

## Proximate analysis: Ash

### Principle and Scope

The ash fraction contains all the mineral elements jumbled together. It would be more useful to know the amounts of different individual elements. But it allows calculation of Nitrogen-Free-Extract (by difference) from dry matter (see below) and provides an estimate of contamination (too much soil or too much salt added).

This method consists of oxidizing all organic matter in a weighed sample of the material by incineration and determining the weight of the ash remaining. It is applicable to fish, fish products, and other materials with a low carbohydrate content.

Note that the high temperature may cause the volatilization of certain elements (particularly K, Na, Cl, and P) and may also cause the mineral matter to melt and fuse.

### Sample preparation

1. Sample preparation should take into account the type of product and how it is used and prepared by the consumer.
  - For fish and fish products that contains no free liquid: comminute the sample until homogeneous.
  - For products that are packed in water, brine or similar medium that is normally discarded by the consumer: open the package and drain the product on an appropriate size sieve for 1 to 1½ minutes. Comminute the part of the sample retained by the screen until a homogeneous blend is obtained.
  - For products that are packed in a medium that may be or is normally used by the consumer, e.g. fish canned in its own juice or oil: transfer the entire contents of the package into a homogenizer and blend for one minute or until a homogeneous mix is obtained.
  - For fish meal: grind the sample in a mill or other suitable apparatus until it will pass through a no. 20 sieve.
2. Collect the homogenized sample into a thoroughly cleaned, sealable plastic cup or glass bottle.
3. Store the sample in a refrigerator or freezer until required.
4. Ensure that the prepared sample is still homogeneous prior to weighing. If liquid separates from the sample, thoroughly reblend before use.

### Procedure

1. Accurately weight ca 5 g of sample in a crucible which has been ignited and tared (use 2.5 g of sample in the case of products which have a tendency to swell).

2. Place crucible in drying oven at 100 oC for 24 hours.
3. Transfer to cool muffle furnace and increase the temperature step wise to 550 oC  $\pm$  5 oC.
4. Maintain temperature for 8 hours or until a white ash is obtained.
5. If white ash is not obtained after 8 hours, moisten ash with distilled water, slowly dry on a hot plate, and re-ash at 550 oC to constant weight. Repeat if necessary.
6. Remove crucible to a desiccator and weight soon after cool.

### Calculation

Calculate the percentage ash content (wet weight basis) as follows:

$$\% \text{ ASH (wet)} = \frac{(\text{wt. crucible and ash} - \text{wt. crucible})}{(\text{wt. crucible and sample} - \text{wt. crucible})} \times 100$$

Calculation of ash content on dry basis (when moisture content is known) as follows:

$$\% \text{ ASH (dry)} = \frac{\% \text{ ash (wet)}}{(100 - \% \text{ moisture})} \times 100$$

### Possible errors

High temperature may volatile some elements such as chloride, zinc, selenium, iodine, etc. Consequently, ash determination tends to underestimate mineral contents This error is small