

MAFF VALIDATED METHODS FOR THE ANALYSIS OF FOODSTUFFS

No. V11

LOSS OF MASS ON DRYING OF QUICK FROZEN FRENCH FRIED POTATOES

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1. Scope and Field of Application

The method allows the determination of the moisture content of quick frozen french fried potatoes, as estimated by the loss of mass on drying.

2. Definition

Loss of mass on drying: the loss of mass on drying under the conditions specified.

3. Principle

The sample is dried to constant weight at $103 \pm 2^\circ\text{C}$.

4. Reagents

None.

5. Apparatus

5.1 Blender

5.2 Weighing dishes, resistant to attack by the sample and the conditions of the test, preferably made of nickel, aluminium, stainless steel or glass, and of diameter 60-80 mm and 25 mm deep, with well fitting but easily removable lids.

5.3 Convection drying oven, temperature-controlled by thermostat at $103 \pm 2^\circ\text{C}$ throughout the volume of the oven.

5.4 Desiccator, containing freshly activated silica gel (with a water content indicator) or an equivalent desiccant.

5.5 Analytical balance

6. Procedure

Thoroughly homogenise the frozen sample in a blender. Weigh about 10 g in duplicate, to the nearest 0.1 mg, into desiccated, tared weighing dishes. These procedures should be carried out in such a way as to avoid condensation of water vapour from the atmosphere onto the sample.

Place the uncovered dishes containing the samples, with their lids, in the convection drying oven for 16 hr. Replace the corresponding lids and transfer to the desiccator to cool. When cool, weigh as quickly as possible to 0.1 mg. Uncover and place the dishes with their lids in the

oven for a further 2 hr. Replace the lids, cool in the desiccator, and re-weigh. Repeat the 2 hr. drying, desiccation and weighing steps until the decrease in mass between successive weighings does not exceed 0.5 mg or until increase in mass is recorded.

7. COSHH

Analysts are reminded that appropriate hazard and risk assessments required by the Control of Substances Hazardous to Health Regulations, 1988 (See "Control of Substances Hazardous to Health - Approved Code of Practice, Control of Substances Hazardous to Health Regulations, 1988") must be made before using this method.

8. Expression of Results

The moisture content, calculated as a percentage by mass of the prepared sample, should be reported to two decimal places, and is given by:

$$\% \text{ Moisture content} = \frac{(M_1 - M_2)}{(M_1 - M_0)} \times 100$$

where:

- M_0 is mass in g of dried, tarred dish and lid;
- M_1 is mass in g of dried, tarred dish and lid plus undried sample;
- M_2 is (lowest) mass in g of dried, tarred dish and lid plus dried sample.

9. References

- 9.1 DO Biltcliffe, HJ Judd and R Wood, J. Assoc. Off. Analyt. Chem., 1984, **67**, 635- 636.
- 9.2 Ministry of Agriculture, Fisheries and Food, Food Safety Directorate, MAFF Validated Methods for the Analysis of Food, Introduction, General Considerations and Analytical Quality Control, J. Assoc. Publ. Analysts, 1992, **28**, 11-16

APPENDIX 1

Analytical Quality Control

General principles of analytical quality control are outlined protocol V.0 of the series⁽²⁾.

A1 Repeatability

The absolute difference between two test results obtained under repeatability conditions should not be greater than the repeatability, r , deduced from the collaborative trial data summarised in Tables 1 and 2. For both types of sample, r may be taken to be 0.3% moisture; this corresponds to a relative standard deviation of repeatability (coefficient of variance of repeatability), RSD_r , of about 0.10% for the uncooked frozen product, and somewhat higher (0.16%) for the oven- ready product.

A2 Reproducibility

The absolute difference between two test results carried out under reproducibility conditions should not be greater than the reproducibility, R , deduced from the collaborative trial data summarised in Tables 1 and 2. R may be taken as 2.0% moisture in the uncooked frozen product, and about 3.3% moisture in the oven-ready product. This corresponds to a relative standard deviation of reproducibility (coefficient of variance of reproducibility), RSD_R , of 0.8-1.8% between laboratories.

A3 Trueness (Bias)

The collaborative trial established satisfactory precision parameters for the method, but its accuracy was not tested by spiking with known amounts of water. However, there is no reason to suspect any systematic bias. The possible loss of mass due to the loss of volatiles other than water may introduce bias only if the result is interpreted as water content.

A4 Limit of Detection

This limit has not been established, but the collaborative trial data suggest an accuracy which, if maintained, corresponds to an extrapolated lower limit of roughly 0.3% moisture for a single determination.

A5 Statistical Data Derived from the Results of Interlaboratory Tests

Participants in the collaborative trial each analysed two samples (A and B) of quick-frozen uncooked french fried potatoes once, each in known duplicate. They also analysed two samples (C and D) of "oven-ready" quick-frozen partly cooked french fried potatoes ("oven chips") once, each in known duplicate. The ingredients of the oven chips included vegetable fat. All the samples were stored in a freezer and macerated while still frozen.

Tables 1 and 2 summarise the statistical data; no outlying results were reported. The losses of mass were expressed as a percentage by mass of the sample.

Symbol	Definition
$\bar{x}$	Overall mean value
S_r	The standard deviation of repeatability
RSD_r	The relative standard deviation of repeatability, expressed as a percentage of the mean (coefficient of variance of repeatability CV_r)
r	Repeatability
S_R	The standard deviation of reproducibility
RSD_R	The relative standard deviation of reproducibility, expressed as a percentage of the mean (coefficient of variance of reproducibility CV_R)
R	Reproducibility

TABLE 1
Statistical Analysis of the % Moisture in Quick Frozen Uncooked
Potato Samples

Sample	A	B
Number of Laboratories retained after eliminating outliers	14	14
Number of results accepted after eliminating outliers	28	28
LEVEL OF ANALYTE		
Mean observed value $\bar{x}$	74.71	72.35
REPEATABILITY		
Standard Deviation S_r	0.08	0.08
Relative Standard Deviation RSD_r (%)	0.10	0.10
Repeatability r [$2.8 \times S_r$]	0.21	0.21
REPRODUCIBILITY		
Standard Deviation S_R	0.71	0.56
Relative Standard Deviation RSD_R (%)	0.95	0.77
Reproducibility R [$2.8 \times S_R$]	1.99	1.58

TABLE 2
Statistical Analysis of the % Moisture in Quick-frozen Partly Cooked
("Oven-ready") Potato Samples

Sample	C	D
Number of Laboratories retained after eliminating outliers	13	13
Number of results accepted after eliminating outliers	26	26
LEVEL OF ANALYTE		
Mean observed value $\bar{x}$	63.06	64.93
REPEATABILITY		
Standard Deviation S_r	0.10	0.10
Relative Standard Deviation RSD_r (%)	0.16	0.16
Repeatability r [$2.8 \times S_r$]	0.29	0.29
REPRODUCIBILITY		
Standard Deviation S_R	0.76	1.17
Relative Standard Deviation RSD_R (%)	1.2	1.8
Reproducibility R [$2.8 \times S_R$]	2.14	3.27