	Solidification point: 73 °C Needle penetration: 29	7.0
	Hydrogenated vegetable fat	Melting point: 30–42 °C	3.2
	Glycerol monostearate (90%)	Emulsifier	2.5

Manufacturing Guidelines

A double-sigma-blade mixer is heated to 120–130 °C. **(A)** is added to the mixer and heated for 5–10 minutes until melted. Then **(B)** is added and the mixture is kneaded. After another 5–10 minutes, **(C)** is added to the mixture. To finalize the preparation **(D)** is added and the base is further kneaded until homogenous mixing is achieved. At the end of the process, the temperature can be reduced to 105–110 °C. The total mixing time is typically 30–40 minutes. This gum base is suitable for sugar-free chewing gum with flavor (1.2–2.0%) and food acids (~0.5%). Typical gum base content in final chewing gum is 20–35%.

Adjusting Gum Base Properties

For a firmer chew, 3–5% of CAPIVA® S can be replaced by VINNAPAS® B 60 sp or 3–5% of wax/fat can be replaced by talc. For a softer chew, 5–10% of CAPIVA® S can be replaced by VINNAPAS® B 1.5 sp or 2–5% talc can be replaced by ACETEM and/or wax/fat. For a more elastic chew, 10–20% CAPIVA® S08 can be replaced by CAPIVA® S12. For non-acid flavors, talc can be replaced by calcium carbonate.

Regulatory Classification

Gum-base regulations for individual countries apply. CAPIVA® S is already approved in North America, EMEA and many APAC countries, including China. For more detailed information on the regulatory situation in individual countries, please contact your local WACKER sales representative.

CAPIVA® S Product Properties

CAPIVA®	S08	S12
Composition	Vinyl acetate/ vinyl laurate-copolymer	Vinyl acetate/ vinyl laurate-copolymer
Viscosity[1,6] [mPas.s]	3.2–4.0	5.0–7.0
Molecular weight[2,7] [g/mol]	140,000	~175,000
Mettler softening point[3,7] [°C]	102–110	112–120
Glass transition temperature[5,8] [°C]	25	25
Supply form	Granules	Granules
Packaging	25 kg bag	25 kg bag

[1]ASTM D445-06; 10 wt % in ethyl acetate
[2]Size exclusion chromatography; PS standard; THF; 60°C, weight average
[3]ASTM 3104 Menthol
[4]Bohlin high temperature viscosity; Bohlin CVO 120, heating rate 5°C/min, parallel plates
[5]DIN EN ISO 11357-2; differential scanning calorimetry; Mettler DSC 821 E; heating rate 20 K/min
[6]For current specification please check technical data sheet
[7]The above data are given as a guideline only; they are not intended as product specifications

At a Glance: CAPIVA® S for Gum Base

- Enabling the replacement of elastomers and rosins in gum base
- Reduced complexity and increased efficiency of gum-base production
- Enhanced flavor release and reduced off-taste
- Reduced stickiness during processing and in the final chewing gum
- Already approved in North America, EMEA and many APAC countries including China

CAPIVA®

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