Intermediate moisture foods
**Intermediate moisture foods (IMF)**

- A food product that has a water activity below that which is required for the growth of microorganisms.
- Generally, they contain moderate levels of moisture, of the order of 20-50% by weight.
- They contain sufficient dissolved solutes.
- Principle: high osmotic pressure associated with high concentration of solutes.
• Example:
  ➢ natural products – honey.
  ➢ confectionery products - jellies, jams, fruit cakes, etc.
  ➢ partially dried products - figs, dates etc.
Honey

Dates and figs

Jam

Jelly
Jam

• Jam is a product made by boiling fruit pulp with sufficient amount of sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position.

• Apple, pear, sapota (chiku), peach, papaya, karonda, carrot, plum, straw-berry, raspberry, mango, tomato, grapes and muskmelon are used for preparation of jams.
Jam

1. Ripe firm fruits
2. Washing
3. Peeling
4. Pulping
   (remove seed and core)
5. Addition of sugar (add water if necessary)
6. Boiling
   (with continuous stirring)
7. Addition of citric acid
8. Judging of end-point
9. By further cooking
   Up to 105°C or 68-70% TSS or
   By sheet test
10. Filling hot into sterilized bottles
11. Cooking
12. Waxing
13. Capping
14. Storage
   (at ambient temperature)
Problems

- Crystallization.
- Sticky or gummy jam.
- Premature setting.
- Surface graining and shrinkage.
- Microbial spoilage.
crystallization

Sticky jam

Premature setting

Surface graining
Jelly

- semi-solid product prepared by boiling a clear, strained solution of pectin-containing fruit extract, free from pulp, after the addition of sugar and acid.

- Guava, sour apple, plum, karonda, wood apple, loquat, papaya and goose-berry are generally used.
Fruit (firm, not over-ripe) → Washing → Cutting into thin slices → Boiling with water (1 ½ times the weight of fruit for about 20-30 minutes) → Addition of citric acid during boiling (2 g per kg of fruit) → Straining of extract → Pectin test (For addition of sugar) → Addition of sugar → Boiling → Judging of end-point (sheet/drop/temperature test) → Removal of scum or foam (one teaspoonful edible oil added for 45 kg sugar) → Colour and remaining citric acid added → Filling hot into clean sterilized bottles → Waxing (paraffin wax) → Capping → Storage at ambient temperature
problems

- Failure to set.
- Cloudy or foggy jellies.
- Formation of crystals.
- Weeping of jelly.
Marmalade

• This is a fruit jelly in which slices of the fruit or its peel are suspended.
• used for products made from citrus fruits like oranges and lemons.
• Citrus marmalades are classified into
(i) jelly marmalade.
(ii) jam marmalade.
Types

Jam marmalade

Jelly marmalade
Fruit (firm, not over-ripe)
↓
Washing
↓
Cutting into thin slices
↓
Boiling with water
(1 ½ times the weight of fruit for about 20-30 minutes)
↓
Addition of citric acid during boiling
(2 g per kg of fruit)
↓
Straining of extract
↓
Pectin test
(For addition of sugar)
↓
Addition of sugar
↓
Boiling
↓
Judging of end-point
(sheet/drop/temperature test)
↓
Removal of scum or foam
(one teaspoonful edible oil added for 45 kg sugar)
↓
Colour and remaining citric acid added
↓
Filling hot into clean sterilized bottles
↓
Waxing
(paraffin wax)
↓
Capping
↓
Storage at ambient temperature
<table>
<thead>
<tr>
<th>Product</th>
<th>Specification</th>
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</table>
| Jam          | Fruit Pulp – 45%  
TSS/(Total soluble solids)-65%  
Citric acid- 5g  
Preservative-40 ppm of SO₂ |
| Jelly        | Fruit Pulp – 45%  
TSS-65%  
Citric acid -2 g  
Preservative-40 ppm of SO₂ |
| Marmalade    | Fruit Pulp – 45%  
TSS-65%  
Citric acid -2 g  
Preservative-40 ppm of SO₂  
Shreds-62 g/lit |
THANK YOU