

Standard Reference Material® 927g

Bovine Serum Albumin (7% Solution)

(Total Protein Standard)

CERTIFICATE OF ANALYSIS

Purpose: The certified values delivered by this Standard Reference Material (SRM) are intended primarily for use in the standardization of procedures employed in clinical analyses for total serum protein, for critical evaluation of daily working standards used in these procedures, and as a reference standard for assays of total protein by colorimetric methods.

Description: This SRM is a solution (mass fraction approximately 7 %) of known protein concentration. A unit of SRM 927g consists of 10 ampoules, each containing approximately 2.2 mL of solution.

Certified Values: These values are traceable to International System of Units (SI) [1,2].

Table 1. Certified Value for BSA Mass Concentration in SRM 927g

Measurand	Value (g/L) ^(a,b)
Bovine serum albumin	68.4 ± 0.3

^{a)} Values are expressed as $x \pm U_{95\%}(x)$, where x is the certified value and $U_{95\%}(x)$ is the expanded uncertainty of the certified value. The true value of the analyte is believed to lie within the interval $x \pm U_{95\%}(x)$ with 95 % confidence. To propagate this uncertainty, treat the certified value as a normally distributed random variable with mean x and standard deviation $U_{95\%}(x)/2$.

^{b)} Mass concentrations were calculated from mass fractions using the measured density listed in Table 2.

Table 2. Certified Density of SRM 927g at 23 °C

Measurand	Value (g/mL) ^(a)
Density	1.017 14 ± 0.000 36

^{a)} Values are expressed as $x \pm U_{95\%}(x)$, where x is the certified value and $U_{95\%}(x)$ is the expanded uncertainty of the certified value. The true value of the analyte is believed to lie within the interval $x \pm U_{95\%}(x)$ with 95 % confidence. To propagate this uncertainty, treat the certified value as a normally distributed random variable with mean x and standard deviation $U_{95\%}(x)/2$.

Non-Certified Values: Non-certified values are provided in Appendix A.

Period of Validity: The certified values delivered by **SRM 927g** are valid within the measurement uncertainty specified until **01 June 2030**. The certified values are nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

Maintenance of Certified Values: NIST will monitor this SRM over the period of its validity. If substantive technical changes occur that affect the certification, NIST will issue an amended certificate through the NIST SRM website (<https://www.nist.gov/srm>). Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (<https://www.nist.gov/srm>).

Safety: The lyophilized bovine serum albumin used in the preparation of SRM 927g Bovine Serum Albumin (7 % Solution) was manufactured from U.S. Department of Agriculture (USDA)-inspected bovine plasma at a facility that is registered with the USDA Animal and Plant Health Inspection Service (APHIS) for shipment to the European Union. Bovine blood was collected from cattle sourced in the United States and handled in accordance with procedures for products intended for pharmaceutical use. Only blood from cattle/carcasses that have passed ante-mortem and post-mortem USDA Food Safety Inspection Service (FSIS) inspection was used. Use good laboratory practices during materials handling and use.

Storage: This SRM is supplied to the user in sealed ampoules. The SRM should be stored in a refrigerator at a temperature between 2 °C and 8 °C. The ampoules should not be frozen because of possible ampoule breakage.

Use: SRM 927g IS INTENDED FOR RESEARCH USE. Once an ampoule is opened, the solution should be used promptly. Any unused solution in opened ampoules should be discarded. Homogeneity of the material has not been evaluated for sample sizes smaller than those used by NIST. Therefore, the certified value may not be valid for test portions smaller than 0.1 g.

Additional Information: This SRM is not intended to be used as a standard for dye-binding tests as the dye-binding characteristics of BSA will likely be dissimilar to other proteins being assayed. Additionally, this SRM is not intended for checking pre-calibrated refractometers, for immunochemical methods, or as an additive for bilirubin standardization. The calculated molecular mass of the most abundant BSA isoform (including the 17 disulfide bonds) is 66 428.022 4 Da based upon the NIST Mass and Fragment Calculator Software [3]. Full details on the production, analysis, and statistical evaluation of SRM 927g are provided in NIST Special Publication 260-258.

REFERENCES

- [1] Beauchamp, C.R.; Camara, J.E.; Carney, J.; Choquette, S.J.; Cole, K.D.; DeRose, P.C.; Duewer, D.L.; Epstein, M.S.; Kline, M.C.; Lippa, K.A.; Lucon, E.; Molloy, J.; Nelson, M.A.; Phinney, K.W.; Polakoski, M.; Possolo, A.; Sander, L.C.; Schiel, J.E.; Sharpless, K.E.; Toman, B.; Winchester, M.R.; Windover, D.; *Metrological Tools for the Reference Materials and Reference Instruments of the NIST Material Measurement Laboratory*; NIST Special Publication 260-136, 2021 edition; National Institute of Standards and Technology, Gaithersburg, MD (2021); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-136-2021.pdf> (accessed Aug 2025).
- [2] Phinney, K.; Lowenthal, M.; Beasley Green, A.; Bunk, D.; Kilpatrick, L.; Yen, J.; Kilpatrick, E.; *Certification of Standard Reference Material® 927g Bovine Serum Albumin (7% Solution) (Total Protein Standard)*; NIST Special Publication 260-258; National Institute of Standards and Technology, Gaithersburg, MD (2025); available at <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.260-258.pdf> (accessed Aug 2025).
- [3] NIST Mass and Fragment Calculator Software; Program available for downloading at <https://www.nist.gov/services-resources/software/nist-mass-and-fragment-calculator-software> (accessed Aug 2025).
- [4] Doumas, B.T.; Bayse, D.D.; Carter, R.J.; Peters, T., Jr.; Schaffer, R.; *A Candidate Reference Method for Determination of Total Protein in Serum. I. Development and Validation*; Clin. Chem., Vol. 27, pp. 1642–1650 (1981).

If you use this SRM in published work, please reference:

Phinney K, Lowenthal M, Beasley Green A, Bunk D, Kilpatrick L, Yen J, Kilpatrick E (2025) Certification of Standard Reference Material® 927g Bovine Serum Albumin (7% Solution) (Total Protein Standard). (National Institute of Standards and Technology, Gaithersburg, MD), NIST Special Publication (SP) 260-258. <https://doi.org/10.6028/NIST.SP.260-258>

Certain commercial equipment, instruments, or materials may be identified in this Certificate of Analysis to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the Office of Reference Materials 100 Bureau Drive, Stop 2300, Gaithersburg, MD 20899-2300; telephone (301) 975-2200; e-mail srminfo@nist.gov; or the Internet at <https://www.nist.gov/srm>.

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APPENDIX A

Non-Certified Value: A non-certified value is suitable for use in method development, method harmonization, and process control but does not provide metrological traceability to the International System of Units (SI) or other higher-order reference system. A non-certified value for protein concentration is provided below. The value was determined using a biuret assay [4] calibrated with SRM 927e.

Measurand	Value (g/L) ^(a)
Protein concentration	70.4 ± 3.2

^{a)} Values are expressed as $x \pm U_{95\%}(x)$, where x is the non-certified value and $U_{95\%}(x)$ is the expanded uncertainty of the non-certified value. The true value of the analyte is believed to lie within the interval $x \pm U_{95\%}(x)$ with 95 % confidence. To propagate this uncertainty, treat the non-certified value as a normally distributed random variable with mean x and standard deviation $U_{95\%}(x)/2$.

Maintenance of Non-Certified Value: NIST will monitor this material to the end of its period of validity. If substantive technical changes occur that affect the non-certified value during this period, NIST will update this Certificate of Analysis. Before making use of any of the values delivered by this material, users should verify they have the most recent version of this documentation, available through the NIST SRM website (<https://www.nist.gov/srm>).

Period of Validity: The non-certified value is valid within the measurement uncertainty specified until **01 June 2030**. The value assignment is nullified if the material is stored or used improperly, damaged, contaminated, or otherwise modified.

***** End of Appendix A *****