

# VIDOPECTINE

## Pectin in Jams, Jellies & Preserves

### Quick Reference Trouble-shooting guide



# Pectin in Jams, Jellies, Preserves Trouble-Shooting Guide

- The following guide and recommendations should assist QC, Product Development and Production staff in the identification and clarification of process/production and finished product problems and faults and give them possible solutions.
  - Page 3 – 5: **Incidents during production**
  - Page 6 – 12: **Incidents in finished product**
  - Left column: Observations, problems, incidents occurring in production or in product.
  - 2<sup>nd</sup> column: Possible reasons for the incident.
  - 3<sup>rd</sup> column: Possible causes affecting the performance of the used pectin.
  - 4<sup>th</sup> column: Possible actions to solve the problem or to prevent it in future.



Problem	Reason	Cause	Possible Action
1.1. FISH-EYES / LUMPS	Undissolved or lumped pectin	Inadequate pectin hydration	Increase mixing speed during pectin solution preparation. Add pectin slowly to water. Add pectin into vortex. Mix longer. Use water of 85°C or higher. Reduce concentration of pectin in solution (max. conc. = 7%).
		Pectin/sugar dry mix used instead of pectin solution	Mix pectin thoroughly with 5 – 10 times sugar. Wet sugar slightly before pectin is added. Add dry mix slowly to the cold batch. Add dry mix below 30°Bx to the batch. Heat slowly, give time to swell, boil for 5' before adding more sugar. Ensure vigorous stirring, if possible.
		Pectin/liquid sugar suspension used instead of pectin solution	Do not let stand until fully swollen. Reduce pectin concentration in suspension (max. conc. = 7%). Use higher solids corn syrup or fruit juice conc. (>65°Bx).
	Gel lumps	Calcium salt or citric acid added as powder instead of suspension or solution.	Pre-dissolve calcium salt and citric acid. Add slowly to prevent local over-concentration and pre-gel.
1.2. FOAMING / AERATION	Fruit	Cell walls not broken down	Cook longer. Add antifoam. Boil vigorously.
	Pre-gel	See 1.4	See 1.4.

Problem	Reason	Cause	Possible Action
<b>1.3. FLOTATION / SEDIMENTATION</b>	<b>Not enough hot viscosity</b>	PH too high.	Add more acid. Reduce sodium-citrate (if any).
		Solids too low	Add more sugar (make sure it dissolves). Cook longer.
		Not enough Calcium for LM pectin	Add calcium salt (as a max. 10% soln.) slowly. Let sit for a while to give pectin time to react with calcium.
		Calcium salt not distributed evenly	Add as max. 10% solution, slowly.
		Not enough pectin	Check if dosage was according to recipe. Add more (as solution only) ⇒ cook again to evaporate the extra water added via the pectin solution.
		Pectin broke down due to long heat exposure	Reduce cooking time next time. Add more pectin (as pectin solution) ⇒ cook again to evaporate water.
		<b>Peels/Fruit too light or too heavy.</b>	Insufficient sugar exchange
	<b>Fill temp. too high</b>	Pectin does not set yet.	Reduce fill temperature.



Problem	Reason	Cause	Possible Action
<b>1.4. PRODUCT TOO VISCIOUS</b>	<b>Pre-gel</b>	Too much pectin or calcium	Check if pectin or calcium are overdosed. Increase batch temperature. Increase fill temperature. Add sodium-citrate (has only little effect).
		PH too low.	Check if citric acid was overdosed. Increase batch temp. and fill temp. Add citric acid slowly and distribute it evenly to prevent local over-concentration. Add sodium-citrate (critical step).
		Solids too high	Add water.
		Temperature drop	Increase temperature and see if pre-gel goes away (only possible if pre-gel is not too strong).
		Production standstill	When citric is added, product starts to set gradually. Increase temperature and see if pre-gel goes away.
<b>1.5. BROWNING</b>	<b>Caramelization of sugars</b>	Too much heat exposure	Reduce cooking time. Reduce temperature in vacuum cooking. Reduce filling time. Reduce filling temperature. Speed up cooling.

Problem	Reason	Cause	Possible Action
2.1. SOFT SET	Pectin not fully hydrated	Inadequate pectin solution	See 1.1.
		Pectin / sugar dry mix	See 1.1.
		Pectin / liquid sugar suspension	See 1.1.
	Pre-gelled pectin	Ph too low	Reduce acid next time (but pH not higher than 3.25 for HM pectin!) Check pH after cooking and again before filling.
		Solids too high	Reduce boiling time. Check solids more often during process. Reduce sugar in recipe. Check solids of fruit.
		Temp. drop during processing	PH should not be below 3.4 during vacuum cooking. When acid is added, temp. must not fall below 80°C.
		Setting too fast for the given parameters.	Use slower setting HM pectin (MRS instead of RS). Increase pH (not above 3.25). Decrease solids (not below 60%). Use buffer salts (sodium citrate). Increase fill temp. Use less Ca <sup>++</sup> reactive LM pectin. Reduce calcium dosage. Increase pH. Decrease solids. Increase fill temp.

Problem	Reason	Cause	Possible Action
<b>2.1. SOFT SET / INCONSISTENT SET</b>	<b>Pre-gel</b>	Too much pectin	Be careful with adding extra pectin if jam is softer. Use re-work carefully and in smaller ratios (15 % of batch). Pectin content and quality in peels can hugely fluctuate.
	<b>Wrong pectin used</b>	Faster pectin ⇒ faster set.	Check production reports and fix fault.
	<b>Pectin dosage</b>	Too low	Check production reports.
	<b>Solids below spec.</b>	Pectin not supported enough.	Increase solids to spec. next time.
	<b>Long cooking time, standstill phases, Pectin soln. kept hot</b>	Breakdown of pectin	Prevent holding periods of the jam at above 80°C. Reduce excess cooking times. Fill quickly. If pectin solution kept over night, cool to 50°C or below.
	<b>Fructose content high</b>	Inversion of sucrose into fructose and glucose	Prevent holding periods at above 80°C. Reduce excess cooking times. Fill quickly.
	<b>Sorbitol, fructose in recipe</b>	Make gels softer and set slower	Consider re-formulation or change pectin.
	<b>PH too high</b>	Not enough citric acid	HM pectin: keep pH below 3.25. LM pectin: needs more calcium at higher pH values.
	<b>Calcium content</b>	Too low for LM pectin	Increase, add more calcium. Use a more reactive pectin. Reduce pH, so pectin needs less calcium. Increase solids, so pectin needs less calcium. Reduce sodium citrate.

**Troubleshooting Guide for Incidents in Finished Product**

<b>Problem</b>	<b>Reason</b>	<b>Cause</b>	<b>Possible Action</b>
<b>2.1. SOFT SET</b>	<b>Sodium-citrate content</b>	Too high	Na-citrate softens the gel. Na-citrate buffers calcium that is needed by LM pectin.
	<b>Center Burning, inversion of sucrose into fructose and dextrose, pectin degradation</b>	High fill temp. (e.g. in large containers) plus slow and insufficient cooling.	Cool after filling. Do not stack and shrink wrap on pallets before 40°C are reached in the center.
	<b>Gel test done too early</b>	Gel has not reached the final firmness	Let sit for 24 hrs minimum.



Problem	Reason	Cause	Possible Action
<b>2.2. HARD SET</b>	<b>Wrong pectin for the product</b>	HM Citrus pectin	Change to apple pectin ⇒ more viscous and spreadable. Use slower setting pectin (lower DE). Reduce dosage (critical!). Use buffer (Na-citrate). Increase pH, reduce solids (but observe the limits!).
		LM Amidated pectin	Change to apple ⇒ more viscous. Use lower calcium reactive pectin. Reduce Ca <sup>++</sup> dosage. Reduce fill temperature (may increase syneresis!). Use buffer (Na-citrate). Increase pH. Reduce solids. Reduce dosage (critical!) Use non amidated pectin.
		Apple pectin	Reduce dosage. Increase pH (to max. 3.25). Reduce solids (but not below 60%). Use lower DE pectin or special pectin.
	<b>Solids too high</b>	Too much evaporation	Stay within specification, higher solids mean firmer sets.
	<b>PH too low</b>	Too much citric	Stay within specification, lower pH mean firmer sets.
	<b>Too much Calcium</b>	Fruit or water fluctuate in calcium content.	Check calcium levels regularly. Use buffer (Na-citrate). Reduce calcium dosage. Increase pH.

**Troubleshooting Guide for Incidents in Finished Product**

Problem	Reason	Cause	Possible Action
<b>2.3 SYNERESIS</b>			
<b>(in closed containers)</b>	<b>Pre-gelled pectin</b>	See 2.1.	See 2.1.
	<b>Disturbed gel</b>	Jars were moved too early	Let sit for 24 hours before moving or transporting.
	<b>Center burning</b>	See 2.1	See 2.1.
<b>(in opened containers)</b>	<b>Stressed gel</b>	Spooning out, pumping, stirring	Opt for different pectin, reformulate and optimize recipe (apple instead of citrus pectin, different or less LM amidated pectin).
	<b>Gel too hard</b>	See 2.2.	See 2.2.

Problem	Reason	Cause	Possible Action
<b>2.4. FLOTATION</b>			
<b>All parameters in spec.</b>	<b>Fruit holding capacity of pectin not sufficient</b>	Pectin too slow	Use faster setting HM Use more reactive LM pectin.
		Pectin not viscous enough	Consider apple pectin instead of citrus.
		Not enough calcium available.	Add more calcium salt. Use more reactive LM Pectin.
	<b>Fill temp. too high</b>		Reduce next time
	<b>Fruit / peels too light</b>	Insufficient sugar exchange	See 1.3.
<b>Parameters outside spec.</b>	<b>PH too high</b>	Pectin does not set.	Stick to spec. or use faster pectin.
	<b>Solids too low</b>	Pectin does not set.	Stick to spec. or use faster pectin.
	<b>Fill temp. too high</b>	Pectin does not set yet.	Stick to spec. or use faster pectin.

**Troubleshooting Guide for Incidents in Finished Product**

Problem	Reason	Cause	Possible Action
<b>2.5. AERATION, air bubbles in jam</b>	<b>Vacuum in jars too high</b>	Fill temp. too high	Reduce fill temperature. Change jar size and form (e.g. large surface and small volume create strong vacuums during cooling).
		Headspace sterilization, steam pressure/temp. too high.	Reduce.
	<b>Pre-gel</b>	See 1.4.	See 1.4.
	<b>Setting speed too fast</b>	Pectin sets too fast and traps air bubbles.	Consider reformulation with slower setting pectin to allow the air bubbles to float to the top. Increase fill temperature where flotation is not an issue.