



YEAST
EXTRACT

Information for food professionals

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What is yeast extract?

Yeast extract is a natural, vegan product that contains important minerals, proteins, vitamins, carbohydrate and amino acids. In order to find out which individual components yeast extract is made up of, it is worth taking a closer look at the production of yeast extract.

How is yeast extract made?

Fresh yeast was an important component of food culture in the earliest civilisations – it was not only used to make bread, but in the production of beer and wine too. Pliny the Elder described the production of baker's yeast in his *Naturalis historia*, published in 77 AD. But what does the production of yeast extract look like in detail?

There are five stages in the production of yeast extract. First, a source of glucose, controlled temperatures and oxygen supply ensure that the yeast multiplies. Enzymes within the yeast then break up the proteins into smaller components and ensure that the wall of the yeast cell is permeable – this process is called autolysis. The dissolved contents of the yeast cell – the yeast extract – is then separated from the surrounding cell wall; finally, the yeast extract is concentrated and dried.

1. Fermentation

The first stage of producing yeast extract is to ferment the yeast. Sugar is fed to the yeast fungus to encourage growth. The yeast is stored in fermenters, which must be kept at a temperature of 30 degrees Celsius and moreover be supplied with sufficient oxygen – quite similar to baking at home. This is the only way to make the yeast grow. Once the fermenter is full and no more sugar can be added, the yeast is concentrated and washed in centrifuges in order to remove the sugar residues. The result is a so-called 'suspension', a viscous, creamy mass of yeast.

2. Breakage

Next, the temperature in the tanks is raised slightly to between 45 and 55 degrees Celsius. This marks the start of autolysis because yeast ceases to grow above roughly 40 degrees Celsius. Instead enzymes that are present in or added to the yeast split the yeast proteins and other macromolecules into smaller molecules. They also partly dissolve the cell walls of the yeast at the same time. In this way, the smaller molecules are released from the yeast cell and combine with a watery solution in the tank.

The autolysis can be controlled with various factors. For example, the resting time of the yeast in the tanks and even the temperature play a decisive role and significantly influence the final flavour of the particular batch of yeast extract. The result of the autolysis is a liquid that already tastes like a bouillon and even has a very similar profile of amino acids to a cooked meat stock.

3. Centrifugation

This liquid is then centrifuged in order to remove the remaining cell walls; what is left over is yeast extract. Valuable proteins, vitamins and minerals from the original yeast cells are retained in the yeast extract. In essence, yeast extract simply comprises the natural components of a yeast cell, but without the surrounding cell wall.

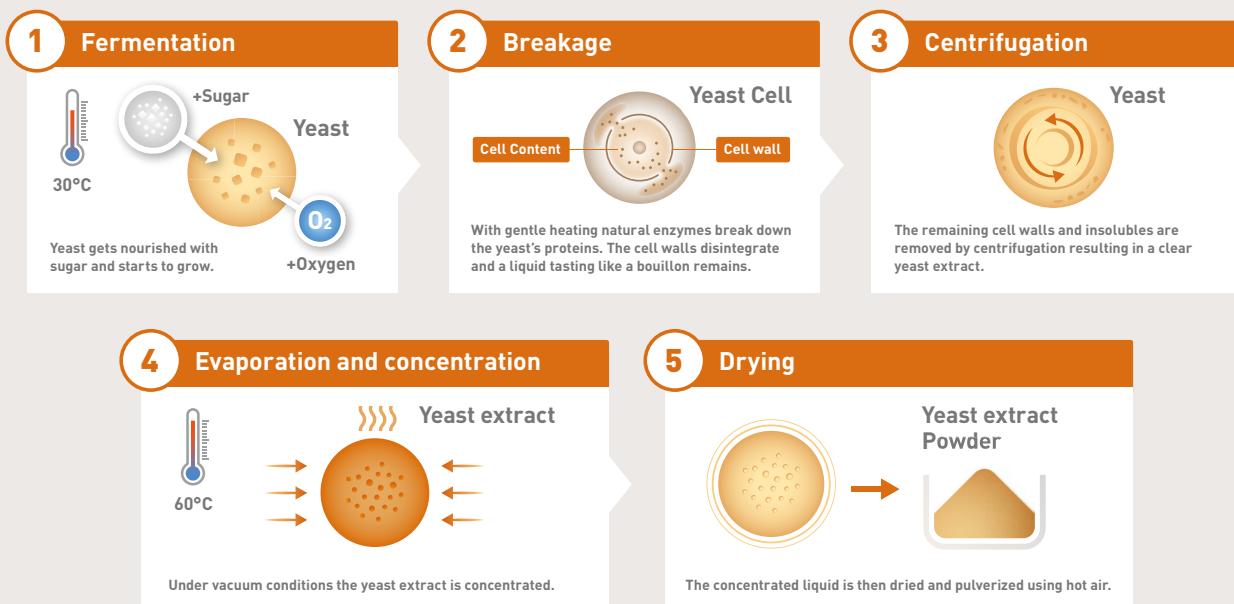
4. Evaporation and Concentration

Lastly, the yeast extract is concentrated through a gentle evaporation process under vacuum conditions at approximately 60 degrees Celsius, which turns it into a paste with a dry matter content of 70-80% or a liquid of 45-65% dry matter content.

5. Drying

Depending on its intended use, liquid yeast extract can then be dried and turned into a powder. The liquid is poured into a spray dryer and dried using hot air. This vaporises the water, allowing the dried extract to drop down and gather at the base of the tower.

Production of Yeast-Extract



Sustainable Production

The production process from baker's or brewer's yeast to yeast extract does not only retain the contents of the yeast cell, it is also sustainable on several levels. In case of yeast extract made from brewer's yeast, the production uses starting material which

is a by-product of beer production. For the growing process, molasses are used that are by-products of sugar refinery. Once the yeast is removed, the spent broth is concentrated and used as animal feed or goes back to the field as fertilizer. The reuse of value streams, such as these, adds value to food ingredients with a very low environmental footprint.

Yeast extract – versatile and natural

Yeast extract is particularly appreciated for its umami flavour. Umami is one of the five tastes alongside sweet, sour, salty and bitter. The word comes from Japanese and roughly translates as “savoury”: the chemist Kikunae Ikeda coined the word after he discovered umami as the fifth taste in 1907. The history of fermented seasonings, however, stretches back at least 2000 years. As far back as antiquity, Romans preferred to season their dishes with garum, a fermented fish sauce.

Yeast extract is an extremely versatile ingredient. It can be used to season sauces, stocks, soups, savoury snacks and much more. It not only balances the savoury flavour of meat and fish dishes but is also ideally suited to preparing vegetarian or vegan dishes because yeast extract is free of ingredients of animal origin.

The protein quality of yeast extract is comparable to the reference proteins according to the Food and Agriculture Organization (FAO) in eggs or in milk. This means that yeast extract contains all the essential amino acids which are necessary for human nutrition in a very absorbable form. Compared to other plant proteins, such as soy, gluten or lupine, yeast extract is also safe in terms of allergenicity.

Yeast extract is not only a natural but also a safe ingredient. It is a non-genetically modified food product with a long history of safe use.

Vegetarian and vegan cuisine: yeast extract provides savoury taste

Yeast extract gives vegetarian and vegan recipes a hearty flavour that is otherwise often lacking. “Yeast extract not only lends dishes an intensive taste – it also particularly highlights their natural aromas. As a result, yeast extract is a true insider’s tip for vegetarian and vegan cuisine,” declares Manuel Lynch, founder of the Vegan Gastronomy Culinary Academy.

“What makes yeast extract so special is its characteristic natural flavour. The taste is so intensive that all it takes is a quarter of a teaspoon of yeast

extract to create a flavour explosion in, for example, a seasonal salad,” explains Lynch. “This unique flavour is down to the glutamic acid that yeast extract contains, which is also found in high-protein and matured foods such as tomatoes, mushrooms and Parmesan cheese.” The taste is best compared with that of a strong meat-based stock. It is this that allows yeast extract to provide the necessary seasoning and a strong flavour in vegan and vegetarian dishes without recourse to any animal-based products at all. “We believe that yeast and yeast extract are important elements of a healthy diet,” explains Lynch.

Siegfried Kröpfl, Austria’s only vegan gourmet chef, instructor and restaurant consultant focusing on vegan cuisine, is of a similar opinion. Kröpfl likes cooking with yeast extract, especially pasta dishes and risottos: “Yeast extract makes a huge contribution to creating a good flavour and rounds the dish off. I also like to use it when preparing pestos.” The ingredient is as easy to use as any other sort of seasoning.

Another benefit of using yeast extract in vegan cuisine is that it blocks the so-called ‘off-taste’ of vegan substitute products. This refers to the metallic or bitter aftertaste of vegan and vegetarian products that are usually made using vegetable proteins such as peas, soy, rice or wheat.

Low-salt cooking

Many health experts advise using salt sparingly in cooking because high salt consumption can be harmful to our health. Yeast extract offers a good alternative to salt: thanks to its savoury and characteristic taste, it lends foods a delicious, piquant note – even those with a low salt content. It helps to reduce salt content with any loss of flavour. This corresponds with the advice of many nutritionists to use fresh herbs, for example, so as to get by with less salt in cooking.

Natural glutamic acid

Glutamic acid is one of the twenty natural amino acids that are found in almost every living cell of plants, animals, humans and microorganisms. It is the most commonly occurring amino acid in nature. Many foods that are part of a varied and balanced diet have a high glutamic acid content, which guarantees an aromatic flavour in numerous recipes.

"Glutamic acid is a completely natural component of proteins," explains Professor Ursula Bordewick-Dell from Münster University of Applied Sciences. "It occurs in all protein-rich foods – for example in meat, fish and even pulses. Glutamic acid is formed naturally through the enzymatic maturing process in foods and sometimes in considerable quantities, for example in tomatoes and parmesan. Glutamate is therefore an important component of our daily diet – not many consumers are aware, however, that it occurs naturally."

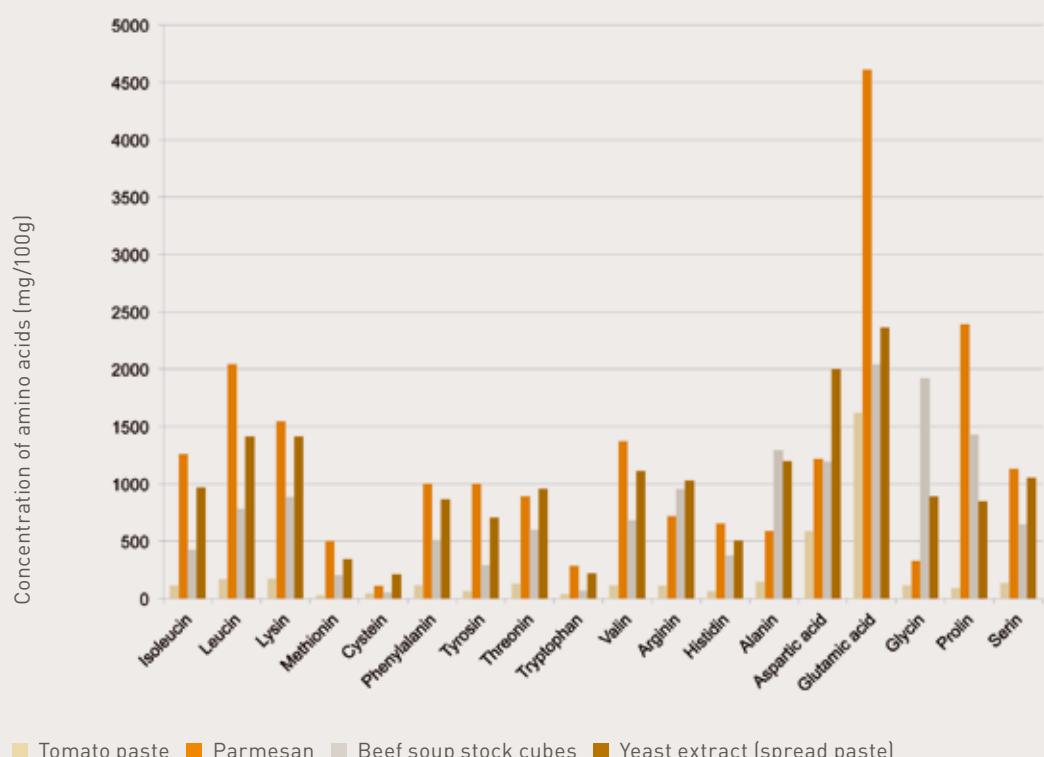
A comparison of amino acid profiles

Like many vegetable, meat and dairy products, yeast extract contains natural glutamic acid, a naturally occurring amino acid. The following diagram uses the examples of tomato purée, parmesan cheese, beef stock cubes and yeast extract paste to illustrate the presence of various amino acids in the respective foodstuffs.

It makes two things particularly clear:

1. Glutamic acid is just one of many natural amino acids that are found in our diets.
2. The glutamic acid content in yeast extract spread is comparable with the content in tomato purée and a beef stock cube. Parmesan cheese tops the table by some distance.

Amino acids in different foodstuffs



Free and bound glutamic acid – what is the difference?

Glutamic acid occurs in foods in two different forms.

The first is its so-called bound form. Here, the glutamic acid is joined to other amino acids and thus bound together in proteins. Glutamic acid has no distinctive flavour in this manifestation. It is also present in plant and animal tissues in its so-called free form – it is this variant that seems to have such a strong savoury flavour. Foods with a high proportion of free glutamic acid, including cheese and ripe tomatoes, are enjoyed by consumers for their intense flavour. Cooking and even fermentation or maturing processes increase the amount of free glutamic acid in plant-based and animal-derived foods. In this respect, it is not surprising that these forms of food preparation and refinement are firmly established in many food cultures – examples of these range from the traditional fermentation of soy sauce to the slow-cooking of a meat stock to the maturing of Spanish serrano ham.

The following examples show how many foods and dishes contain a relatively high proportion of free glutamic acid:

Food	Natural glutamic acid present (mg/100g)
Chicken	22
Emmental cheese	308
Tomatoes	246
Green peas	106
Mushrooms	42
Stock based on yeast extract	40

The difference between glutamic acid and monosodium glutamate

Glutamic acid is one of many amino acids in yeast extract. It occurs in all high-protein and many ripe foods and is an integral element of our daily diet. Yeast extract normally contains 5% glutamic acid. This is not to be confused with the flavour enhancer monosodium glutamate (MSG), which is an isolated pure substance made of 100 per cent sodium salt from glutamic acid, and is defined as a flavour enhancer and additive by EU food legislation.

Natural ingredients such as tomatoes, cheese, soy sauce and yeast extract have a much broader unique flavour and are designated as ingredients in their own right, for example tomato purée, cheese powder and yeast extract.

What links yeast extract and monosodium glutamate is that they are metabolised by the human body in the same way.

For more information on this aspect, EURASYP turned to a relevant expert, Professor Achim Stiebing – Director of the Institute for Food Technology NRW at the Ostwestfalen-Lippe University of Applied Sciences, Vice-President of the German Agricultural Society and member of the board of trustees at the Warentest Foundation.

Yeast extract is criticized as an ingredient because it contains the amino acid glutamic acid. What is your assessment of the use of yeast extract in food production?

Yeast extract contains proteins and carbohydrates as well as macronutrients such as vitamins and minerals. The amount of glutamic acid is small – usually less than 5%. Yeast extract is a natural ingredient and not an additive. I see many advantages in using yeast extract in food production – both in my professional role and as a consumer – because given the right dosage, it can perfectly round off the unique flavour of a savoury dish.

Through which ingredients does natural glutamic acid end up in foodstuffs?

Glutamic acid occurs naturally in numerous foods – even unprocessed ones. For example, meat, fish and dairy products as well as some types of vegetable all contain glutamic acid. Particularly high concentrations can be found in parmesan cheese and soy sauce, which are widely used for seasoning dishes in home cooking.

How does natural glutamic acid change the flavour of a foodstuff? What effect is achieved?

If glutamic acid is used as an isolated pure substance, it is considered an additive and labelled as a flavour enhancer in the list of ingredients. This enhances the unique flavour of the dish. The taste sensation called "umami" can be translated as "meaty", "savoury" or "flavoursome" and is also triggered by natural glutamic acid. Umami is

now considered one of the five recognised tastes alongside sweet, sour, salty and bitter. Natural glutamic acid has the effect of enhancing flavours, which also allows for lower salt content in foods without having to accept noticeable adverse effects on taste.

Does the food industry want to achieve particularly high amounts of glutamic acid by developing recipes and adding ingredients such as yeast extract?

Yeast extract is not used calculatingly but as a seasoning ingredient. The dosage is different depending on the desired effect: the amount added to round off the flavour of a dish is very small, but a much larger dose is required in order to recreate a stock-like flavour, for example in a vegetarian dish. The myth that glutamic acid could cover up the inferior quality of an industrially produced foodstuff is simply false.

Labelling

Yeast extract is used as seasoning and for rounding off flavours. As a result of this function, EU guidelines designate yeast extract as an ingredient rather than an additive. You will find it on lists of ingredients as "yeast extract" or "natural aroma". If yeast extract is added to food for nutritional reasons, "yeast extract" is a universally accepted common name that can be added to the list of ingredients. Both designations are based on the requirements of EU food regulation 1334/2008.

Yeast extract is a natural ingredient that contains glutamic acid. Glutamic acid is one of several amino acids that is present in yeast extract as well as other savoury foods such as tomatoes and cheese. At 5%, the proportion of glutamic acid in yeast extract

is quite low compared with other foods that we eat every day. Yeast extract contains the micronutrients of a yeast cell, vitamins and minerals, and in addition to the amino acid glutamic acid contains other protein fragments that likewise contribute to its characteristically intense flavour. The flavour of yeast extract is similar to that of a home-made stock.

This is not to be confused with the flavour enhancer monosodium glutamate (MSG), which is an isolated pure substance made of 100 per cent sodium salt from glutamic acid, and is defined as a flavour enhancer and additive by EU food legislation. Yeast extract is a natural ingredient and is different from MSG, which does not have its own flavour and is only used to enhance existing aromas.

Which foods is yeast extract used in?

Yeast extract is used in modern vegetarian and vegan cuisine and in many products that are available in supermarkets. For example, it is used to refine sauces, stocks, soup, meat dishes, ready-meals and savoury snacks. In the countries of the Commonwealth, savoury yeast extract is a popular sandwich

spread. In other countries, yeast extract is gaining popularity, particularly among those who enjoy vegetarian and vegan cuisine. Yeast extract is available to consumers in supermarkets, organic stores and health food stores.

An overview of the most important aspects of yeast extract

- ✓ Yeast extract is a savoury ingredient that is extracted from fresh yeast
- ✓ Yeast extract is a vegan product and suitable for plant-based cooking
- ✓ Yeast and yeast extract have been used in cooking for more than 75 years
- ✓ Yeast extract has a strong umami flavour that lends an especially hearty taste to vegan cuisine in particular
- ✓ Yeast extract contains glutamic acid, one of many amino acids in yeast extract, which occurs in all high-protein and many ripe foods and is an integral element of our daily diet.
- ✓ Glutamic acid is not to be confused with the flavour enhancer monosodium glutamate (MSG), which is an isolated pure substance made of 100 per cent sodium salt from glutamic acid, and is defined as a flavour enhancer and additive by EU food legislation.
- ✓ Yeast extract is used as seasoning and for rounding off flavours.
- ✓ In accordance with EU food legislation, yeast extract is specified either as “yeast extract” or “natural aroma” on lists of ingredients.

About EURASYP

“EURASYP” is the abbreviation for the European Association for Specialty Yeast Products, which represents the political and economic interests of its members. One of the association’s main goals is to disseminate information to the public, to strengthen the awareness of specialty yeast products – including yeast extract – as an ingredient in a wide variety of products and dishes.

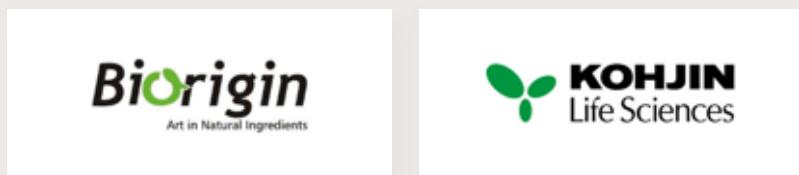
Yeast products specifically used for the production of bread, beer and wine fall under the scope of other professional organisations, such as Cofalec.

Members

EURASYP represents leading producers of specialty yeast products. Together they provide most of the European market with a broad range of yeast-based ingredients.



Associate members



EURASYP

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