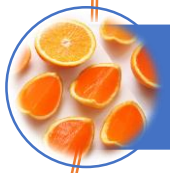
Processing of Orange Jelly

Orange - an Overview

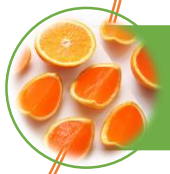
High in fibre, water, sugars, mineral & enzymes. A large amount of the CHO present in the fruits as fibre

It is important sources of vitamin C, which is necessary in human diet for activating the antibodies and combat diseases in the body

Regular consumption could help in reduction of cancer, cardiovascular diseases, stroke, alzheimer diseases, cataracts etc



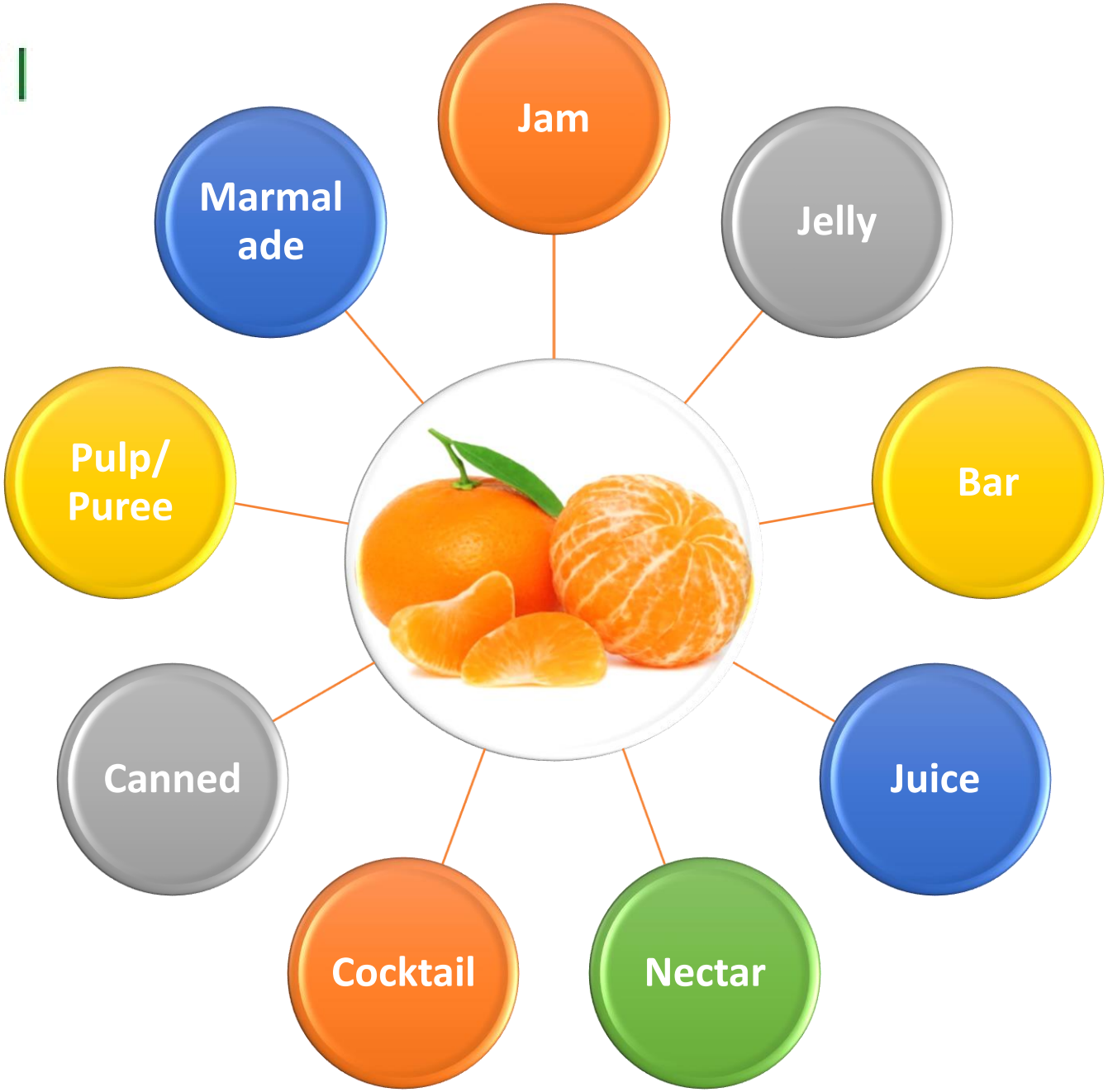
A small quantity of starch may also be present in fruit, but it typically converted to sugars during the ripening process



Different food products like jam, jelly, fruit bar and marmalade are prepared from raw edible fruits

This is one of the oldest processes used by mankind to preserve fruit for consumption in the off-season

Orange Products



General Guidelines

- Those making value added products should be sure to have clean hands.
- Fruits should be washed prior to processing.
- Bottles or jars that will be utilized should be sterilized
- Equipment and supplies that will be utilized should also be cleaned.
- Plastic containers are not as safe to use, as high temperatures can melt the plastic.
- All materials should be on-hand and ready to be used, as the processing can often occur rapidly and it is better to be prepared.

Important considerations in jelly making

- Pectin, acid, sugar (65%) and water are the four essential ingredients.
- Pectin test and determination of end-point of jelly formation are very important for the quality of the jelly.
- Pectin substances present in the form of calcium pectate are responsible for the firmness of fruits.
- Pectin is the most important constituent of jelly. It is a commercial term for water-soluble pectinic acid which under suitable conditions forms a gel with sugar and acid.

Processing of Orange Jelly

Orange (firm, not over ripe) → Washing and separate segments → Boiling with water (1 ½ times the wt. of fruit, 20-30 min.) → Addition of citric acid (2g per kg of fruit)

↓

Straining of extract ← Pectin test (for addition of sugar) ← Addition of sugar ← Judging end point (105°C temp, 65 ° brix)

↓

Sheet test & drop test → Removal of scum or foam → Addition of food Color and citric acid → Filling hot into sterlized bottles

↓

Addition of preservative (for commercial purpose) → Waxing (paraffin wax) → Capping → Storage at ambient temp.

Ingredients	Quantity
Orange pulp	100 kg
Sugar	75 kg
Citric acid	300 g
Pectin	100 g

Strength of Pectin

Three methods are available to test the pectin content of fruit juices :

- Precipitating with alcohol
- Jelmeter test
- Test jellies from the fruit extract

End point for Pectin

The end point in boiling a jelly can be judged in the following way :

- Determination by thrmometer
- Determination by sheeting / ladle test
- Determination by weighing

Determination of pectin content

Alcohol test : One teaspoonful of strained extract is taken in a beaker, cooled. Three teaspoonfuls of methylated spirit are poured gently down the side of the beaker which is rotated for mixing & allowed to stand for a few minutes

A	B	C
• If extract is rich in pectin, a single, transparent lump or clot will form. An equal amount of sugar is to be added to the extract for preparation of jelly.	• If extract contains a moderate amount of pectin, the clot will be less firm and fragmented. Three-fourths the amount of sugar is to be added.	• It extract is poor in pectin, numerous small granular clots will be seen. One-half the amount of sugar is added.

Alcohol test (extracted juice only)

The extract rich with pectin will form a solid jelly-like substance that is dense enough to be lifted with a fork

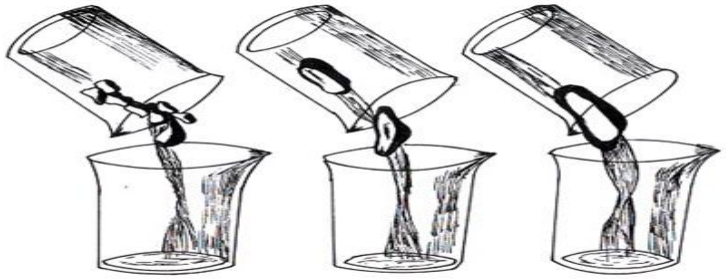
Alcohol

Pectin alcohol test

Pectin test, strong gel

Alcohol Test

- 1 tsp. juice
- 1 T. rubbing alcohol
- Gently stir or shake in closed container
- Solid jelly-like mass forms if enough pectin to gel. It can pick up with fork.



The extract low in pectin will form small particles of jelly-like substance that is significantly weaker

Determination of pectin content

Jelmeter test : A jelmeter is a graduated glass tube with an opening at each end. It is used to determine the amount of pectin in fruit juice. It is an index to the amount of sugar to be used.

Step - 1

- The jelmeter is held in the left hand with the thumb and forefinger. The bottom of the jelmeter tube is closed with the little finger. The strained extract is poured in to the jelmeter with a spoon, held in the right hand, till it is filled to the brim.

Step - 2

- While still holding the jelmeter, the little finger is removed from the bottom end and the extract is allowed to flow or drip for exactly one minute, at the end of which the finger is replaced.

Step - 3

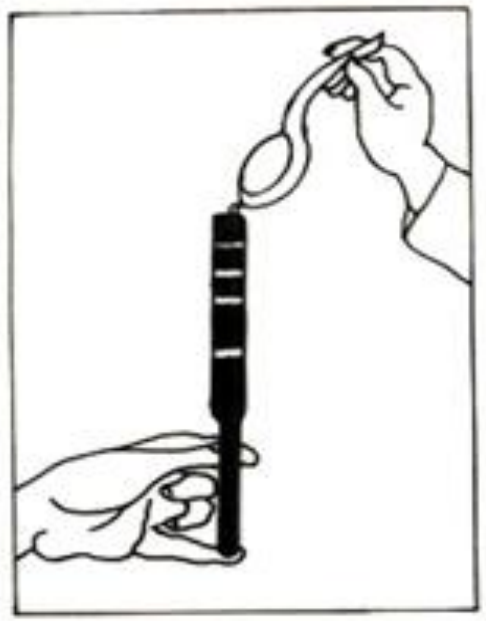
- The reading of the level of extract in the jelmeter is noted. This finger indicates how many parts of sugar are to be added to one part of juice. .

Jelmeter Test : (extracted juice only)

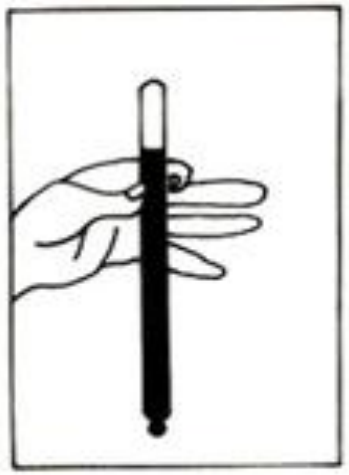
Jelmeters were once commonly available, but are not easy to find today, most likely because the alcohol test is more reliable

A small Jelmeter

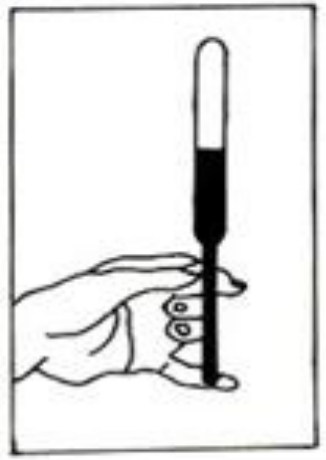
Step - 1



Step - 2



Step - 3



The rate of flow of the juice through this tube is used as a measure of the jellying power of the juice.

Does juice have enough natural pectin to make jelly?

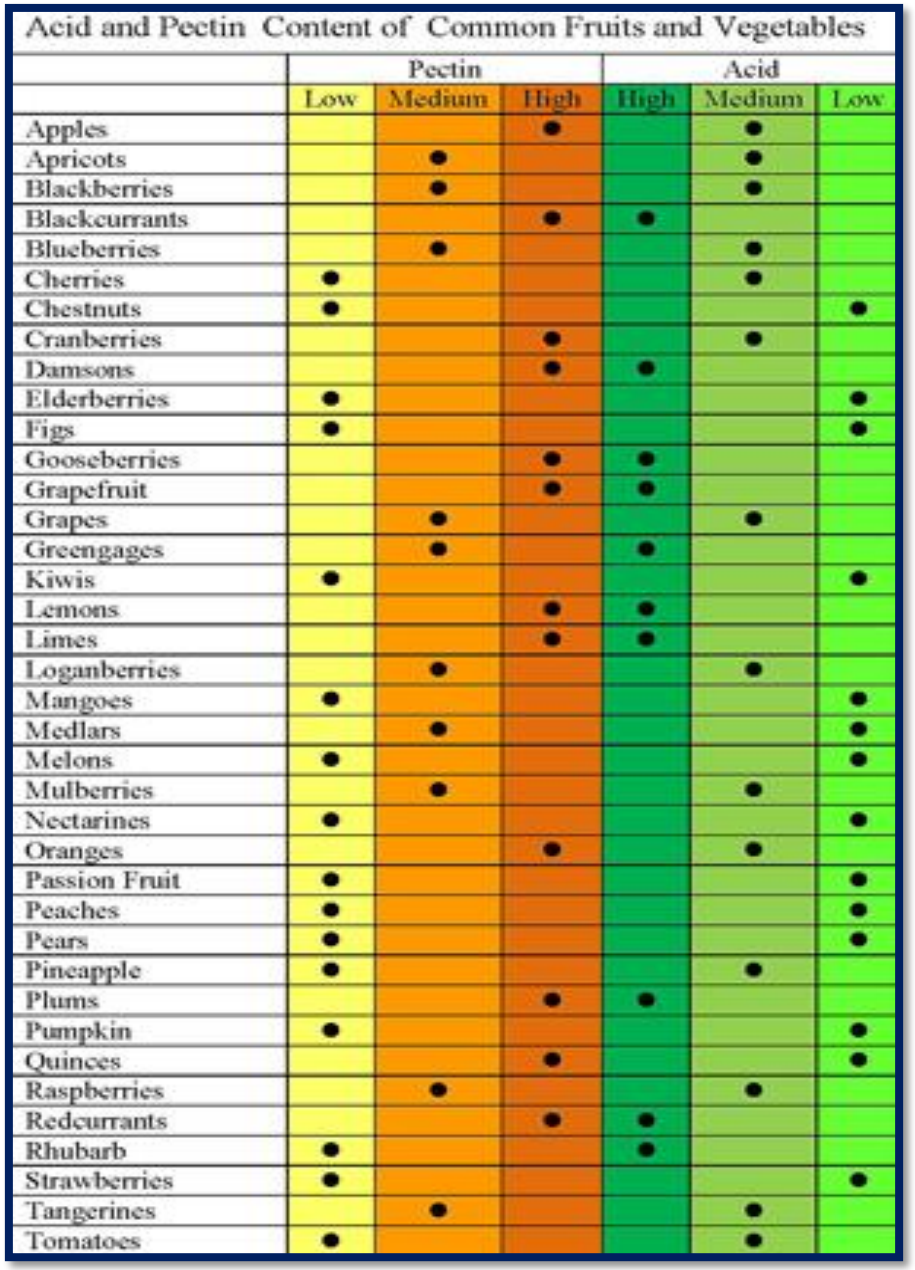
Tests for natural pectin

- 1/3 cup juice
- ¼ cup sugar
- Heat, stir, dissolve sugar
- Boil rapidly until it sheets from spoon
- Pour in bowl or jelly glass and cool
- If cooled mixture is jelly-like, it has enough natural pectin to gel

Does juice have enough acid to make jelly?

Tests for acid

- 1 tsp. juice
- 3 T. water
- ½ tsp. sugar
- Mix and taste. Taste fruit juice
- If your juice is at least equal in tartness, then it has enough acid to make jelly.



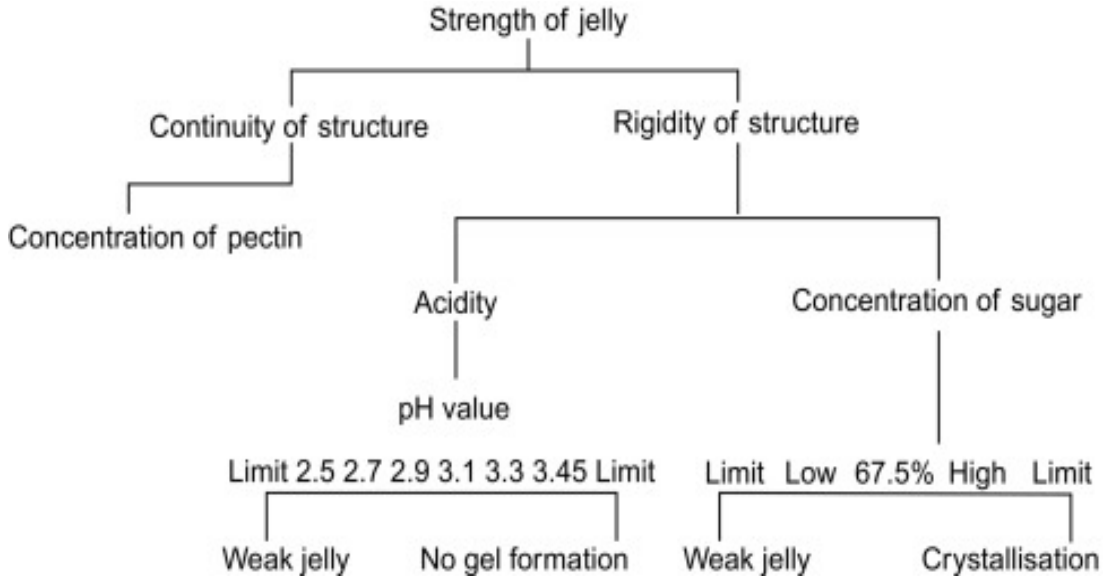
Acid and Pectin Content of Common Fruits and Vegetables

	Pectin			Acid		
	Low	Medium	High	High	Medium	Low
Apples			●		●	
Apricots		●			●	
Blackberries		●			●	
Blackcurrants			●	●		
Blueberries		●			●	
Cherries	●				●	
Chestnuts	●					●
Cranberries			●		●	
Damsons			●	●		
Elderberries	●					●
Figs	●					●
Gooseberries			●	●		
Grapefruit			●	●		
Grapes		●			●	
Greengages		●		●		
Kiwis	●					●
Lemons			●	●		
Limes			●	●		
Loganberries		●			●	
Mangoes	●					●
Medlars		●				●
Melons	●					●
Mulberries		●			●	
Nectarines	●					●
Oranges			●		●	
Passion Fruit	●					●
Peaches	●					●
Pears	●					●
Pineapple	●				●	
Plums			●	●		
Pumpkin	●					●
Quinces			●			●
Raspberries		●			●	
Redcurrants			●	●		
Rhubarb	●			●		
Strawberries	●					●
Tangerines		●			●	
Tomatoes	●				●	

Jelly - End Point Test

Use of Refractometer :

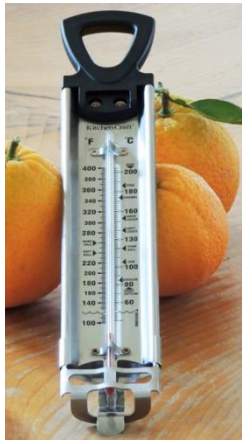
A hand-held refracto-meter has a scale which gives a reading in percent of sugar present. The total sugar should be 65 -68%



Use of sugar - thermometer :

A solution of 68% sugar content boil at 105^{0}C at sea level. For higher altitudes, the end point for finishing the boiling of jelly should be 4. – 5^{0}C higher than the boiling point of water at that altitude.

Alttude above sea level	Boiling point of water ^{o}C	End boiling point for jam/jelly ^{o}C
0	100	105
1000	99	104
2000	97.8	102.9
3000	96.9	101.8
4000	95.8	100.8
5000	94.8	99.8
6000	93.7	98.7



Jelly - End Point Test

Thermometer test :

- Take the temperature of the jelly with a candy or jelly thermometer.
- When done, the temperature of the jelly should be 220F, 8F above the boiling point of water, if you are at sea level.
- Test the accuracy of the thermometer by placing it in boiling water.

Use a jelly or candy thermometer and boil until mixture reaches the following temperatures at altitudes of:

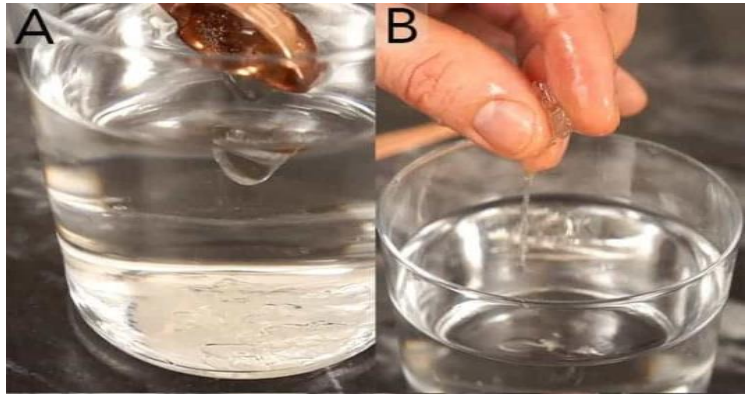
Sea Level	1,000 ft	2,000 ft	3,000 ft	4,000 ft	5,000 ft	6,000 ft	7,000 ft	8,000 ft
220F	218F	216F	214F	212F	211F	209F	207F	205F

***NOTE**: For each 1000 feet of altitude above sea level, subtract 2 degrees F. For instance, at 1,000 feet of altitude, the jelly is done at 218F; at 2,000 feet, 216F, etc. See Table 1 below.*

Jelly - End Point Test

Drop test or Cold plate test :

A drop of the concentrated mass is poured into a glass containing water. Settling down of the drop without disintegration denotes the end point.



Sheet test or Spoon test :

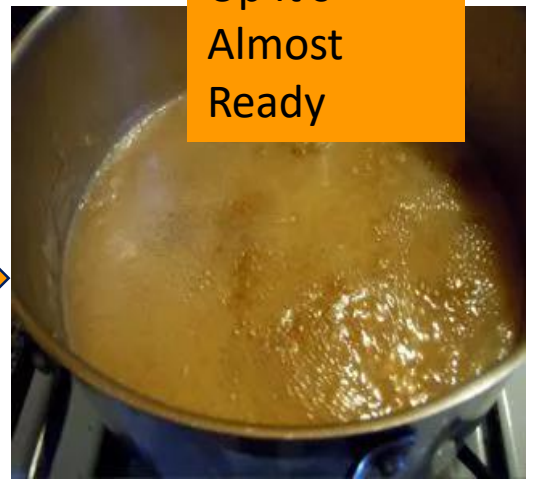
A small portion of jam is taken out during boiling, in a spoon or wooden ladle and cooled slightly. It is then allowed to drop. If the product falls off in the form of a sheet of flakes instead of flowing in a continous stream or syrup, it means that the end point has been reached and the product is ready, otherwise, boiling is continued till the sheet test is positive

Testing Jellies for the Gel Point

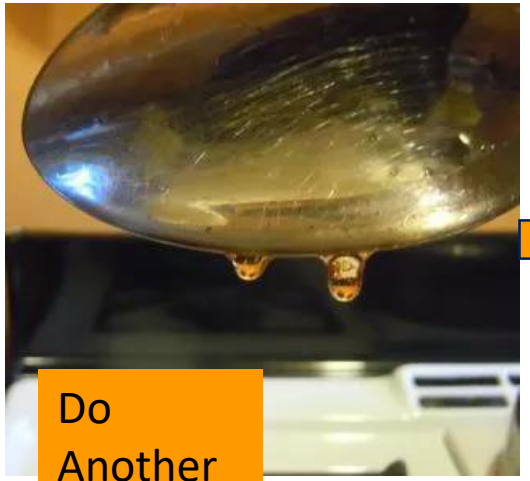
The Early Stage of Making Jelly

The Sheet or Spoon Test

When the Jelly Foams Up It's Almost Ready



Perfect Jelly



Do Another Spoon Test

Test the Jelly Until It Sheets off the Spoon

The Wrinkle Test for Jelly

Jelly - End Point Test

Refrigerator/Freezer Test :

Pour a small amount of boiling jelly on a plate, and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it should be done. During this test, the rest of the jelly mixture should be removed from the heat.

Wrinkle test

Not quite gelling – still runny

Gelling – finger leaves clear path

Chilled Plate test

Weighing Test :

In this method, the boiling pan is weighed before, and again after, transferring the fruit extract and sugar into it. The weight of the finished jelly should be about 1½ times the weight of sugar used. The end point of boiling is determined by weighing the pan with the boiling jelly mixed a few times, especially towards the final stage.

Advantage or disadvantage to using the added pectin

Without added pectin

- Long boiling time with fruit and sugar
- Less added sugar, but concentrated natural sugar
- Loss of flavor from long boiling

With added pectin :

- Greater yield from measure of fruit
- Fresher fruit flavor, but some flavor may be masked
- Better color
- Less chance of failure

Qualities of jelly

- A perfect jelly should be transparent, well-set, but not too stiff, and should have the original flavour of the fruit.
- It should be of attractive colour and keep its shape when removed from the mould.
- It should be firm enough to retain a sharp edge but tender enough to quiver when pressed.
- It should not be gummy, sticky syrupy or have crystallized sugar.
- The product should be free from dullness, with little or no syneresis (weeping). And neither tough nor rubbery.

How to Prevent Problems With Jellied Products

Problem	Cause	Prevention
Formation of crystals	• Excess sugar	• Test fruit juice with jelmeter for proper proportions of sugar
	• Undissolved sugar sticking to sides of kettle	• Wipe side of pan free of crystals with damp cloth before filling jars
	• Tartrate crystals in grape juice	• Make grape jelly stock, and let tartrate crystals settle out before making jelly. Then strain through two thicknesses of cheesecloth to remove crystals
	• Mixture cooked too slowly or too long	• Cook at a rapid boil. Remove from heat immediately when jellying point is reached
Syneresis or “weeping”	• Excess acid in juice makes pectin unstable	• Maintain proper acidity of juice
	• Storage place too warm or storage temperature fluctuated	• Store in a cool, dark and dry place
	• Paraffin seal too thick	• Seal jelly with a single thin layer of paraffin ⅛ inch thick. Prick air bubbles in paraffin

How to Prevent Problems With Jellied Products

Too much pectin in fruit	Cause	Prevention
Too soft	• Overcooking fruit to extract juice	• Avoid overcooking as this lowers the jellying capacity of pectin
	• Incorrect proportions of sugar and juice	• Follow recommended instructions
	• Undercooking causing insufficient concentration	• Cook rapidly to jellying point
	• Insufficient acid	• Avoid using fruit that is overripe. Lemon juice is sometimes added if fruit is acid deficient
	• Making too large a batch at one time	• Making too large a batch at one time
Too stiff or tough	• Overcooking	• Cook jelly mixture to a temperature 8° F higher than the boiling point of water or until it “sheets” from a spoon
	• Too much pectin in fruit	• Use ripe fruit

How to Prevent Problems With Jellied Products

Problem	Cause	Prevention
Cloudy	• Green fruit (starch)	• Use firm, ripe fruits or slightly underripe
	• Imperfect straining	• Do not squeeze juice but let it drip through jelly bag
	• Jelly allowed to stand before it was poured into jars or poured too slowly	• Pour into jars immediately upon reaching jellying point. Work quickly
Bubbles	• Kettle was not held close to top of jar as jelly was poured, or jelly was poured slowly and air became trapped in hot jelly	• Hold kettle close to top of jar and pour jelly quickly into jar
	• May denote spoilage.	• Follow recommended methods to get airtight seal
	• If bubbles are moving, do not use	
Mold (denotes spoilage; do not use)	• Imperfect seal	• Use recommended methods to get airtight seal
	• Lack of proper sanitation	• Sterilize jelly glasses and all equipment used

Thank You