

ALBUMIN, HUMAN

The source material for all human albumins made by Sigma has tested negative for HIV and HBSAG.

PRODUCT NO.	PREPARATION/PURIFICATION	SPECIAL CHARACTERISTICS
A 1653	Fraction V ¹ From human serum.	Powder 96-99% by agarose gel (remainder mostly globulins)
A 2817	Fraction V ¹	Powder 96-99% by agarose gel (remainder mostly globulins) Produced specifically for bulk usage.
A 1887	Fraction V ¹ , heat step ² Prepared from A 1653.	Powder ≥96% by agarose gel Essentially fatty acid free (~0.005%)
A 9511	1× crystallized and lyophilized. Prepared from A 1653 using method IV of Cohn, et al. ³	Powder 97-99% by agarose gel
A 8763	Prepared from A 1653. ⁴	Powder Essentially globulin free
A 3782	Prepared from A 8763. ⁴	Powder Essentially fatty acid free (~0.005%) Essentially globulin free
A 4327	Prepared from A 1653.	Powder ≥96% by agarose gel Essentially protease free (<0.0001 u/mg protein) Essentially alkaline phosphatase free (0.001 u/mg protein) Essentially peroxidase free (<0.001 u/mg protein)
A 3173	Prepared from A 2817.	Powder Low endotoxin content (≤0.1 ng/mg protein)
A 6784	Contains approx. 0.85% NaCl. Contains 0.05% NaN ₃ as preservative. Aseptically filled.	10% Solution
A 6909	Contains approx. 0.85% NaCl. Contains 0.05% NaN ₃ as preservative. Aseptically filled.	30% Solution
A 9080	From human plasma. Contains approx. 0.85% NaCl. Aseptically filled.	30% Solution Protease free.
A 2830	From human serum.	Solution in 40 mM potassium phosphate, pH 7.0 ¹⁴ C-Methylated 5-50 μCi per mg protein

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CAS NUMBER: 70024-90-7

MOLECULAR WEIGHT: 66,248.3⁵ or 66,437⁸ (based on amino acid composition)

STRUCTURE:⁵

The amino acid sequence and structure of human albumin have been determined. Human albumin is a protein with no carbohydrate content. It is a single polypeptide chain with one free sulfhydryl group on residue # 34 and 17 intrachain disulfide bonds.

Amino Acid	Asp	Asn	Thr	Ser	Glu	Gln	Pro	Gly	Ala	Cys	Val	Met	Ile	Leu	Tyr	Phe	His	Lys	Trp	Arg
Residues	39	15	30	22	60	23	25	12	63	35	39	6	8	61	18	30	16	58	1	23

PHYSICAL PROPERTIES:⁵

Sedimentation constant, $S_{20,W}$ X 10 ¹³	4.6 (monomer), 6.5 (dimer)
Diffusion constant, $D_{20,W}$ X 10 ⁷	6.1
Partial specific volume, V_{20}	0.733
Intrinsic viscosity, η	0.042
Frictional ratio, f/f_0	1.28
Overall dimensions, Å	38 X 150
Isoelectric point ($\Gamma/2 = 0.15$)	4.7
Isoionic point ($\Gamma/2 = 0$)	5.2
Electrophoretic mobility, pH 8.6, $\Gamma/2 = 0.15$	-5.9
Refractive index increment (578 nm) X 10 ⁻³	1.89
Optical absorbance, $A_{279\text{ nm}}$ (1 gram/liter)	0.531
Mean residue rotation, $[m]_{233}$	8590
Mean residue ellipticity	17 $[\theta]_{209\text{ nm}}$; 16 $[\theta]_{222\text{ nm}}$
Estimated α -helix, %	48
Estimated β -form, %	15

SOLUBILITY / SOLUTION STABILITY:

Sigma tests the solubility of human albumin powders in water at 50 mg/. In the experience of Sigma production chemists, aqueous aliquots stored at -20 °C are stable for several months. Repeated freezing and thawing of solutions is not recommended.

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PRODUCT DESCRIPTION / USAGE:⁷

Albumins are a group of simple proteins found in the body fluids and tissues of animals and in some plant seeds. Unlike globulins, albumins have low molecular weights, are soluble in water, are easily crystallized and contain an excess of acidic amino acids. Serum and plasma albumin is carbohydrate-free and comprises 55-62% of the protein present. Due to its high charge to mass ratio albumin binds water, Ca^{2+} , Na^+ , K^+ , fatty acids, bilirubin, hormones and drugs. The main biological function of albumin is to regulate the colloidal osmotic pressure of blood. Human and bovine albumins contain 16% nitrogen and are often used as standards in protein calibration studies. Due to their free hydrophobic region **fatty acid free albumins** are used to solubilize lipids in tissue culture, and are also used as blocking agents in Western blots or ELISA applications. **Globulin free albumins** are suitable for use in applications where no other proteins should be present (e.g., electrophoresis).

REFERENCES:

1. E.J. Cohn, *J. Amer. Chem. Soc.*, 68, 459 (1946).
2. R.F. Chen, *J. Biol. Chem.*, 242, 173 (1967).
3. E.J. Cohn, *J. Amer. Chem. Soc.*, 69, 1753 (1947).
4. Globulins are precipitated in a heat step following addition of caprylate, then removed by filtration.
5. *The Plasma Proteins*, 2nd Ed., Vol. I, F. W. Putnam, Ed., pp. 133-181, Academic Press, New York (1975).
6. S.C. Gill and P.H. von Hippel, *Anal. Biochem.*, 182, 319 (1989).
7. T. Scott and M. Eagleson, *Concise Encyclopedia: Biochemistry*, 2nd Ed., pp. 19-20, Walter de Gruyter, New York (1988).
8. Sigma calculation based on sequence given by B. Meloun, et. al., *FEBS Letters*, 58(1), 134 (1975).

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