GENERAL CHARACTERISTICS OF FRESH BAKER'S YEAST

Updated in December 2012..

Foreword

This document serves to provide general characteristics for fresh baker's yeast: block or compressed yeast, granulated yeast and liquid yeast.

Although – or maybe just because – fresh baker's yeast is a very long standing natural product, no real definition of fresh baker's yeast exists at the moment. Also in the Codex Alimentarius a description of fresh baker's yeast lacks. The yeast mentioned in the Food Chemical Codex is inactivated yeast and the description is not relevant for fresh baker's yeast.

In order to establish a description for fresh baker's yeast, the technical committee of Cofalec prepared this document.

The document contains the following sections:

- Product characteristics
- Application characteristics
- Physico-chemical characteristics
- Microbiology
- Nutritional data

Within each section several parameters are mentioned with their typical value. The typical value is that value that is most prevelant but it should be realised that baker's yeast is a natural product and is adapted to local application characteristics and customs. For that reason some parameters have a rather large range indicated.
Where necessary a short description or explanation has been given to clarify the opinion of the Cofalec technical committee, especially on parameters that are requested but that are not very valuable in our eyes. For such parameters no typical values are given.

We trust this document will be of value to the bakery industry in giving a description of fresh baker's yeast. Should you have any questions or remarks, do not hesitate to contact Cofalec.

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Product characteristics

1. *Product definition*

Fresh Baker's yeast consists of living cells of *Saccharomyces cerevisiae*, a unicellular fungus, and is produced by multiplication of a pure strain of *Saccharomyces cerevisiae* cells.
Although all baker's yeast is taxonomically designated as *Saccharomyces cerevisiae*, the different strains can have different characteristics.

2. *Description*

Fresh baker's yeast is an internationally recognized term for baker's yeast formulations with a high water content (relative to so-called dried yeast) like block or compressed yeast, granulated (crumbled) yeast and liquid yeast. It is presented in three major product forms:

Compact blocks
This is the so-called compressed yeast, available in blocks with a variation in weight, depending on the local application demands. Depending on local customs and demands, the texture or consistency may vary from a high plasticity (kneadable, deformation possible without breakage) to a friable/crumbly texture (blocks easily break in small pieces). The colour is generally ivory, with variation in brightness depending on strain and the production process in combination with raw materials. The smell is typical for yeast.

Granulated yeast
Also this is compressed yeast but in the form of (small) granules usually packed in bags of various weight depending on local application requirements and regulations.
Colour and smell is similar to block yeast.

Liquid yeast
This is a liquid suspension of yeast cells in water with a cream-like viscosity and an ivory type colour with variation in brightness depending on the strain, production process and raw materials. The smell is typical for yeast.

3. *Product use*

Baker's Yeast is used in the baking industry in all fermented doughs. There is a large variation in the dough composition and process conditions throughout the world.
Yeast cells produce gas (carbon dioxide) from the sugars present in the dough. The gas is captured in the dough that increases strongly in volume and thus gets its light texture. This light structure is fixed in the baking process.
In the Codex Alimentarius international food categorization system[1] the definition of bread clearly requires the presence and use of Baker's Yeast.

[1] *Codex Alimentarius committee on food additives and contaminants*

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4. *Conservation*

Baker's yeast consists of living micro-organisms and is therefore a perishable product. For best conservation it should be conserved at all times under cold conditions as mentioned on the package, where also a "best before" date is mentioned.

5. *Weight of the package*

Yeast blocks and granulated yeast

Yeast blocks are weighed in-line at the end of the process. The indicated weight is a net weight. In order to allow the yeast to respire during conservation, the packaging is not water-tight and therefore the yeast blocks will lose water during storage, explaining the major part of the loss of weight. As the loss of weight is due to water mainly, this does not affect the performance of the product.

Liquid yeast

Liquid yeast is usually packed in containers suitable for liquid food stuffs. This means that liquid yeast is not subject to dessication and related loss of weight.

6. *Traceability*

The following information is indicated on the package or accompanying documents:

- Best before + date
- Batch number

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Application characteristics

7. Fermentation activity

Fermentation activity or leavening power is the most critical characteristic of yeast. It is checked on regular basis in the normal quality control by all baker's yeast manufacturers. For quality control reasons this is done under carefully controlled, constant conditions, meaning:

1. Controlled dough or fermentation medium composition, e.g. sugar content
2. Controlled fermentation conditions, e.g. temperature

As yeast is applied in many different bread production processes, i.e. different dough compositions and leavening and baking conditions, it is impossible to check fermentation activity under all these conditions. For this reason fermentation activity is checked in one or more tests, having a good correlation with local application conditions. From country to country and one yeast producer to another, there are different tests to achieve an relationship as close as possible with the actual application.
Such fermentation tests can be done with a range of equipment, from proprietary, in-house developed equipment to equipment available on the market, e.g. from Burrows & Harrison or SJA.
Given the tuning of the fermentation tests to local conditions to optimally serve the local market, the comparison of fermentation test results from different manufacturers has to take the above mentioned differences into consideration.

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Physico-chemical characteristics

8. *Dry matter and density*

The dry matter content of fresh baker's yeast products has a wide range, depending on the formulation of the product – block yeast, granulated yeast, liquid yeast – and the requirements for fermentation performance and consistency/friability.

Block yeast and granulated yeast

In the production of yeast, the dry matter is a process result after achieving the requirements for the specifications of the yeast product in terms of consistency/friability and fermentation activity. For more firm/friable blocks a higher level of dry matter is required. However, also other factors are of importance here, such as the type of strain used and the process conditions during manufacturing. The relationship between fermentation activity and consistency/friability and dry matter is therefore indirect.

Liquid yeast

Liquid yeast is typically standardized on fermentation activity. The dry matter level of the liquid yeast and therefore also its density is determined by the specification of the fermentation activity and the activity level of the yeast as achieved by the combination of the yeast strains (breeds) and the production process.

Typical dry matter values

Type of product	**Dry matter range (%)**
Liquid yeast	14 – 29
Block yeast	26 – 35
Granulated yeast	31 - 37

9. *Nitrogen / dry matter (%)*

The nitrogen content on dry matter typically has a value of 8.0% +/- 1.5%, and is determined using the Kjeldahl method.

10. *Ashes / dry matter (%)*

The ash content on dry matter for yeast is typically 6% +/- 2%, using the determination method of desiccation and mineralization at 550-650°C.

11. *pH*

The typical pH of yeast is normally around pH=5 but shows a relatively high variation of +/- 2 pH units.

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Microbiology

Being an ingredient used in the production of a major foodstuff, the microbiological quality of yeast is of prime importance. However, next to yeast also other ingredients sensitive to microbological contamination are used. Also the hygiene of the dough preparation process and especially the handling of the bread after the baking – e.g. during packaging and transport – is of high importance to the overall hygiene of the bread. Fortunately due to the baking process that kills most of the micro-organisms present in the dough including the yeast cells, and the relative low water content, bread is not extremely sensitive to microbiological spoilage.

The following microbiological analyses are normally used in checking the microbiological quality of fresh baker's yeast:

12. Total count

The total count is normally the total count achieved on a suitably rich medium agar plate. In the case of baker's yeast, the total plate count will include the yeast cell count, which will overwhelm all other counts. So unless special measures are taken to suppress the growth of the yeast cells, for fresh baker's yeast this result is with little meaning.
Even when the growth of yeast cells is suppressed this cell count is not very informative because the vast majority of the cell count is usually due to lactic acid bacteria that are harmless. Checking the microbiological quality of fresh baker's yeast is therefore better done with the tests indicated below.

13. Coliforms

The content is below 1000 CFU/g following the NF ISO / 4832 standard or an internal protocol compatible with this standard.

14. E.coli

The content is below 100 CFU/g following the SDP 07/1 - 07/93 standard or an internal compatible protocol.

15. Salmonella

Absence of Salmonella in a sample of 25g, following the NF ISO / FDIS 6579 standard or an internal protocol compatible with this standard.

16. Listeria monocytogenes

The content is below 100 CFU/g following the NF V08-55 standard or an internal protocol compatible with this standard.

17. Staphylococus aureus

The content is below 10 CFU/g following the NF ISO / 6888 standard or an internal protocol compatible with this standard.

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Nutritional data

18. Fats / dry matter (%)

The typical fat content on dry matter is 6% +/-2%, and is determined with an extraction method with appropriate solvents.

19. Carbohydrates / dry matter (%)

The typical carbohydrate content on dry matter is 15% +/- 9%. Carbohydrates in the sense of regulation 1169/2011 means any carbohydrate which is metabolised by humans, and includes polyols.

20. Fibre / dry matter (%)

The typical fibre content on dry matter is 28% +/-5%.

21. Proteins / dry matter (%)

The typical Kjeldahl protein content on dry matter is: 50% +/- 9%, as determined with the Kjeldahl method.
See also the remarks made on the nitrogen content of yeast.

22. Minerals / dry matter (%)

The amount of minerals in yeast is highly dependent on the raw materials used in the preparation of the yeast. The variability in the levels of minerals in molasses thus explains the variability of minerals in yeast. Minerals are normally measured using Atomic Absorption Spectrometry (AAS).

Component	Typical content
Potassium	0.6% - 2.5%
Sodium	< 1%
Calcium	0.02% - 0.15%
Magnesium	0.03% - 0.25%
Iron	0.001% - 0.1%

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23. Vitamins / dry matter (%)

Vitamins are determined by third party laboratories according to standard methods, often biological assays. Typical values for yeast are indicated in the table below.

Vitamin	Typical content	Units
B1	2 – 15	mg/100 g
B2	6 – 8	mg/100 g
B6	2 – 6	mg/100 g
Folic acid	2 – 4	mg/100 g
PP (Niacin)	10 – 60	mg/100 g
Biotin	0.05 – 0.25	mg/100 g

24. Energy value (Kcal/100g)

A typical caloric energy value is 370 kcal/100g dry matter.
Please make sure to take into account the correct dry matter of your specific commercial product (see 8. dry matter and density), especially for liquid yeast which has a lower dry matter content.

Below the typical, indicative values for nutritional components are summarised in a table. For ranges of these typical values, see text above. For detailed provisions concerning nutrition labelling, we refer to the Regulation 1169/2011 on "Food Information to Consumers" Yeast is exempted from the requirement of the mandatory nutrition declaration (Annex v).

Typical nutritional data as is

100g of Compressed yeast (30% dry matter)	Typical value
Energy	111 kcal
fat of which - saturates - polyunsaturates	1,8g 0,3g <0,3g
carbohydrate of which - sugars - polyols - starch	4,5g 3,7g
fibre	8,5g
protein	15g
salt	0,05g
vitamins and minerals	

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