INDUSTRIAL FERMENTATION

Nitrogen, Carbohydrates and Processing Aids

SOLUTIONS TO ADVANCE AND OPTIMIZE PRODUCTION

ROQUETTE

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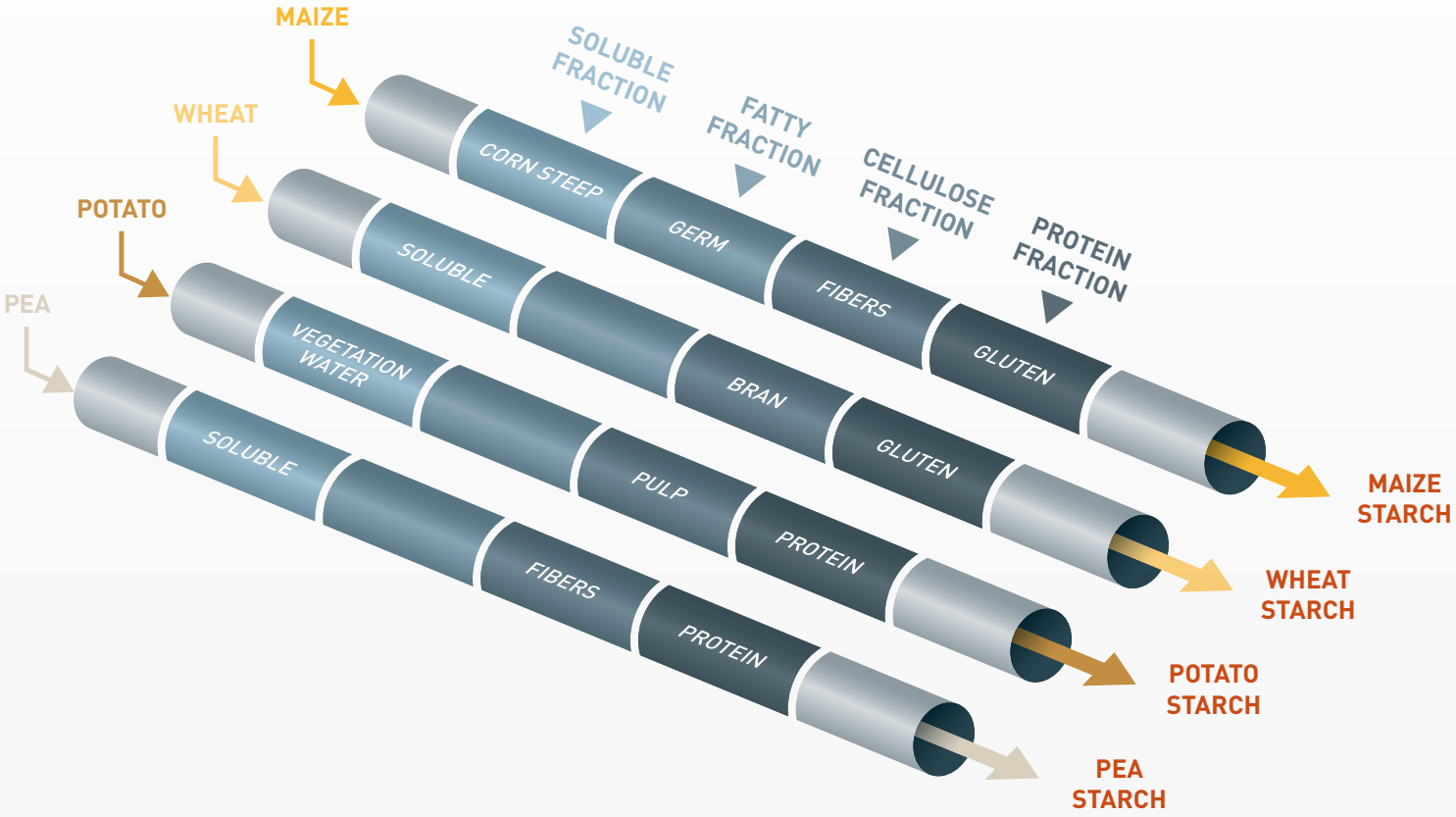
TABLE OF CONTENTS

INTRODUCTION

Maize, wheat, potato and pea have the ability to accumulate reserve substances as starch molecules.

Products obtained from starch hydrolysis and their derivatives, constitute a range of sugars that are increasingly used in the fermentation industry as key substrate.



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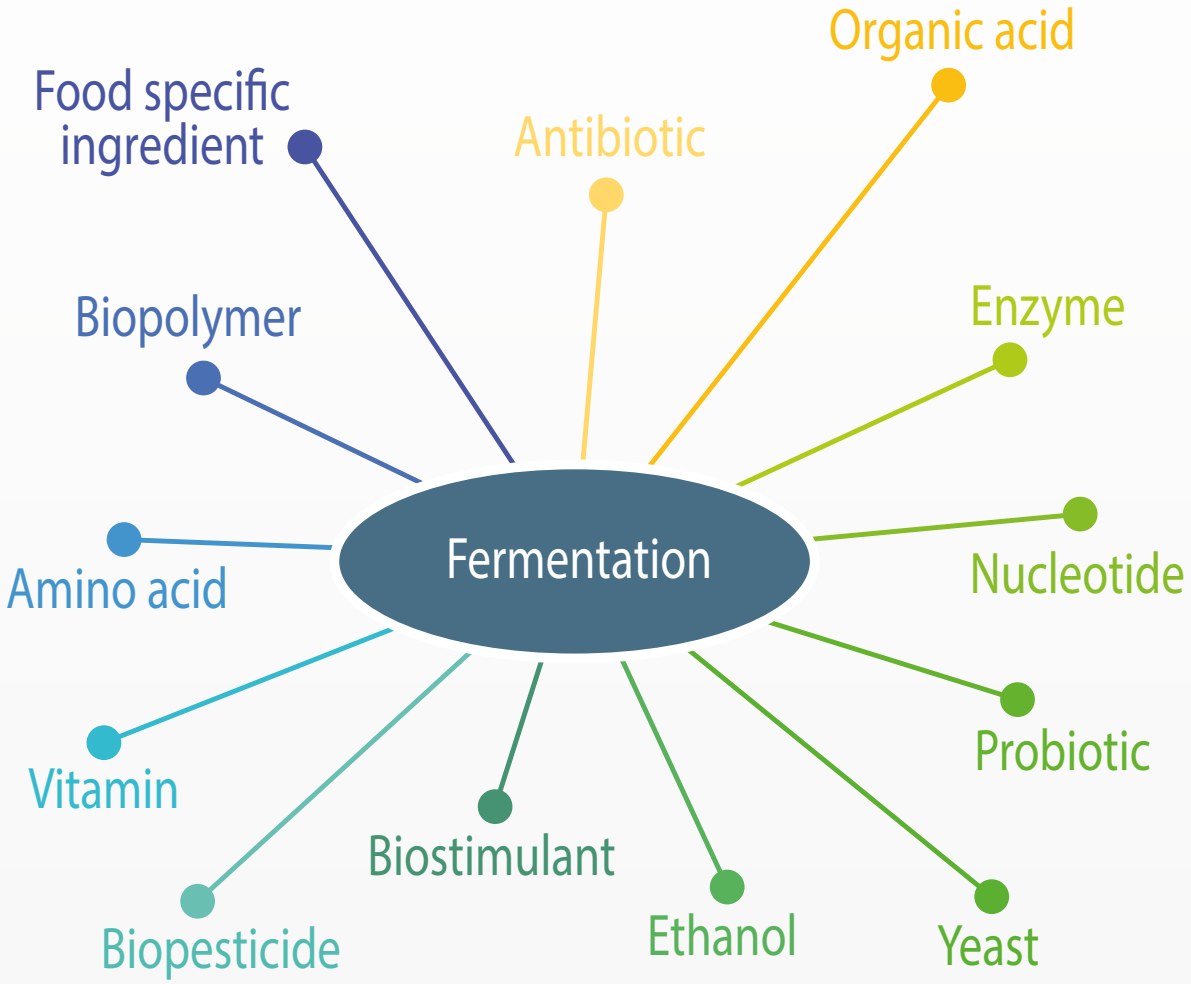
INDUSTRIAL FERMENTATION APPLICATIONS

Markets we serve

Biological science is encountered everywhere: from probiotics to biofuel to laundry detergent. It is driven by the critical need to develop alternatives to petrol-based products and our obligation to be environmentally responsible.



Industrial fermentation relies on the cultivation of living cells for the production of biomass (yeast or probiotic as an example), or biomolecules of interest (enzyme, antibiotic, amino acid, etc.).

Nutrition when dealing with microorganisms is a constant challenge due to the nature of **biological processes**. We provide cost-effective solutions to stabilize and advance industrial fermentations.

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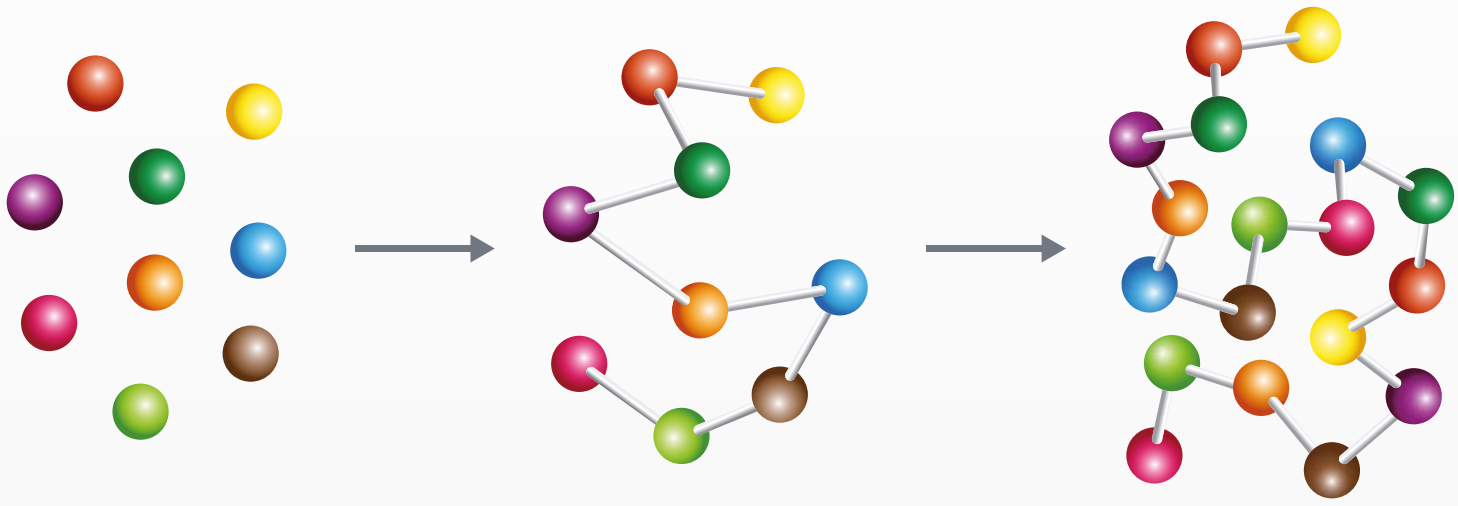
OVERVIEW

Culture medium requires key biological elements which **encourage the growth of microorganisms**. In addition to carbohydrates used as a source of energy, living cells need critical components to **optimize the performance** of their metabolism.

Organic nitrogen (proteins) and growth factors are critical for industrial fermentation processes. These elements act as building blocks and messengers within the microorganism, **guaranteeing a high rate of production** for the molecule of interest.

How microorganisms use amino acids as building blocks



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SOLULYS®: Corn Protein Extract

FUNCTIONALITIES

SOLULYS® is a unique vegetable-based protein extract valued for its **nitrogen and critical growth-factor content.** The amino acids, peptides, vitamins, and trace elements contained in the corn kernel are not only essential to the growth of the plant, but also to the growth and development of microorganisms. SOLULYS® is used in a wide **variety of applications across the fermentation industry** for yeast, E. coli, fungal, and bacterial systems.

Culture medium requires key biological elements which encourage the growth of micro-organisms.

In the laboratory, **yeast extracts or peptones** are generally used to meet these needs. However, on an industrial scale, the price of these products can be cost prohibitive. The SOLULYS® product line has become one of the most commonly used growth factors in the world due to its production at **industrial scale, performance and cost effectiveness.**

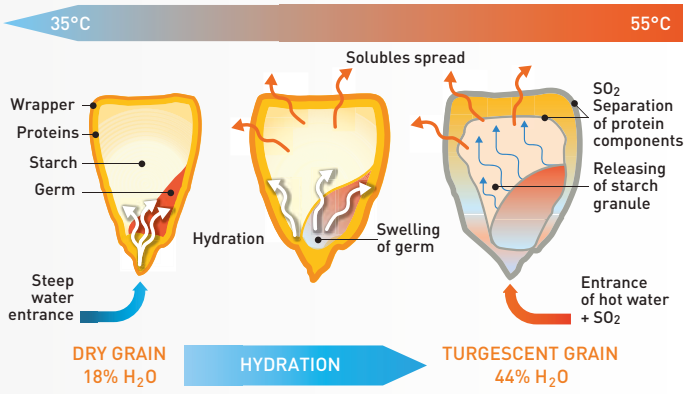
DEFINITION

SOLULYS® is produced during a patented biochemical process that includes a controlled fermentation stage, resulting in a product with **consistent composition** and no observed seasonal variability. The strong acidity, osmotic pressure and low reducing sugar content guarantee the **stability of the final product**.

SOLULYS® is the result of three consecutive stages:

- Diffusion of soluble compounds (elements present in the corn kernel).
- A controlled lactic acid bacterial fermentation.
- Concentration of the soluble fraction to 48% at low temperature, to prevent degradation of the finished 048 product.

(A fourth spray-drying stage is used to produce the powdered 095 product).



RANGE

Liquid and powder solutions

- **SOLULYS® 048:** corn extract at 48% dry matter.
- **SOLULYS® 048P:** corn extract with available phosphorous at 48% dry matter.
- **SOLULYS® 095:** corn extract powder at 95% dry matter.

PRODUCT INFORMATION

Specifications*:

	SOLULYS® 048	SOLULYS® 095
Dry extract	48%	95%
pH	4	4.2
Total acidity (expressed as lactic acid)	23%	17%
Reducing sugars	1% max.	1% max.
Amino nitrogen	2.5%	2.5%
Total nitrogen	7.1%	7.8%
Proteins (N x 6.25)	45% env.	48% env.
Ash	19%	16%

(*) Indicative values

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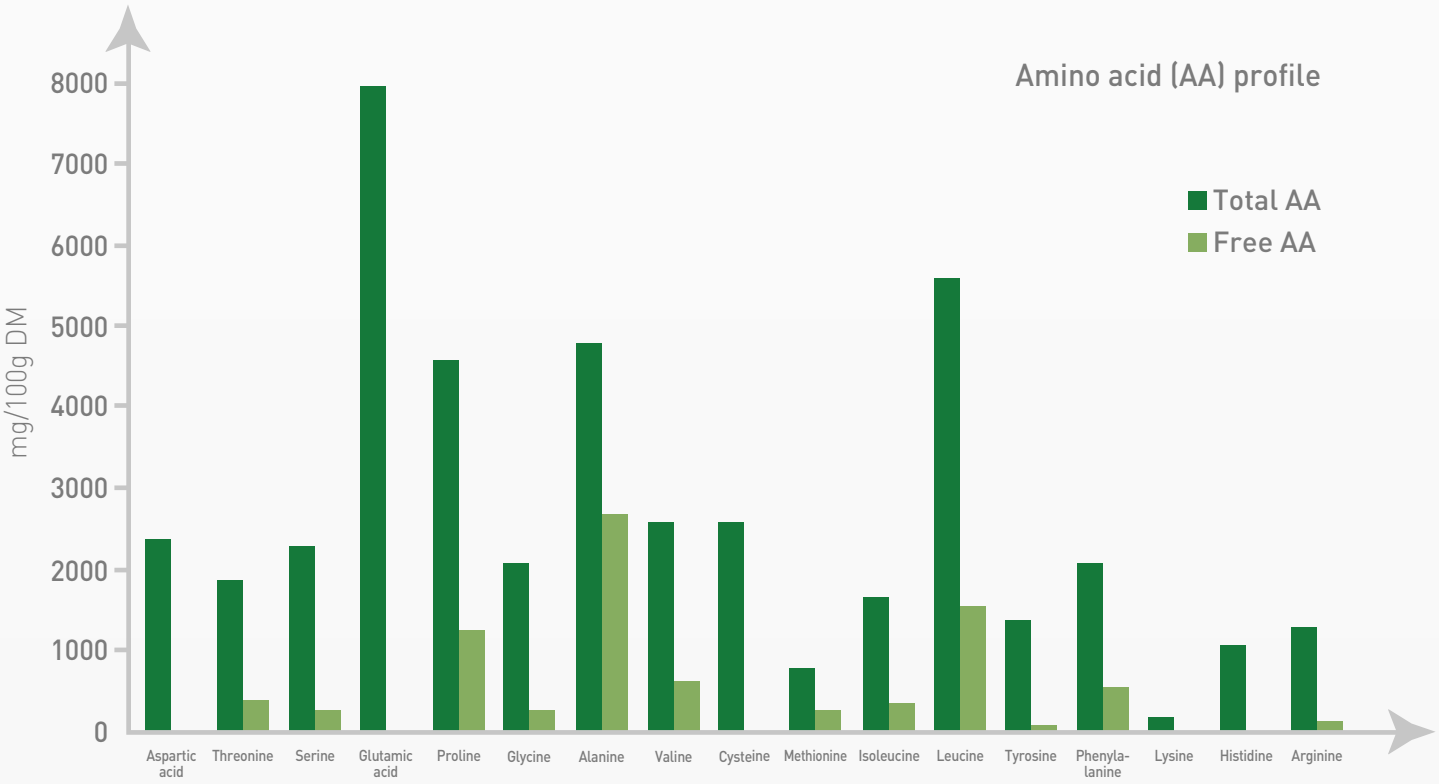
SOLULYS®: Corn Protein Extract

PRODUCT INFORMATION

Specifications*:



Vitamins*	Range	Unit (dry matter)
Thiamin (Vit B1)	0.06	mg/100g
Riboflavin (Vit B2)	0.2	mg/100g
PP (Vit B3)	2.2	mg/100g
Pantothenic acid (Vit B5)	1.4	mg/100g
Pyrodoxin (Vit B6)	3	mg/100g
Cholin (Vit B7)	216	mg/100g
Biotin (Vit B8)	8	ug/100g
Folic acid (Vit B9)	124	ug/100g
Cyanocobalamin (Vit B12)	1.8	ug/100g

Minerals*	Range (%)
Calcium (Ca++)	0.06
Magnesium (Mg++)	1.4
Phosphorus (P+)	3.4
Potassium (K+)	5.3
Sodium (Na++)	0.6

(*) Typical values

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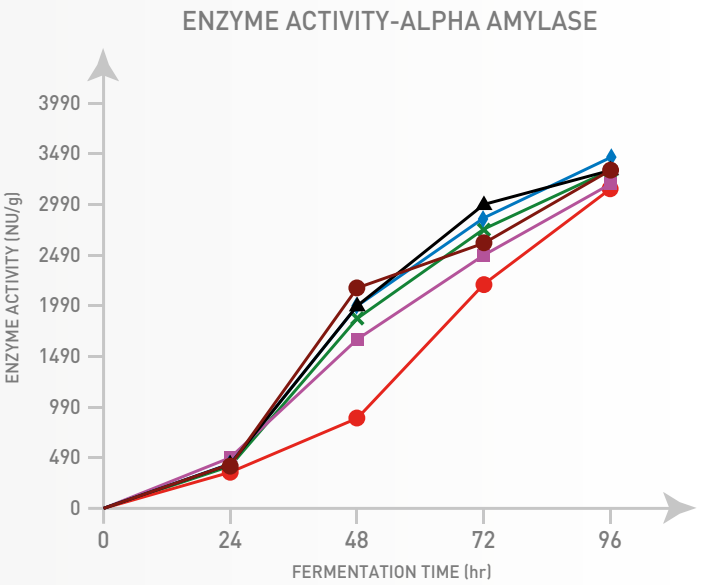
SOLULYS®: Corn Protein Extract



	0	24	48	72	96
SOLULYS® 095	0.0	386.1	1945.6	2787.2	3414.4
Yeast Extract 1	0.0	460.3	1687.5	2464.0	3244.8
Yeast Extract 2	0.0	451.2	1890.1	2998.4	3273.6
Yeast Extract 3	0.0	361.6	898.1	2144.0	3139.2
Yeast Extract 4	0.0	362.7	1798.4	2723.2	3305.6
UF Yeast Extract	0.0	408.0	2116.3	2614.4	3312.0

Cost model:

	% Formulation	kg	$ / kg	Total cost $	% Increase
SOLULYS® 095	4.50	100	3	300	n/a
Yeast extract 1	3.50	78	6.5	507	69
Yeast extract 2	3.20	71	6.5	462	54
Yeast extract 3	3.75	83	6.5	540	80
Yeast extract 4	2.80	62	6.5	403	34
UF Yeast extract	3.50	78	8.5	663	121

CAS Number:

- 66071-94-1

Quality information:

- Non-GMO*
- Kosher
- Halal
- ISO 9001
- BSE
- TSE

Packaging available:

- Bulk
- Big bag
- 20/25 kg bag
- Drums

Alternatives to be evaluated upon request.

Manufacturing:

- Europe
- America

Storage conditions and sterilization:

We recommend to preserve the product in its unopened original packaging, preferably protected from wide variation of T° and humidity.
To limit precipitation during sterilization, diluting the SOLULYS® and adjusting the pH during fermentation is recommended.
Our technical team will enjoy sharing with you some guidance.

(*) According to EU regulation 1829/2003 - 1830/2003

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TUBERMINE®: Potato Protein

FUNCTIONALITIES

TUBERMINE® is a potato protein isolate used as a **nitrogen source** in media formulations for industrial fermentation applications. It is often used in processes for the production of:

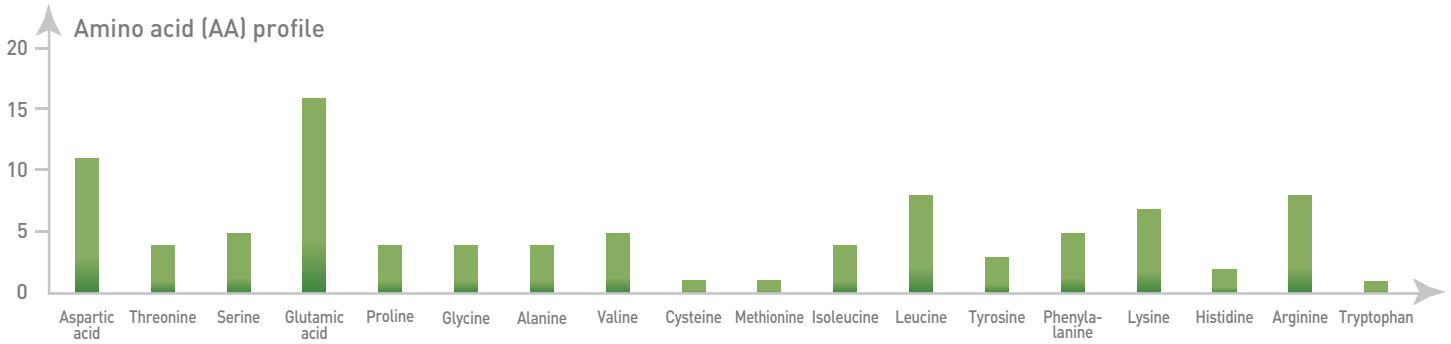
- Enzyme
- Probiotic
- Organic acid

It is an ideal solution and substitute for any source of protein thanks to its diverse and **well balanced amino acid profile**. Microorganisms with protease activity, like Bacillus or Trichoderma, will perform exceptionally well on TUBERMINE®.

RANGE

- **TUBERMINE® FV:**
  fine particle lower than 50 microns.
- **TUBERMINE® GP:**
  standard particle distribution.

PRODUCT INFORMATION



	ASP	THR	SER	GLU	PRO	GLY	ALA	VAL	CYS	MET	ISO	LEU	TYR	PHE	LYS	HIS	ARG	TRY
Total AA (g)	10	4.5	4.5	8	4	4	4	5	1.5	2	4.5	8	4.5	5	6	1.5	4	1

Specifications*:

	TUBERMINE®
Appearance	Off-white, yellowish powder
Loss on drying	10% max.
Protein (Nx6.25)	76% min.
pH in solution 10%	4.5 - 5.5
Particle size / Residue on 50 µ	2% max.
Ash	3% approx.*
Crude fat	2% approx.*

(*) Indicative values

CAS Number:

- 212520-82-6

Quality information:

- Kosher
- Halal
- Non-GMO*
- ISO 9001
- BSE/TSE

Packaging available:

- Big bag and 25 kg bag

Alternatives to be evaluated upon request.

Manufacturing:

- Europe

(*) According to EU regulation 1829/2003 - 1830/2003

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NUTRALYS® AND LYSAMINE®: Pea Protein

FUNCTIONALITIES

NUTRALYS® and **LYSAMINE®** are our pea protein isolates and concentrates used as an **organic nitrogen source** during various fermentations like:

- Enzyme
- Antibiotic
- Probiotic
- Amino acid

They are **ideal solutions to substitute traditional protein sources** like soy and casein with:

- Similar **nutrition profile to soy and casein**
- Similar performance and notable advantages
- Not a major allergen*
- Non-GMO**
- Non-animal
- Environmentally friendly

RANGE

- **LYSAMINE® GPS:**
  Pea protein concentrate.
- **NUTRALYS® S85:**
  Pea protein isolate available in multiple particle sizes.
- **NUTRALYS® H85:**
  Pea protein hydrolyzate containing a high portion of free amino acid and peptides.

Fermentations using **NUTRALYS® H85** saw reduced foaming and improved solubility.

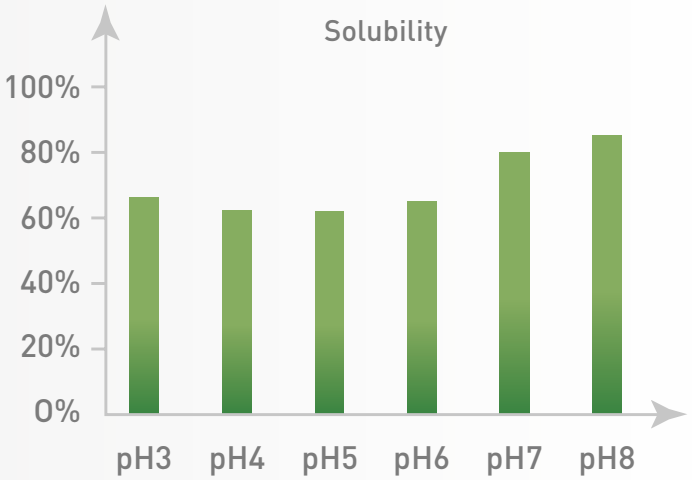
* According to EU regulation 1169/2011
** According to EU regulation 1829/2003 - 1830/2003

PRODUCT INFORMATION

Specifications*:

	NUTRALYS®
Appearance	Off-white powder
Loss on drying	8% max.
Protein (Nx6.25)	76% min.
Ash	5% approx.*
pH in solution	7% approx.*

(*) Indicative values



NUTRALYS® H85:
Concentration evaluated from 1% to 10%

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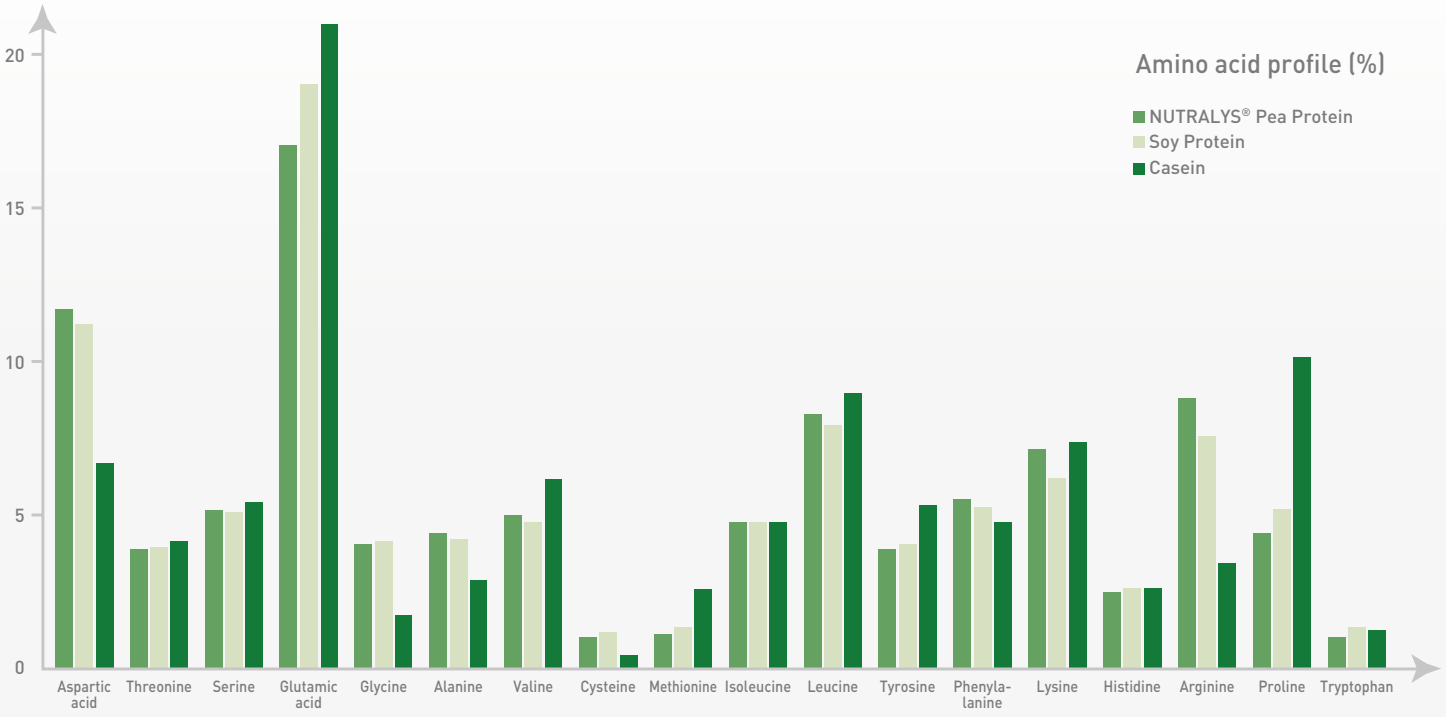
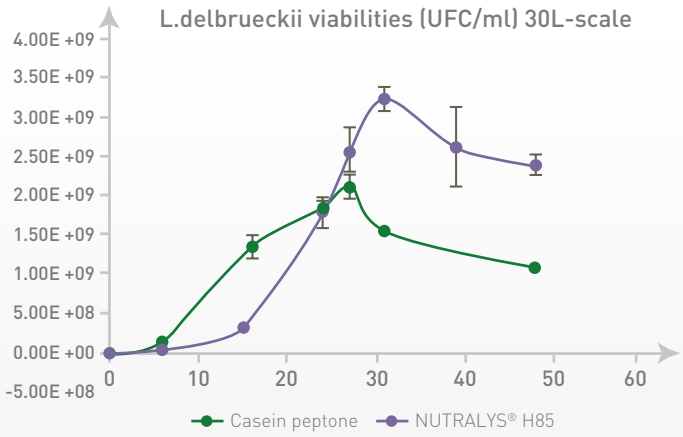
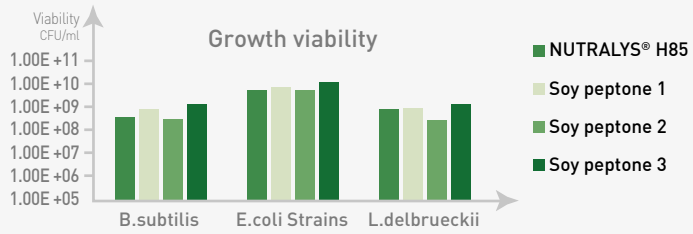
NUTRALYS® AND LYSAMINE®: Pea Protein

PRODUCT INFORMATION

Specifications*:







CAS Number:

- 90082-41-0

Quality information:

- Kosher
- Not a major allergen*
- Non-GMO**
- Food application

Packaging available:

- Big bag
- 20/25 kg bag

Alternatives to be evaluated upon request.

Manufacturing:

- Europe
- Canada

(*) According to EU regulation 1169/2011
(**) According to EU regulation 1829/2003 - 1830/2003

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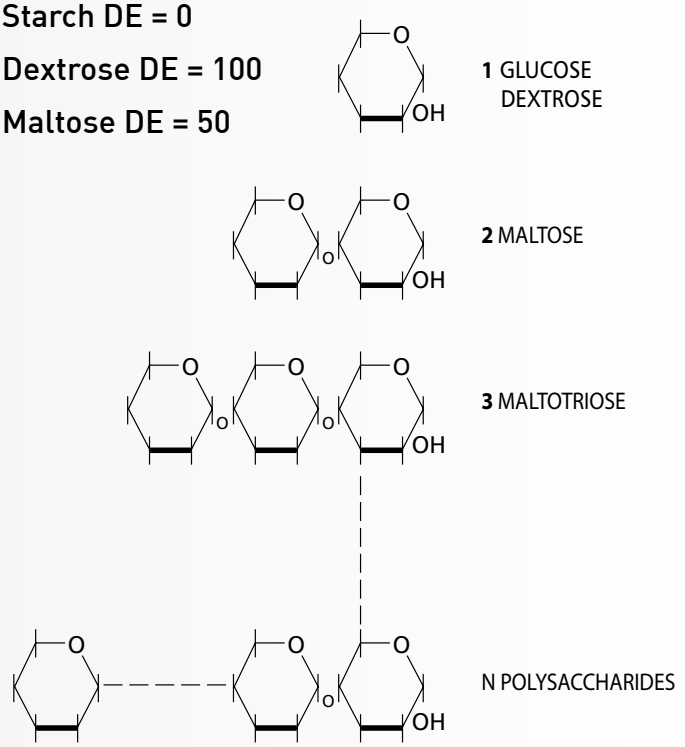
OVERVIEW

Dextrose Equivalent (DE) is often used to quantify the value of polysaccharide.
It is the reducing power of 100 grams of hydrolysate expressed as Dextrose Equivalent or DE (pure D-glucose).

Starch DE = 0

Dextrose DE = 100

Maltose DE = 50



CATEGORIES

Our solutions	Dextrose Eq	Form
Dextrose	Pure dextrose	Liquid and powder
Glucose syrups	45 to 95 DE	Liquid
Maltodextrins	1 to 47 DE	Liquid and powder

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DEXTROSE

FUNCTIONALITIES

Dextrose is the crystallized form of D-glucose. It is obtained from the starch hydrolysis. **Glucose** is one of the fundamental molecules of life that microorganisms **use to gain energy, grow and produce key biomolecules**.

DEFINITION

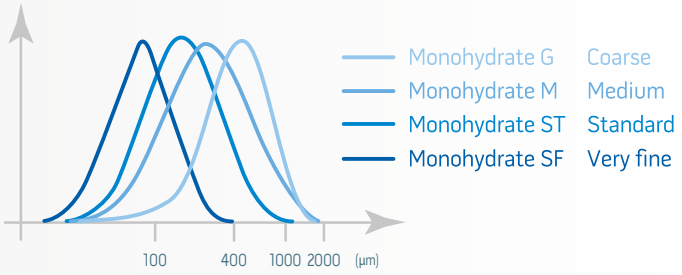
Dextrose is a white powder available in two crystalline forms and also in liquid form:

- **Dextrose monohydrate** contains a water molecule and crystallizes in plates.
- **Anhydrous dextrose** does not contain water and forms prism-shaped crystals.
- **Dextrose liquid** containing dextrose at a concentration of 70% dry matter.

RANGE

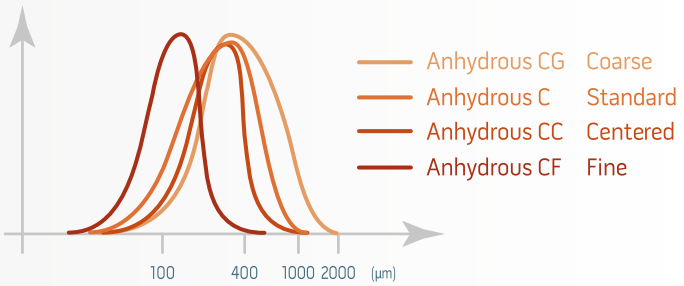
ROQUETTE dextrose monohydrate

In order to best meet the needs of your application, ROQUETTE offers you a range of **dextrose monohydrate** products with a variety of particle size distributions.



ROQUETTE anhydrous dextrose

The ROQUETTE range includes various grades of **anhydrous dextrose** which differ mainly in their particle sizes.



PRODUCT INFORMATION

Specifications*:

	DEXTROSE
Powder	Dextrose content 99% min.
Liquid	Dextrose content 80% to 99%
pH at 50%	5 approx.*
Powder density	62 kg/l approx.*
Ash	Low content
Granulometry	Available in several forms or granulations to meet process specifications

(*) Indicative values

Our solutions		Glucose	Di- and Polysaccharides	Dry matter
Glucose Syrup 74/904	90DE	84	16	74%
Glucose Syrup 74/968	95DE	94	6	74%
Liquid dextrose	100DE	99	1	70%

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DEXTROSE

Properties:

Consistency:
The rapid development of enzyme technology and implementation of advanced purification techniques (fixed-bed activated carbon, ion exchange resins, ultrafiltration) has enabled ROQUETTE to consistently produce high quality starch hydrolysates.

Solubility:
Readily soluble in water with a negative heat of solution.

Highly Fermentable:
As a monosaccharide, it is the ideal building block for fermentation applications.

High Bacteriological Purity:
Syrups shipped and stored in temperature controlled tanks at 55°C.

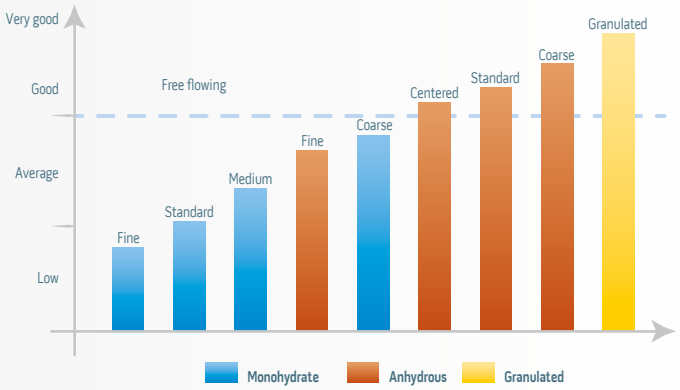
Non-seasonal:
Available in powder or liquid form all year round.

Sterilization:
Promotes browning in the presence of nitrogen substances, often sterilized separately to reduce Maillard reactions.

Sustainable:
The high quality and performance of ROQUETTE products rely on the very high standards required at every stage of the raw material conversion process.These standards all conform to ROQUETTE's sustainability policy and include :

- Long-standing,trustworthy relationships with local suppliers.
- Comprehensive traceability of raw materials and end-products.
- Conversion processes that provide competitive, renewable and environment-friendly solutions.

Flowability:
The flowability characteristics of a powder depend on the shape of crystals and on the size of particles. ROQUETTE has developed dextrose powders with flowability characteristics which meet customers' needs.



CAS Number:

- **Glucose syrup:** 8029-43-4
- **Dextrose Monohydrate:** 14431-43-7
- **Dextrose Anhydrous:** 50-99-7

Quality information:

- Halal
- Kosher
- Non-GMO*
- Human Nutrition: FSSC 22000

Packaging available:

- 25 kg
- 500 kg
- 1000 kg
- Bulk
- 2000 lbs

Alternatives to be evaluated upon request.

(*) According to EU regulation 1829/2003 - 1830/2003

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MALTODEXTRINS

FUNCTIONALITIES

Maltodextrins are branded as **GLUCIDEX®** and correspond to specific starch hydrolysis processes.

Grades of **GLUCIDEX®**, standardized as Dextrose Equivalent, are used to control saccharide and oligosaccharide needs for multiple fermentation processes.

RANGE: GLUCIDEX®

There is a large range of maltodextrins which extend from 3 to 20 Dextrose Equivalent.
The **GLUCIDEX® IT** range are granulated products to facilitate handling during media preparation.

MAIN GRADES

TYPE	1 Potato based	2 Waxy Maize based	6 Waxy Maize based	9 Potato based	12	17	19	21	29	33	38	39	40	47
Dextrose Equivalent (D.E.)	5 max.	5 max.	5 to 8	8 to 10	11 to 14	15 to 18	18 to 20	20 to 23	28 to 31	31 to 34	36 to 40	38 to 41	38 to 42	43 to 47
Loss on drying (minimum %)	6	6	6	5	5	6	5	5	5	5	5	5	5	5
Carbohydrate composition														
Glucose (%)	0.2	0.2	0.2	0.2	1	1	2	1.5	8	11	15.5	2	16	2
Maltose (%)	0.5	0.5	1	1.5	3	4	5	6	8	10	12	32	12	45
Oligo and Polysacch. (%)	99.3	99.3	98.8	98.3	96	95	93	92.5	84	79	72.5	66	72	51
Poured bulk density (kg / liter)														
Standard grades	0.40	0.40	0.45	0.45	0.45	0.50	0.50	0.50	0.55	-	-	0.55	0.55	-
IT grades	-	-	0.35	-	0.40	-	0.40	0.40	0.45	0.45	0.50	-	-	0.50

*IT grades = granulated powder for an easier handling dispersion and dissolution.

MALTODEXTRINS

PRODUCT INFORMATION

Specifications*:

	MALTODEXTRINS
Powder	Dextrose content 99% min.
pH at 50%	4 approx.*
Powder density	62 kg/l approx.*
Typical particle sizes are:	
Greater than 250 µ	10% Max.
Greater than 40 µ	50% Min.

(*) Indicative values

Properties:

Consistency:
The rapid development of enzyme technology and implementation of advanced purification techniques (fixed-bed activated carbon, ion exchange resins, ultrafiltration) has enabled ROQUETTE to consistently produce high quality starch hydrolysates.

Solubility:
Readily soluble in water with a negative heat of solution.

Fermentable:
Array of different saccharide distributions, supporting growth or productivity of specific microorganisms.

Non-seasonal:
Available in powder or liquid form all year round.

Sterilization:
Promotes browning in the presence of nitrogen substances, often sterilized separately to reduce Maillard reactions.

Sustainable:
The high quality and performance of ROQUETTE products rely on the very high standards required at every stage of the raw material conversion process. These standards all conform to ROQUETTE's sustainability policy and include:

- Long-standing, trustworthy relationships with local suppliers.
- Comprehensive traceability of raw materials and end-products.
- Conversion processes that provide competitive, renewable and environment-friendly solutions.

CAS Number:

- **Maltodextrin <20 DE:** 9050-36-6
- **Maltodextrin >20 DE:** 68131-37-3

Quality information:

- Halal
- Kosher
- Non-GMO*
- Food grade
- Multiple botanical origin, etc.

(*) According to EU regulation 1829/2003 - 1830/2003

Packaging available:

- 25 kg
- 500 kg
- 1000 kg
- Bulk
- 2000 lbs

Alternatives to be evaluated upon request.

(*) According to EU regulation 1829/2003 - 1830/2003

OVERVIEW

Molecules and biomass synthesized during the fermentation process require **purification and stabilization** in order to be used by consumers.
Starch derivative solutions are generally selected for their physicochemical properties in order to meet a number of industrial requirements.
They are especially efficient for use in **encapsulation, filtration, stabilization and spray drying properties**.

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STABILIZATION AND CRYOPROTECTION

FUNCTIONALITIES AND DEFINITION

Polyols, dextrose monohydrate and maltodextrins are frequently used as **stabilization solutions** in industry. Our plant-based solutions perform well as **cryoprotectant additives** for applications in probiotics and enzyme stabilization during:

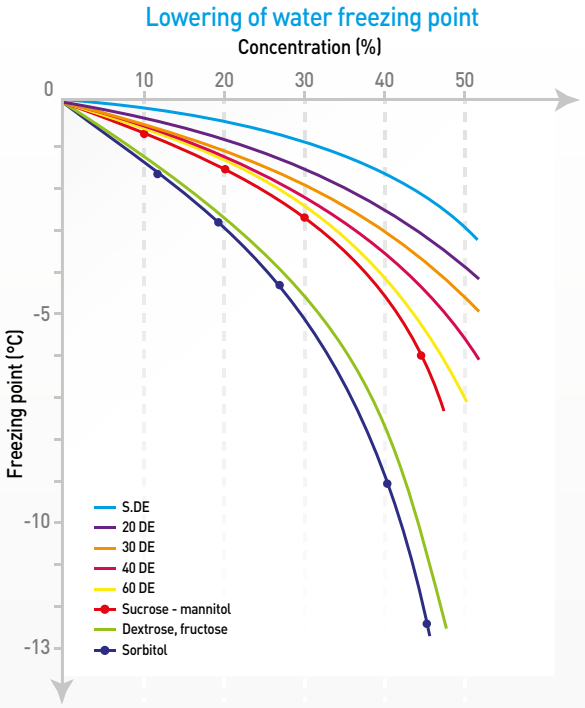
- Storage at low and ultra-low temperatures.
- Ambient storage.
- Freeze-drying.

Polyols like mannitol and sorbitol perform well during the freeze-drying process as they **impact the osmotic pressure** of the solution:

- Mannitol: Freeze-dried powder.
- Sorbitol: Protein stabilization allowing storage at low and ultra-low temperature (enzymes).

Dextrose monohydrate and polyols have the capacity to decrease the freezing point, resulting in a **better controlled freezing process** and ultimately storage at low temperature.

Maltodextrins are used during the lyophilization process, especially the low DE grades, where they **act as lyoprotectant**.



Example:
NEOSORB® 70/07 (sorbitol syrup rich in mannitol) can also be successfully employed in filamentary mycelium development. Due to their loss of reducing power, polyols do not color during long-term storage or during heat treatment (during a sterilization or freeze-drying step for example).

PRODUCT INFORMATION

Specifications*:

Type	1 Potato based	2 Waxy Maize based	6 Waxy Maize based	9 Potato based	12 Maize based	17 Maize based	19 Maize based
Dextrose Equivalent (DE)	5 max.	5 max.	5 to 8	8 to 10	11 to 14	15 to 18	18 to 20
Loss on drying (maximum %)	6	6	6	5	5	6	5
Typical carbohydrate composition							
• Glucose (%)	0.5	0.5	0.5	0.5	1	2	2
• Maltose (%)	0.5	0.5	1	1.5	2	5	7
• Oligo and Polysacch. (%)	99	99	98.5	98	97	93	91
Poured bulk density (kg/liter)	0.40	0.40	0.45	0.45	0.45	0.50	0.50

IT Grades*

	IT 6	IT 12	IT 19
Poured bulk density (kg/liter)	0.35	0.40	0.40

*IT grades = granulated powder for an easier handling dispersion and dissolution.

CAS Number:

- **Dextrose Monohydrate:** 14431-43-7
- **Maltodextrin <20 DE:** 9050-36-6
- **Maltodextrin >20 DE:** 68131-37-3
- **Mannitol:** 69-65-8
- **Sorbitol:** 50-70-4

Packaging available:

- Big bag and bags
- Dextrose also in bulk

Alternatives to be evaluated upon request.

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SPRAY DRYING AND GRANULATION

FUNCTIONALITIES AND DEFINITION

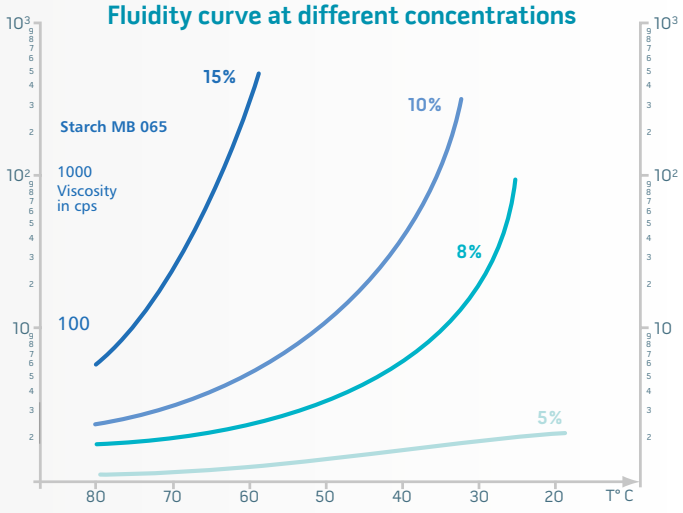
Maltodextrins and dextrins are largely used thanks to their variety of profiles and origin. Dextrose is also available as a potential carrier in a variety of formulations. These products are generally used in granulation processes as they are partially to entirely soluble and **meet requirements for viscosity process compatibility**.

FOR MORE VISCOSITY:

Roquette dextrins	Raw material	Viscosity obtained
TACKIDEX® B 167	Potato	240 - 720 mPa.s
TACKIDEX® C 166	Potato	4440 - 6360 mPa.s
TACKIDEX® B 039	Maize	3600 - 6000 mPa.s
TACKIDEX® B 056	Maize	1680 - 3120 mPa.s

Our plant-based solutions, **GLUCIDEX®** (maltodextrin) and **TACKIDEX®** (dextrins), provide the **ability to formulate and stabilize compounds** of interest while meeting requirements like food-grade, kosher and halal certification, non-GMO and many more.

ROQUETTE offers a **full complement of starches and modified starches** for use as **processing aids**. Starch MB 065 is prepared from standard maize.



This type of fluid starch is highly soluble with low viscosity at elevated temperatures, but retrogrades to a large extent when the medium is cooled.

This allows for **easy-to-prepare culture broths** containing up to approximately 100 grams/liter.

Reproducibility is guaranteed by series of viscosity measurements that are carried out at the end of the treatment and preparation process.

Our **PREGEFLO®** product line provides a range of cold water soluble modified starches.

ROQUETTE **potato starch** is used for a variety of **spray drying**, **granulation and filtration applications**.

PRODUCT INFORMATION

CAS Number:

- **Dextrins:** 9004-53-9
- **Maltodextrin <20 DE**: 9050-36-6
- **Pregel:** 9037-22-3
- **Starch MB:** 65996-63-6

Packaging available:

- Big bag & bags

Alternatives to be evaluated upon request.

ENCAPSULATION

FUNCTIONALITIES AND DEFINITION

ROQUETTE has developed a wide range of **carriers for encapsulation** using a variety of **vegetable sources**. Our solutions are designed to solubilize a large range of molecules particularly for processes that use **spray drying, lyophilization and blending**.
Encapsulation carriers can be chosen based on a variety of criteria, including oxidation resistance, amylose content, flavor retention, solubility, dispersion, viscosity and impact on glass transition points.

PRODUCT INFORMATION

KLEPTOSE® (Betacyclodextrin) is very stable in alkaline conditions or in the presence of enzymes (amylases). It is frequently used for its inclusion and association capabilities, which aid in:

- The **solubilization** of organic compounds.
- The **stabilization** of volatile compounds.
- The **complexation** of organic substrates in order to facilitate the **purification** of fermentation media.
- The **protection** of sensitive molecules against oxygen, light or temperature variations, etc.
- The **emulsification** of lipid-based products

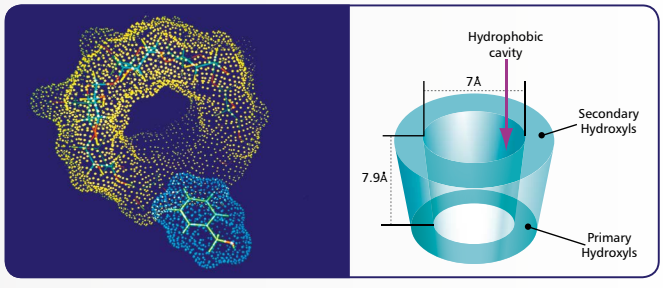
KLEPTOSE® LINECAPS is a pea-based maltodextrin widely used for molecular encapsulation of a large range of molecules. It is also applicable to blend with **CLEARGUM® CO** (octenyl succinate starch) in order to enhance the encapsulation protective power.

PROPERTIES OF KLEPTOSE®

CAS registry N°	7585-39-9
Molecular formula	$C_{12}H_{70}O_{33}$
Molecular weight	1/35
Aspect: White crystalline powder	
Assay % (on dry matter)	min. 99
Water content %	max. 14
Decomposition point	260°C (N2)
Bulk density	approx. 0.7
Optical rotation	160° to 164°
Solubility in water at 20°C at 50°C at 80°C	1.6 g/100 ml 7.5 g/100 ml 25 g/100 ml

Soluble in nucleophilic solvents (DMF, DMSO)

Three-dimensional representation of BETA-CYCLODEXTRIN



ROQUETTE
Offering the best of nature™

ENCAPSULATION

PRODUCT INFORMATION

The **CLEARGUM® CO** product line (octenyl succinate starch) is comprised of amphiphilic polymers supporting emulsions with non-miscible substrates or biomolecules.
CLEARGUM® makes it possible:

- **To stabilize an emulsion before spray drying** a product.
- **To facilitate the incorporation of hydrophobic products** into a recipe for substrates or culture medium.
- **To facilitate the encapsulation of certain flavors** before the end product is dried.

ALBUREX® is a modified potato protein allowing the **creation of emulsions for stabilization of compounds** like vitamins or enzymes.

Products	Emulsifier power* (ml)	Viscosity (mPa.s)
Arabic gum	1282	112
Vegetal proteins	1550	1200
Lecithin	1162	800
CLEARGUM® CO 01	1566	1600

* Quantity of emulsified oil at 1 % solution of emulsifier component

Vitamin A encapsulation

▪ Ingredients

	Composition in weight	Composition of the final product
Vitamin A	10.3	20.0
VITEN® CWS	10.0	19.4
CLEARGUM® CO 01 modified starch	19.7	38.2
GLUCIDEX® 19 D	10.0	19.4
Water	50.0	3.0
	------	------
	100.0	100.0

▪ Method

- Warm water to 50°C.
- Disperse the modified starch in the water while mixing; mix for 20 minutes.
- Add vitamin A.
- Strongly mix the mixture.
- Homogenize to obtain droplets of less than 1 micron diameter.
- Spray drying (entry temperature 170°C; outlet temperature 70°C).

CAS Number:

- **Betacyclodextrins:** 7585-39-9
- **KLEPTOSE® LINECAPS:** 9050-36-6
- **CLEARGUM®:** 52906-93-1
- **ALBUREX®:** 100209-45-8

Packaging available:

- Big bag & bags

Alternatives to be evaluated upon request.

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For more information, please contact us at:

www.roquette.com

Request a sample

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