Rousselot[®] Gelatine

Improvement by nature





A natural food

Gelatine is a natural and healthy ingredient that has been used for ages in a large number of applications either food, pharmaceutical or technical.

Some definitions of Gelatine...

American Pharmacopoeia-USP 35 NF 30

"...a product obtained by the partial hydrolysis of collagen derived from the skin, white connective tissue, and bones of animals."

European Pharmacopoeia EP7

"...a purified protein obtained either by partial acid hydrolysis (type A) or partial alkaline hydrolysis (type B) or enzymatic hydrolysis of collagen from animals including fish and poultry. It may also be a mixture of different types."

Food Chemical Codex 8

"...a product obtained from the acid, alkaline or enzymatic hydrolysis of collagen, the chief protein component of the skin, bones, and connective tissues of animals including fish and poultry."



Gelatine: a unique amino acid composition

Nutritional value

Gelatine is a totally digestible protein of low calorific value (17 kJ/g or 4 kcal/g). It is composed of more than 85 % protein, less than 13 % water and less than 2% minerals. It is fully digestible and contains 18 different amino acids, including 8 out of the 9 essential amino acids, the exception being tryptophan. It is particularly rich in glycine, proline and hydroxyproline, which together represent almost 50% of the composition of the molecule and give gelatine its unique properties. Hydroxyproline is an amino acid specific to gelatine and collagen.

Properties & Characteristics

Gelatine is a natural colloidal protein having gelling properties and a stabilizing effect. These depend on its type, its concentration and its pH, as well as on the conditions of temperature.

Compatible food

Gelatine is water-soluble and compatible with most other hydrocolloids, including vegetable colloids such as agar-agar, alginates, carrageenans or pectins. It is compatible with sugars, corn syrups, edible acids and flavors.

Characteristics

Bloom (gel strength)

A main characteristic used to describe gelatine is the Bloom. Bloom is linked to the mechanical elasticity of the gelatine gel. It is based on the re-arrangement of individual gelatine chains into an ordered network. Bloom testing uses a standardized measurement. The Bloom indicates the force required to depress a prescribed area of the surface of a 6.67% gelatine gel at 10°C (50°F) to a distance of 4 mm.

The values for Rousselot® gelatines range from 75 to 300-grams and gelatines are described as:

- High bloom (gel strength above 200-grams)
- Medium bloom (gel strength between 120 and 200-grams)
- Low bloom (gel strength less than 120-grams). Bloom may be null for hydrolyzed gelatines.

Viscosity

Viscosity is an important factor regarding the rheological behavior of a gelatine solution. Once dissolved in water above its setting temperature, gelatine will yield solutions typically ranging from 1.5 to 7.5 mPa.s. Viscosity is measured by a standardized method and indicates the flow time of 100 ml of a 6.67% gelatine solution at 60°C (140°F) through a standard pipette.

Melting point

The melting point corresponds to the temperature at which gelatine melts into solution.

Residue on ignition (ash)

Percentage of residue after ashing at 550°C (1022°F) during 17 hours.

Isoelectric point

The isoelectric point is defined at the pH at which positive charges (from NH2 radical) equal negative charges (from COOH radical), and there is no movement in an electric field.

Turbidity/clarity

Clarity of the gelatine solution/gel is critical in a wide range of applications. It also indicates the efficiency of the filtration stage during the processing.

Color

Color depends on the raw materials, treatment and nature of the extracted gelatines. Color is evaluated by visual observation and comparison with a range of control color scale.

Microbial content

Rousselot[®] Gelatine quality is controlled on the production line. It conforms to the most stringent food standards and pharmacopoeias.

Stability

Dry gelatine keeps its properties at least five years when stored away from heat and moisture in its original unopened packaging.

Solubility

Solubilization of gelatine is easy and concentrations of 40 to 45% are attainable. Typically, gelatine needs to swell before it solubilizes in hot water, but it can also be dispersed directly in hot water under stirring.

Setting point

The setting point corresponds to the temperature at which gelatine forms a gel.

A multi-talented ingredient

Rousselot[®] Gelatine is a multi-talented ingredient. Its gelling, foaming, emulsifying and binding functionalities are complemented by numerous characteristics that make it irreplaceable in many applications, either in the food, pharmaceutical or technical industries.

Because of all its functionalities, Gelatine has the capacity to fulfill all your applications.

Whether you are looking for one of the following functionalities, gelatine is the candidate of choice.

Gelling power and thermo-reversibility

What really makes gelatine unique in terms of functionalities is its thermo-reversible gelling power: a gelatine-based formulation gels when cooled and liquefies when subsequently heated. This transformation occurs rapidly and can be repeated without significant changes in characteristics.

This is the most important functionality of gelatine and the key to a vast range of applications.

Foaming power

Gelatine has the property to form foam and to stabilize it. This is of particular value in foodstuffs such as aerated dairy products, mousses or whipped confectioneries.

Film forming

Decreasing the temperature below the setting point allows the gelatine to set into a film. This functionality is used in the manufacture of capsules and microcapsules. Rousselot experts know-how to address your specific requirement and are able to link a particular functionality of gelatine to your need.

Other functionalities include:

- Stabilizing
- Syneresis prevention
- Thickening agent
- Clarifying power
- Plasticizer



- Emulsifier
- Sticking agent
- Disintegration agent



The widest range of gelatines

Based on its technical know-how, Rousselot's particular strength is to develop products and services in order to find new solutions, fitting international, local or individual environments and needs.

Rousselot is the only supplier to offer such a range of gelatines.

The wide variety of products goes with a strict naming system built to meet our customers' need for clarity.

Rousselot® Gelatine names are built as follows:

- Rousselot® Gelatine "Bloom" "letter" "particle size" where:
- the Bloom is defined according to your application (from 75 to 275),
- the letter is defined according to the table below,
- the particle size may be chosen according to our standard particle size

For example: Rousselot[®] Gelatine 125 PS 30 refers to Rousselot[®] Gelatine of pig skin origin, acid process, 125 Bloom and 30 mesh.

For Peptan[®] collagen peptides range, see our specific brochure.

Rousselot[®] Gelatines Commercial names

| Letter | Raw Material |
|--------|-------------------|
| Р | Acid Porcine |
| В | Alkaline Bovine |
| н | Bovine Hides |
| SH | Soda Hides |
| PS | Acid Pig Skins |
| AP | Acid Pig Bones |
| LB | Lime Bovine Bones |
| AB | Acid Bovine Bones |
| AH | Acid Bovine Hides |
| LP | Lime Pig Bones |
| FG | Fish |



Rousselot[®] Gelatine particle size

| 8 mesh | 2,36 mm |
|---------|---------|
| 18 mesh | 1,00 mm |
| 30 mesh | 0,60 mm |
| 60 mesh | 0,25 mm |

Production process

Rousselot[®] gelatines are obtained through partial hydrolysis of the collagen contained in the raw material. The goal is to render the naturally insoluble collagen into gelatine, soluble in warm water. To reach this objective a complex, multi-stage process, interspersed with numerous chemical, physical and bacteriological quality controls has to be performed.

It all starts with raw materials ...

The highest quality of Rousselot products is determined by the careful selection of the suppliers of raw materials and their swiftest collection and transport.

Rousselot ensures a complete traceability of its products through its production process.

Traceability

Rousselot has always provided complete transparency to its customers. Our traceability system is built on two principles:

- Rousselot[®] Gelatines are manufactured exclusively from strictly selected raw materials,
- Traceability of Rousselot[®] gelatines allows any lot to be traced to its raw materials and its process conditions.





Animal fit for human consumption

Rousselot raw materials Veterinary certificates (imports) or commercial documentation

Raw material processing

Gelatine extraction



Shipment to customers

Traceability of raw materials used for the production of Rousselot[®] Gelatines

Controlled production steps

Two possible production processes can be used, the acid process or the alkaline process depending on the raw material used and the characteristics required for the end product.

Whatever the process used, gelatine production process follows six very specific steps: raw material pre-treatment, gelatine extraction, gelatine purification, semi-finished product recovery, blending of commercial lots and final release.

All these production steps are always strictly and carefully controlled to meet specifications.

| | | Proc | ess |
|---------------|-------|------|----------|
| Raw materials | | Acid | Alkaline |
| fol yes | Bones | • | • |
| | Skins | • | |
| 25) | Bones | • | • |
|) | Hides | • | • |
| S.A | Fish | • | |

The above table lists Rousselot range of raw materials and processes.

The table below describes the different steps needed to produce gelatine.



Pre-treatment for bones only

Demineralization

Preparation of raw materials

- Alkaline or acid treatment
- Washing

Extraction

Cooking

Purification

- Filtration
- Concentration with steam
- Sterilization with steam

Gelation

- Gelling at low temperature
- Drying with filtered air
- Crushing-Screening



- rinshed produ
- Blending
- Packaging
- Shipment

Quality

Pre-selection of raw materials, control of production parameters, expertise of staff, and systematic testing and inspection of semi-finished and finished products, combine to guarantee the reliability of our gelatines and the reproducible characteristics of these products.

The use of leading edge technologies is associated with the development of a stringent Quality Assurance System. All Rousselot manufacturing facilities are ISO certified.

Rousselot also depends on the Food Safety System and is involved in a voluntary quality policy to respect all national and international regulations, norms and quality standards including GMP/GHP, HACCP and IFS.

All these standards and practices are essential to guarantee quality to customers.

Regulation update and compliance

The evolution of various regulations significantly impacts the gelatine business. Rousselot is constantly in contact with the main regulatory bodies throughout the world, either directly or through the various gelatine manufacturers' associations such as the GME, GMIA, GMJ, SAGMA and GMAP. In doing so, Rousselot permanently scrutinizes all major regulatory evolution (EU: DGSANCO, EMEA; USA: USDA, FDA; Japan: MHWL) and consequently adjusts in order to ensure full compliance and maximize the availability of its products on a global basis.

Main gelatine pharmacopoeia

| Parameters | European Pharmacopoeia 7 | United States Pharmacopoeia 35 NF 30 | Japanese Pharmacopoeia 15 | |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------|--|
| Identification description | Conforms to tests | Conforms to tests | Conforms to tests | |
| Odor and water-insoluble substances | - | - | Conforms to tests | |
| Gel strength (6.67 % - 10° C) | Gelling or non gelling gelatine AOAC method (80 to 120 % of labelled nominal value for gelling gelatine) | AOAC method | AOAC method | |
| рН (1 % - 55°С) | 3.8 - 7.6 | - | - | |
| Isoelectric Point (IEP) | Typically | Description chapter | | |
| | A : 6.0 - 9.5 | A : 7.0 - 9.0 | A : 7.0 - 9.0 | |
| | B : 4.7 - 5.6 | B : 4.7 - 5.2 | B : 4.5 - 5.0 | |
| Residue on ignition (550° C) | - | <u>≤</u> 2.0 % | <u>≤</u> 2.0 % | |
| Conductivity (1 %, 30°C) | ≤ 1 mS.cm-1 | - | - | |
| Loss on drying | <u>≤</u> 15.0 % | - | <u>≤</u> 15.0 % | |
| Sulfur dioxide (SO2) | <u>≤</u> 50 mg/kg | \leq 40 mg/kg or 1500 mg/kg for capsules and tablets | 60 mg/kg or 1000 mg/kg for capsules and tablets | |
| Arsenic (As) | - | <u>≤</u> 0.8 mg/kg | <u><</u> 1 mg/kg | |
| Mercury (Hg) | - | - | <u><</u> 0.1 mg/kg | |
| Heavy metals | - | <u>≤</u> 50 mg/kg | <u>≤</u> 50 mg/kg | |
| Iron (Fe) | <u><</u> 30 mg/kg | - | - | |
| Chromium (Cr) | <u><</u> 10 mg/kg | - | - | |
| Zinc (Zn) | <u><</u> 30 mg/kg | - | - | |
| Peroxides (H2O2) | <u>≤</u> 10 mg/kg | - | - | |
| Microbial limits | | | | |
| Total Aerobic microbial count (TAMC) | ≤ 1000 CFU/g | ≤ 1000 CFU/g | - | |
| Salmonella | Absence in 10 g | Absence in 10 g | - | |
| E. coli | Absence in 1 g | Absence in 1 g | - | |
| Total yeast and molds count (TYMC) | ≤ 100 CFU/g | ≤100 CFU/g | | |

Main gelatine edible requirements

| Parameters | Food Chemical Codex 8 | European Regulation (EC) N°853/2004, (EC)N° 2073/2005 and further amendments |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition | Obtained from acid, alkaline or enzymatic hydrolysis of collagen the chief protein component of the skin, bones and connective tissues of animals. | Natural, soluble protein, gelling or non gelling, obtained by the partial hydrolysis of collagen produced from bones, hides, skins, and sinew of animals. |
| Loss on drying | ≤ 15.0 % (105°C) | - |
| Ashes | ≤ 3.0 % (550°C) | - |
| Sulfur dioxide (SO2) | ≤ 50 mg/kg | <u>≤</u> 50 mg/kg |
| Peroxides(H2O2) | - | ≤ 10 mg/kg |
| Cadmium (Cd) | - | ≤ 0.5 mg/kg |
| Arsenic (As) | - | ≤ 1 mg/kg |
| Copper (Cu) | - | ≤ 30 mg/kg |
| Lead (Pb) | ≤ 1.5 mg/kg | ≤ 5 mg/kg |
| Zinc (Zn) | - | ≤ 50 mg/kg |
| Chromium (Cr) | ≤ 10 mg/kg | ≤ 10 mg/kg |
| Mercury (Hg) | - | ≤ 0.15 mg/kg |
| Pentachlorophenol | ≤ 0.3 mg/kg | |
| Microbial limits | | |
| Salmonella | Absence in 25 g | Absence in 25 g |
| E. coli | Absence in 25 g | |

1 mg/kg = 1 ppm = 0,0001%

Rousselot[®] Gelatine for pharmaceutical applications





Rousselot[®] Gelatine is an excipient tailored for pharmaceutical use. It is specifically developed and manufactured to meet customer constraints and requirements. The highest quality raw materials are chosen to go through Rousselot's strictly controlled and fully traceable process. Hygiene, selection and control is our motto for repeatable Rousselot[®] pharmaceutical gelatines.

Hard capsules

In hard capsules, Rousselot[®] Gelatine provides a strong and flexible film for tamper-evident dosage form. These gelatines have been developed to meet the most stringent parameters. Along with excellent disintegration and gliding properties, Rousselot[®] Gelatines meet the highest microbiological standards.

Soft capsules

Rousselot applies its pharmaceutical methodology to all gelatines used for soft gelatine capsules, whether they are for pharmaceutical, nutraceutical or cosmeceutical use.

Tablets

In tablets, Rousselot[®] Gelatine is a natural binding and disintegration agent that meets the requirements of those consumers concerned about the use of synthetic or chemically modified ingredients.

Blood plasma substitute

The quality and purity of Rousselot[®] Gelatine has made it the material of choice as an ingredient in the preparation of blood plasma substitute.

Micro-encapsulation

For micro-encapsulation, Rousselot[®] Gelatine's emulsifying and filming properties allow the preparation of a coating that will protect the active ingredient from reacting with oxygen or water.

| | Gel Strength (Bloom) | Viscosity (mPa.s) | Other characteristics | |
|------------------|------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------|--|
| | 220 LB | | | |
| Hard capsules | 200 LB | 2550 | · Loss on drying · Iron content | |
| | 220 SH | 5.5-5.0 (6,67%, 60°C) | | |
| | 280 PS | | Peroxides Microbial limits | |
| | 275 FG | | Which oblight minites | |
| Soft capsules | 160 LB | | Loss on drying Iron content Peroxides Microbial limits | |
| | 160 SH | | | |
| | 180 H | | | |
| | 200 AH | 2.5-4.2 (6.67%_60°C) | | |
| | 200 PS | (0.07 /0, 00 C) | | |
| | 200 FG | | | |
| | 275 FG | | | |
| | 150 PS | 2.5-4.2 | · Loss on drying | |
| Tablets | 150 LB | (6.67%, 60°C) | · Bacteriology | |
| | Hydrolyzed gelatine | · Binding power | | |
| Suppositories | The gelatine is selected in order to be compatible with the active ingredients to be released. | | · Microbial limits | |
| Plasma subsitute | 250 LB gelatine suited to manufacture plasma expander. · Microbial limit | | · Microbial limits | |

The right Gelatine, whatever your application

Rousselot[®] Gelatine for edible applications

A versatile and unmatched ingredient, Rousselot[®] Gelatine offers multiple functionalities that make it irreplaceable in many food applications such as sweets, dairy products, desserts, meat or fish preparations...

Confectionery

Gelatine is an important ingredient to the confectionery industry. It can be characterized in different ways and primarily by its gelling power and thermoreversibility. Gelatine may be considered as a:

- gelling agent: jelly confectionery,
- whipping agent: aerated confectionery,
- stabilizer: anti-crystallizer,
- emulsifier: fruit chews,
- thickening agent: filled confectionery
- binder: sugar paste, liquorice,
- coating agent: dragées, coated chewing gums...

Water jellies/Gelatine desserts

The powder mix prepared with gelatine, sugar, acids, salts, colors and flavors is a very common preparation around the world using water or milk.

Dairy products

Gelatine and milk are an ideal combination for many formulations of aerated and low fat products. With the strong influence of fat replacement, interest in gelatine is growing, and it is compatible with polysaccharides for the best texture and functionality.

Gelatine is compatible with all the steps of fermented process (yogurt, quarks, cheese,...) and can be used at the early stage to bring texture, smoothness, fat replacement, water binding..., to fermented products.

Meat, fish and aspics

As a natural ingredient of these products,

Rousselot[®] Gelatine is used to improve the presentation, the conservation and the protein content of meat emulsions, cooked injected hams, aspics and salted jellies, sauces and canned meat products.

For instance in sauces, gelatine improves the creaminess and avoids phase separation even after thermal shocks.

Wine fining and fruit-juice clarification Rousselot® Gelatine is particularly suited for red wine, cider and apple juice clarification where it reduces the turbidity and decreases the astringency of final beverages without negative impact on suitable flavor components.



| | Gel strength (Bloom) | Rousselot® Gelatine type | Viscosity (6.67 % - 60°C) | Other important characteristics | Gelatine content (%) |
|--------------------------------------------------|----------------------|-----------------------------|------------------------------|---------------------------------|-------------------------|
| CONFECTIONERY | | | | | |
| Jelly item to be oiled/not oiled or sugar sanded | 200 - 275 | PS, H, FG | medium-low | Color, clarity | 6-9 |
| Gums | 150 | PS, H, FG | medium-low | | 10-15 |
| _ | 125 | PS, H | medium-low | | 4-8 |
| Wine gums | 150 | FG | medium-low | | 4-8 |
| | 100 | PS. H | medium-low | | 3-8 |
| Liquorice | 150 | FG | medium-low | | 3-8 |
| Extruded marshmallows | 225 - 250 | PS H EG | medium | Foaming power | 2-5 |
| | 100 | | medium | Foaming power | 2-5 |
| Meringues | 150 | FG | medium | Foaming power | 2-5 |
| | 100 125 | | high modium | Foaming power | 2-5 |
| Deposited marshmallows | 160 - 125 | FG, II | high modium | Foaming power | 27 |
| | 125 | | modium | Fooming power | 0525 |
| Characteristics | 120 | гэ, п | medium | Foaming power | 0.5-2.5 |
| Chewy candles | | FG | medium | Foaming power | 0.5-2.5 |
| | Hydrolyzed gelatine | PS | | Foaming power | 0.2.4 |
| Caramels | 100 | РЅ, Н | medium | | 0.2-1 |
| | 150 | FG | medium | | 0.2-1 |
| Toffees | 100 | PS,H | medium | | 0.2-1 |
| | 150 | FG | medium | | 0.2-1 |
| SWEET DESSERTS | | | | | |
| Water jellies/gelatine desserts | 250 | PS, H | medium | Color, clarity | 1.5-3 |
| DAIRY PRODUCTS | | | | | |
| Cream for long storage | 150 | H, PS | medium | | 0.2-0.5 |
| Whipped cream | 150 | H, PS | medium | | 0.2-0.6 |
| Reduced-fat butter-type spreads | 250 | PS, H | medium | Melting point | 0.5-3 |
| Home-made dessert mixes | | | | | |
| Puddings | 150 | PS | medium | Gelling power | 0.2-2 |
| Pastry custards | 150 | PS | medium | | 0.2-3 |
| Industrial dairy desserts | | | | | |
| Flavered mills jallies (Danna Catta | 150 | PS | medium | Calling norman | 0.2.2 |
| Flavored milk jelles/Panha Cotta | 225 | Н | medium | Gelling power | 0.2-2 |
| Manager and dates of | 150 | LB, LP | | Foaming power | 0.2.2 |
| Mousses, aerated dessert | 200 | PS | medium | Gelling power | 0.2-3 |
| | Hydrolyzed gelatine | | | Foaming power | |
| Cream custards | 150 | PS | medium | | 0.2-1 |
| Acidified milk products | | | | | |
| | 150 | PS, LB | medium | | 0.5-5 |
| | 200 | DC | modium | _ | 0.2.2 |
| Yogurts (yogurt-based products), | 175 | 15 | medium | Water binding | 0.2-2 |
| fermented milks | 175 | | medium | Melting point | 0.5-5 |
| | 225 | Н | medium | | 0.2-2 |
| | 200 | FG | medium | | 0.2-2 |
| Desserts | 150 | PS | medium | | 0.2-2 |
| | 150 | PS | medium | Water binding | 0.2-2 |
| Fresh cheese-based products | 225 | Н | medium | power | 0.2-2 |
| | 200 | FG | medium | ivieiting point | 0.2-2 |
| Ice creams and sorbets | 150 | PS | medium | Foaming power | 0.2-1 |
| lee creams and sorbers | Hydrolyzed gelatine | 15 | | rounning power | 0.2 1 |
| MEAT INDUSTRY | | | | | |
| Jellies | 200 | PS, LB | high-medium | Color, clarity | 3-15 |
| Binder for meat emulsions | 200 | PS, H | high-medium | | 0.5-3 |
| Hame most processor | 200 | PS, H | high-medium | Clarity | 1-2 |
| nams, meat preserves | Hydrolyzed gelatine | | | Water binding | |
| Coating | 200 | PS, H | high-medium | Clarity | 5-20 |
| FISH AND SHELLFISH | | | | | |
| Binder | 200 | PS, H, FG | medium | | 0.5-3 |
| • • • • | 200 | PS, H, FG | medium | | 2.45 |
| Aspic | 275 | FG | medium | Color, clarity | 3-15 |
| WINE AND FRUIT-JUICE CLARIFICATION | | | | | |
| | 75 | PS | low | | |
| | Hydrolyzed gelatine | | | | |







Rousselot[®] Gelatine for technical applications

Photographic applications

Rousselot imaging technology, with its tradition of innovation and perfection, has adapted to the recent gelatine developments including in the field of holography. Rousselot fit-for-use gelatines give to these products an unbeatable gloss, a traditional photographic touch and a protection against adverse environments or effects of time.

Building industry

Machine-applied plasters have longer setting times than standard methods of application. Specific adjuvants are necessary such as swelling agents, water retainers, products to enhance adhesion and setting retainers like gelatine. Hydrolyzed or low bloom gelatines increase setting time without changing the mechanical characteristics of plaster.

In cement, the addition of hydrolyzed gelatines fluidifies mortar.

Other technical applications

In addition to these two applications, Rousselot[®] Gelatine is widely used in other numerous "technical" applications, including microcapsules, paintballs, ballistics gels and many more.

It can also be used to restore old books.

| Imaging | technology |
|---------|------------|
|---------|------------|

| Including silver halide photography, Holography | thoroughly developed in cooperation with each client, in order to adjust the gelatine varieties to the customer's process and/or to final specifications. | |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Technical applications | | |
| Micro-encapsulation | Preservation in acid-type gelatines with gel strength, viscosity and pH characteristics adjusted to the user's process. | |
| Buildings | Hydrolyzed gelatine, binding power | |

Rousselot®

Rousselot is the leading manufacturer of Gelatine and collagen peptides to the food, pharmaceutical and technical industries. With a staff of 2.400 people, the company benefits from a global sales and production network of 13 plants and 10 sales offices located in Europe, North America, South America and Asia. Rousselot is part of Darling Ingredients International.

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