



AITC course 2023 : The application of a parabolic greenhouse solar dryer together with raw material preparation techniques to extend shelf-life and enhance quality of agricultural products

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# How to measure the quality of dried product



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# Quality of dried whole longan fruit



THAI AGRICULTURAL STANDARD

TAS 10-2006

## DRIED WHOLE LONGAN FRUIT

National Bureau of Agricultural Commodity and Food Standards  
Ministry of Agriculture and Cooperatives

ICS 67.080.10

ISBN 974-403-368-1

### 3 QUALITY

#### 3.1 GENERAL

Dried whole longan fruit of all classes shall have the skin of brown or reddish dark brown colour. The skin shall be free from dark colour or burnt. Mycelium shall not be present. The flesh shall be dry, non-sticky to the hand or attached to the pit. It shall have the odour characteristics of the variety. Its flavour shall be sweet, being free from sour or bitter taste.

#### 3.2 CHEMICAL REQUIREMENT

Dried whole longan fruit of all classes shall comply with the following requirements:

- 3.2.1 Moisture content for the whole fruit (including flesh, pit and skin) not exceeding 13.5% or not exceeding 17% for the flesh only
- 3.2.2 Water activity of the flesh not exceeding 0.6
- 3.2.3 Total soluble solids of the flesh not lower than 76 °Brix
- 3.2.4 pH of the flesh not lower than 5.0.





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# Quality of dried longan flesh



THAI AGRICULTURAL STANDARD

TAS 8-2006

## DRIED LONGAN FLESH

National Bureau of Agricultural Commodity and Food Standards  
Ministry of Agriculture and Cooperatives

ICS 67.080.10

ISBN 974-403-366-5

### 3 QUALITY

#### 3.1 GENERAL

Dried longan flesh of all classes shall be yellow in colour ranging from light yellow, golden yellow to dark yellow. The product in the same package shall have consistent colour. The product shall have flavour and texture characteristic to the variety. The product shall be dry, non-sticky to the hands, be free from sour taste. The product shall have odour characteristics for dried longan flesh and shall be free from odour foreign to the product and abnormal flavour. The product shall be free from extraneous matter such as insect or its segment, animal hair, soil, sand or metal particle.

#### 3.2 CHEMICAL REQUIREMENT

Dried longan flesh of all classes shall comply with the following requirements:

- 3.2.1 Moisture content of not less than 12% and not more than 18%
- 3.2.2 Water activity not exceeding 0.6
- 3.2.3 Total soluble acids not lower than 80 °Brix
- 3.2.4 pH not lower than 6.2.





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## Quality of dried products

- Moisture content (MC)
- Water activity ( $a_w$ )
- Total Soluble Solids (TSS)
- pH



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## Moisture content determination

- Determine via a thermogravimetric approach, i.e., by loss on drying.
- Sample is heated under the operating conditions and the weight loss due to evaporation of moisture is noted.
- The moisture content,  $W$ , is expressed as percentage by mass (grams per 100 grams).



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# Moisture content determination

## Hot air oven method (AOAC,1999)

### Apparatus



Hot air oven



Desiccator



Weighing balance



Moisture can



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# Moisture content determination

Hot air oven method (AOAC,1999)

## Preparation



Pre-heat moisture can at 105°C for 3 h



Keep in desiccator contained desiccant until used



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# Moisture content determination

## Hot air oven method (AOAC,1999)

### Sample preparation



Sampling the test sample and cut into small particles



Keep in closed container or plastic cup covered with parafilm

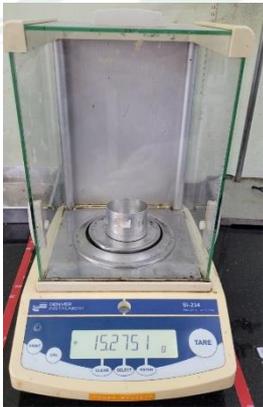


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# Moisture content determination

## Hot air oven method (AOAC,1999)

### Method



Weigh the empty moisture can with lid and noted the weight



Put 3-5 grams of prepared test sample and noted the weight



Place the sample in hot air oven at 105°C for 24 h

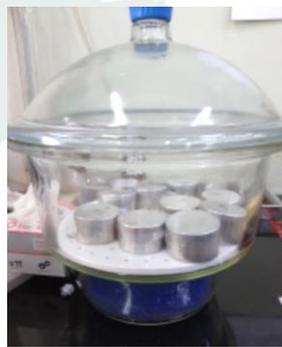


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# Moisture content determination

## Hot air oven method (AOAC,1999)

### Method



Calculate the moisture content

Close the lid and keep the sample in desiccator until reach room temperature

Weigh the sample and noted the weight



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# Moisture content determination

Hot air oven method (AOAC,1999)

## Calculation

$$\text{Moisture content, W} \quad = \quad \frac{M_1 - M_2}{M_1 - M_0} \times 100$$

(% wet basis)

where

$M_0$  is the mass, in grams, of the aluminum can and lid.

$M_1$  is the mass, in grams, of the aluminum can and lid and the test portion before drying.

$M_2$  is the mass, in grams, of the aluminum can and lid and the test portion after drying.



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## Moisture in Dried Fruits (AOAC 934.06)



Vacuum Drying Oven

### Apparatus

- Metal dish ca 8.5 cm diameter provided with tight-fit cover
- Weighing balance
- Vacuum drying oven
- Desiccator

### Procedure

- Cutting test sample into small pieces and spread 5-10 grams of prepared test sample into metal dish
- Drying at  $70 \pm 1^\circ\text{C}$  under pressure  $\leq 100$  mm Hg (13.3 kPa) for 6 h.
- Replace cover, cool dish in desiccator, and weigh.
- Calculate the moisture content.
- Duplicate determinations should be done and agree within 0.2%



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## Moisture content determination



Moisture analyzer  
(IR radiation)

- Forced ventilation to remove moisture
- Drying time in minute (Rapid Moisture Analyzer Technology)
- Used widely from the food industries because it is fast, accurate, and easy



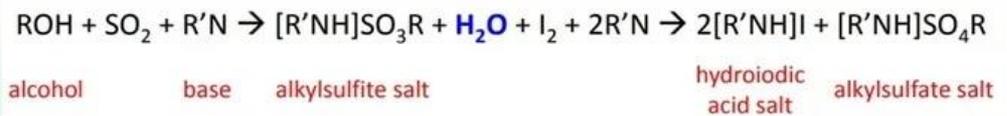
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# Moisture content determination



Karl Fischer titration

- Karl Fischer titration is the specific standard method for the determination of water content and gives accurate and precise results within minutes
- The quantitative reaction based on an iodine / iodide reaction
  - The water reacts with iodine.
  - The endpoint of the titration is reached when all the water is consumed

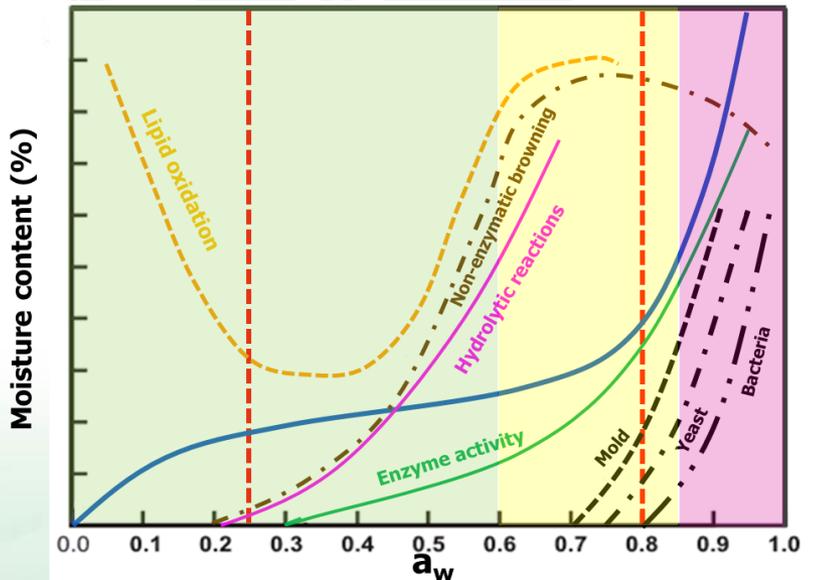




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# Water activity ( $a_w$ )

- The measure of the availability of water molecule to enter into microbial, enzymatic or chemical reaction
- The ratio of the water vapor pressure of the food to the water vapor pressure of pure water under the same conditions



$$a_w = \frac{P_{water \text{ above food}}}{P_{water}} = \frac{\%ERH}{100}$$

Where

% ERH = Equilibrium Relative Humidity



Water activity meter



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# Water activity ( $a_w$ ) determination



Fill prepared test sample in sample cup



Place sample in chamber



Close the chamber and move the lever to the left



Wait until ready and read the value



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Dried Products	MC (%)
Dried Banana 	20-25%
Dried Longan Flesh 	18%
Dried Mango Leather 	12- 15%
Dried Osmotic Dehydrated Tropical Fruits 	5 -10%



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Dried Products	$a_w$
Dried Banana 	0.60 - 0.65
Dried Longan Flesh 	0.60
Dried Mango Leather 	0.53 – 0.60
Dried Osmotic Dehydrated Tropical Fruits 	0.50 - 0.60



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## Total Soluble Solids (TSS)

- The amount of sugar and soluble minerals present in fruit and vegetables.
- Determine by the index of the index of refraction at 20°C.
- TSS is measured using refractometer equipped with a scale and expressed as degree Brix (°Brix)



Hand held refractometer



Digital refractometer



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## TSS determination

### Sample preparation

- Clear liquid product : Thoroughly mix the sample and use it directly.
- Semi thick products (Puree etc.) : Filter the puree through sheet cloth to get the clear juice.
- Thick products (Jam, Jelly, Dried fruit etc.) :
  - Blending or homogenize the sample with known amount of distilled water.
  - Filter the puree through sheet cloth or filter paper to get the clear juice.

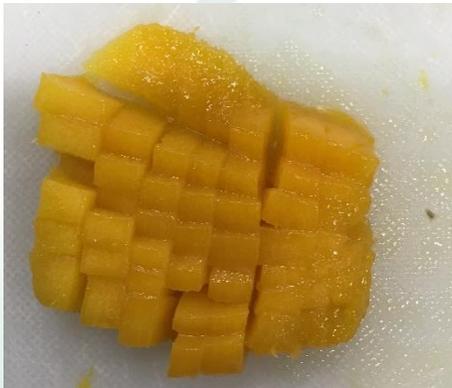


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# TSS determination

## Method

- Put a small quantity of test solution onto the prism of refractometer.
- Look through the eyepiece while pointing the prism in the direction of good light (for hand held refractometer) or press the bottom to read the value (digital refractometer).





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