

# DETERMINATION OF MOISTURE

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## INTRODUCTION

There are various methods to determine the moisture content such as drying methods, distillation method and Kahr-Fischer titration method. The determination depends on the following criteria:

- a) the form in which water is present
- b) nature of product analysed
- c) rapidity of determination
- d) accuracy desired
- e) availability and cost of equipment required.

In the drying method the amount of moisture in foods is the difference between the weight before and after drying. It is simple and is used (as a standard method) for many kinds of foods. The process of drying is caused by the difference of the relative humidity between a food and the atmosphere, so that the higher the temperature, the faster the drying. Some fermented products are unstable and decompose at high temperature. Such fermented products are dried at 40-70° under vacuum. On the other hand cereals are stable at high temperature and are dried at 135°C under normal atmosphere. Fish and fish products are normally dried at 100-110°C. Simple and rapid drying methods by oven, infra-red balance and microwave moisture checker are used for the drying of fish products.

## APPARATUS

Method 1 : Oven of temperature range 100-150°,  
Aluminium dish with lid,  
Chemical balance (100g),  
Desiccator with some moisture absorbent (silica gel,  
calcium-chloride, concentrated sulfuric acid *etc*).

Method 2 : Infra-red balance (Kett, model F-1A).

Method 3 : Microwave moisture checker (Anritsu, model K377C).

## SAMPLE PREPARATION

Collect meat sample ( $\leq 100\text{g}$ ) and pass 2-3 times through food mincer, or chop very finely and mix thoroughly.

## PROCEDURE AND CALCULATION

### METHOD 1 : OVEN METHOD

1. Dry the empty dish and lid in the oven at 105°C for 30 min and transfer to the desiccator to cool (30 min). Weigh the empty dish and lid to 3 decimal places.
2. Weigh about 5 g of sample prepared to the dish. Spread the meat with spatula. Replace the lid and weigh the dish and contents to 3 decimal places.
3. Place the dish with its lid partially covered in the oven. Dry for 16 hrs or overnight at 105°C.
4. After drying, transfer the dish with partially covered lid to the desiccator to cool (about 45 min). Reweigh the dish and its dried content.

### CALCULATION

$$\text{Moisture (\%)} = \frac{W_1 - W_2}{W_1} \times 100$$

where  $W_1$  = weight (g) of sample before drying.

$W_2$  = weight (g) of sample after drying.

### METHOD 2 : INFRA-RED METHOD

1. Balance the infra-red meter at zero level.
2. Evenly spread accurately-weighed 5 g meat prepared onto the dish.
3. Place dish with sample on infra-red meter dish holder and level the balance.
4. Set lamp height to mark 7 and switch on the moisture meter. As moisture content in the sample decreases, lower the lamp height gradually until mark 5-4.5.
5. Continue to dry until the readout on the scale is constant (30-45 mins).

### CALCULATION

- a) Results can be read directly from the balance scale or
- b) Calculate as in the oven method i.e.:

$$\text{Moisture (\%)} = \frac{W_1 - W_2}{W_1} \times 100$$

where  $W_1$  = weight (g) of sample before drying.

$W_2$  = weight (g) of sample after drying.

### METHOD 3 : MICROWAVE METHOD

1. Warm up and stabilise the microwave checker for half an hour before use.
2. Tare the sample dish containing glass fiber filter and Teflon ring to zero.
3. Evenly spread about 5 g meat sample on the sample dish and cover with filter paper held in place with Teflon ring.
4. Close the oven door. The weight of sample (g) is displayed on readout.
5. Set the required time at full power, 600w and at variable power, 300w (see Table 1).
6. Press the start switch to activate the drying.
7. At the end of drying, a buzzer sounds and the moisture content (%) is displayed directly.
8. Press the readout button to obtain the dried weight.
9. Repeat for an additional 30 sec at 300w until the dried weight is constant.

Table 1.

#### SUITABLE TIME AND HEATING CONDITIONS FOR FISH MEAT SAMPLE

Sample	Power	
	600w	300w
Minced meat	120 sec	60 sec
Leached meat	300 sec	60 sec
Surimi	120 sec	90 sec

#### CALCULATION

The microwave method is calibrated to give direct readout in % moisture.

#### REFERENCES

- AOAC Official Methods: 13th ed., p. 507-532 (1980)  
Japan Food Industrial Technology Society: Analytical methods of food, Kohrin, p. 4-69 (1982).