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## Product Information

### Gelatin

Product Numbers **G6650, G9382, G1393, G9391, G6144, G2625, G2500, G8150, G1890, G9136, G0411, G7765, and G7041**

CAS# 9000-70-8

Synonyms: Gelatine, Teleostean gelatin (G7765, G7741)

### Product Description

Gelatin is a heterogeneous mixture of water-soluble proteins of high average molecular weights, present in collagen. The proteins are extracted by boiling skin, tendons, ligaments, bones, etc. in water.<sup>1</sup> Type A gelatin is derived from acid-cured tissue and Type B gelatin is derived from lime-cured tissue.<sup>2</sup>

Applications using gelatin include coating cell culture plates to improve cell attachment for a variety of cell types, addition to PCR to help stabilize Taq DNA polymerase,<sup>7</sup> and use as a blocking reagent in Western blotting, ELISA, and immunohistochemistry.<sup>8</sup> In bacteriology, gelatin can be used as a component of culture media for species differentiation.<sup>9</sup> Additionally, as a biocompatible polymer, gelatin has been used as a delivery vehicle for the release of bioactive molecules<sup>11</sup> and in the generation of scaffolds for tissue engineering applications.<sup>12</sup>

Industrial applications include the use of gelatin as a stabilizer, thickener, and texturizer in foods and in the manufacture of rubber substitutes, adhesives, cements, lithographic and printing inks, plastic compounds, artificial silk, photographic plates and films, matches, and light filters for mercury lamps.<sup>1</sup> In the pharmaceutical industry, gelatin is used as a suspending agent, encapsulating agent, and tablet binder; and in veterinary applications it is used as a plasma expander and hemostatic sponge.<sup>1</sup>

### Physical Properties:

pI: The charge on a gelatin molecule and its isoelectric point are primarily due to the carboxyl amino and guanidino groups on the side chains. Type A gelatin has 78–80 millimoles of free carboxyl groups per 100 g of protein and a pI of 7.0–9.0; type B has 100–115 millimoles of free carboxyl groups per 100 g of protein and a pI of 4.7–5.2.<sup>2,3</sup> The pH of a 1.5% solution at 25 °C is 3.8–5.5 for Type A and 5.0–7.5 for Type B.<sup>2</sup>

### Bloom number:

The Bloom number, as determined by the Bloom gelometer, is an indication of the strength of a gel formed from a solution of known concentration.<sup>3</sup> The Bloom unit is a measure of the force (weight) required to depress a given sample area of gel a distance of 4 mm; the higher the Bloom number, the stronger the gel. A method of determining Bloom strength has been described.<sup>4</sup> Bloom number is proportional to the average molecular weight:

<u>Bloom Number</u>	<u>Average Molecular Weight</u>
50 - 125 (Low Bloom)	20,000 - 25,000
175 - 225 (Medium Bloom)	40,000 - 50,000
225 - 325 (High Bloom)	50,000 - 100,000

### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

### Storage/Stability

Dry gelatin stored in airtight containers at room temperature remains unchanged for many years. When heated at 100 °C in the presence of air it swells, becomes soft, and disintegrates to a carbonaceous mass with evolution of pyridine bases and ammonia.<sup>2</sup> Below 35–40 °C gelatin swells in and absorbs 5–10 times its weight of water to form a gel. Gelatin is soluble in glycerol and acetic acid, and more soluble in hot than in cold water.<sup>1</sup> It is practically insoluble in most organic solvents such as alcohol, chloroform, carbon disulfide, carbon tetrachloride, ether, benzene, acetone, and oils.<sup>5</sup>

Sterile solutions of gelatin stored cold are stable indefinitely, but at elevated temperatures hydrolysis or rupture of peptide bonds occurs, increasing the number of free amino groups. Gel strength and viscosity gradually weaken upon prolonged heating in solution above 40 °C; this degradation is accelerated by extremes in pH, proteolytic enzymes, and bacterial action.<sup>2</sup> Gelatin has been autoclaved at 121 °C for 15–20 minutes with appreciable hydrolysis.<sup>2,6</sup>

### Procedure

#### Cell Culture Using 2% Solution (Product No. G1393)

Optimal conditions for attachment must be determined for each cell line and application.

1. Allow gelatin solution to completely liquefy at 37 °C.
2. Coat culture surface with 5–10 µl gelatin solution/cm<sup>2</sup> (i.e., 0.1–0.2 mg/cm<sup>2</sup> gelatin).
3. Allow surface to dry at least 2 hours before introducing cells and medium.

### References

1. *Merck Index*, 12th Ed., S. Budavari, Ed., p. 742, # 4388 (1996).
2. Supplier data.
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4. *United States Pharmacopeia XX*, p. 1017 (1990).
5. *Martindale The Extra Pharmacopeia*, 29th Ed., p. 818, J.E.F. Reynolds, Ed., The Pharmaceutical Press, London (1989).
6. Sigma data.
7. *PCR Primer: A Laboratory Manual*, C. Dieffenbach and G. S. Dveksler, Eds., Cold Spring Harbor, NY (1995).
8. Vogt, R. F., Jr., Quantitative differences among various proteins as blocking agents for ELISA microtiter plates. *J. Immunol. Methods* **101**, 43, (1987).
9. Levine, M., and Carpenter, D.C., Gelatin liquefaction by bacteria. *J. Bacteriol.* **8**, 297, (1923).
10. Sakai, Y., *et al.*, Non-antigenic and low allergic gelatin produced by specific digestion with an enzyme-coupled matrix. *Biol. Pharm. Bull.* **21**, 330, (1998).
11. Young, S. *et al.*, Gelatin as a delivery vehicle for the controlled release of bioactive molecules. *J. Control Release* **109**, 256-274 (2005).
12. Huang Y, *et al.* *In vitro* characterization of chitosan-gelatin scaffolds for tissue engineering. *Biomaterials* **26**, 7616-7627 (2005)

### Related Products

- Gelatin Blocking Buffer, for molecular biology, powder blend, (Product No. G7663) provides 1 liter of blocking buffer after reconstitution.
- Glycerol Gelatin (Product No. GG1), prepared with gelatin, glycerol and phenol, is an aqueous slide mounting media for histological use.
- Gelatin Veronal Buffer (Product No. G6514)
- Inositol Gelatin Medium, *BioChemika*, for microbiology, (Product No. 17155), for the cultivation of *Plesiomonas shigelloides* from foods
- Gelatin Iron Medium, *BioChemika*, for microbiology (Product No. G0289)
- Lactose Gelatin Broth (Base), *BioChemika*, for microbiology (Product No. 61348)
- Gelatin Hydrolysate Enzymatic (Product No. G0262)
- Microcarrier Beads Gelatin-Coated (Product No. M9650)
- Nutrient Gelatin, *BioChemika*, for microbiology (Product No. 70151)
- Nutrient Gelatin Special Grade, *BioChemika*, for microbiology (Product No. 70198)

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## Gelatin Selection Guide

Product Number	Description	Bloom	Storage Temperature	Notes	Applications
G6144	Gelatin from porcine skin, Type A	90-110	Room temperature	Derived from acid-cured tissue	Recommended for use as a cell culture substratum.*
G2625	Gelatin from porcine skin, Type A	~175	Room temperature	Derived from acid-cured tissue	Recommended for use as a cell culture substratum.*
G2500	Gelatin from porcine skin, Type A	~300	Room temperature	Derived from acid-cured tissue	Recommended for use as a cell culture substratum.*
G1890	Gelatin from porcine skin, Type A, powder, cell culture tested	~300	Room temperature	Derived from acid-cured tissue	Recommended for use as a cell culture substratum.*
G8150	Gelatin from porcine skin, for electrophoresis, Type A	~300	Room temperature	Derived from acid-cured tissue. Protease, none detected	Suitable for use as a blocking reagent for Western blots.
G9136	Gelatin from porcine skin, Type A, lyophilized powder, $\gamma$ -irradiated, cell culture tested	~300	Room temperature	Derived from acid-cured tissue	Recommended for use as a cell culture substratum.*
G0411	Prionex <sup>®</sup> Highly purified Type A, aqueous solution		Room temperature	Aseptically processed; ~10% protein; derived from porcine source	A protein stabilizer, an alternative to BSA and HSA.
G6650	Gelatin from bovine skin, Type B	~75	Room temperature	Derived from lime-cured tissue	Recommended for use as a cell culture substratum.*
G9382	Gelatin from bovine skin, Type B	~225	Room temperature	Derived from lime-cured tissue	Recommended for use as a cell culture substratum.*
G1393	Gelatin solution, Type B (from bovine skin), 2%, cell culture tested	~225	2–8 °C	Derived from lime-cured tissue. Prepared in tissue culture grade water. Endotoxin tested	Recommended for use as a cell culture substratum.*
G9391	Gelatin from bovine skin, Type B, powder, cell culture tested	~225	Room temperature	Derived from lime-cured tissue	Recommended for use as a cell culture substratum.*
G7765	Gelatin from cold water fish skin, ~45% in H <sub>2</sub> O		2–8 °C	Contains 0.15% propyl p-hydroxybenzoate and 0.2% methyl p-hydroxybenzoate as preservatives; mol wt ~60 kDa	Used as a blocking agent in immunochemistry.
G7041	Gelatin from cold water fish skin, solid		Room temperature		Used as a blocking agent in immunochemistry.

\*Recommended for use as a cell culture substratum at 0.1-0.2 mg/cm<sup>2</sup> or 5-10  $\mu$ l/cm<sup>2</sup>. Optimal concentration will depend on cell type as well as the application or research objectives.

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