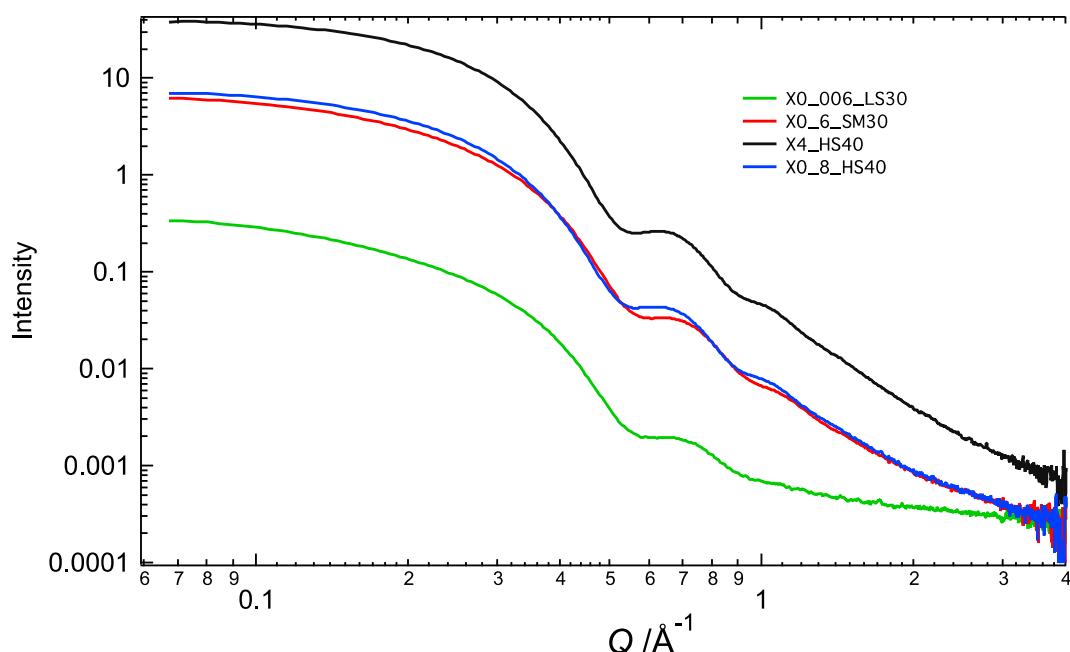
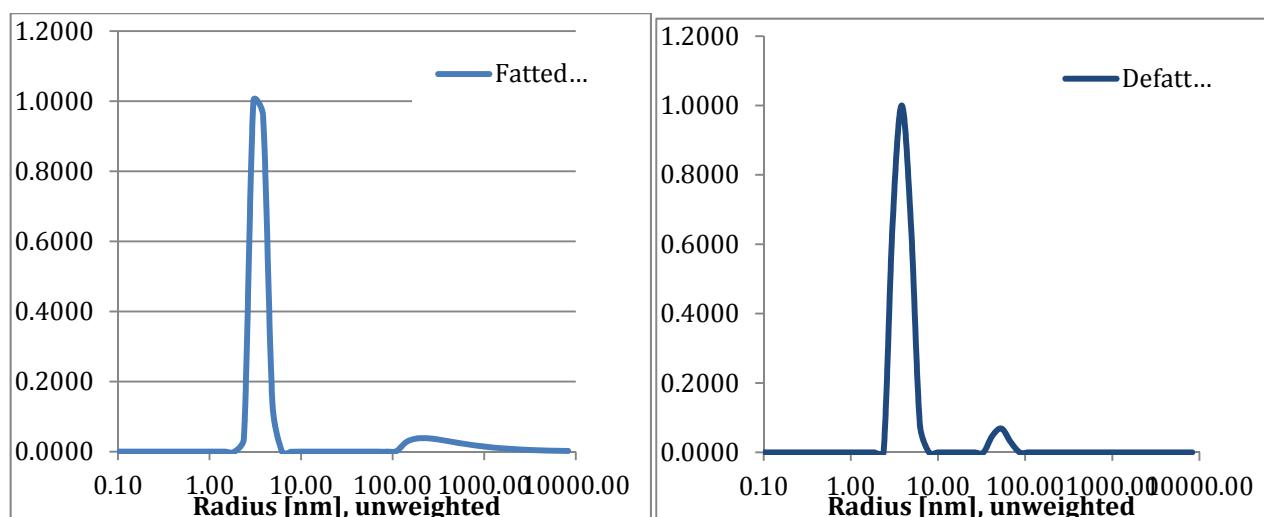


### Characterisation of the Silica sols

The small angle x-ray scattering functions LS-30, SM-30 and HS-40 silica sols with three different volume fractions in SPB solutions are shown in Figure SI1. Radii were extracted by fitting a Schultz distribution and the light aggregation by a “stick spheres” model.



**Figure SI1** X-ray Small Angle scattering from (a) LS-30, SM-30 and HS-40 used throughout the project (all in standard phosphate buffer).



**Figure SI2** Dynamic Light Scattering from Fatted and Defatted Human Serum albumin (all in standard phosphate buffer) at 25C

### Optical absorption measurements on D<sub>2</sub>O and ACMW Figaro Samples

The wavelength dependence of the optical spectra, however, show (a) scattering at short wavelengths – indicating that some aggregation was occurring. (b) the situation in D<sub>2</sub>O and ACMW is comparable. (c) Only above protein concentrations of 0.1 mg/ml was free protein absorption at ca 270nm detected.

### UV FHSA w/ Ludox

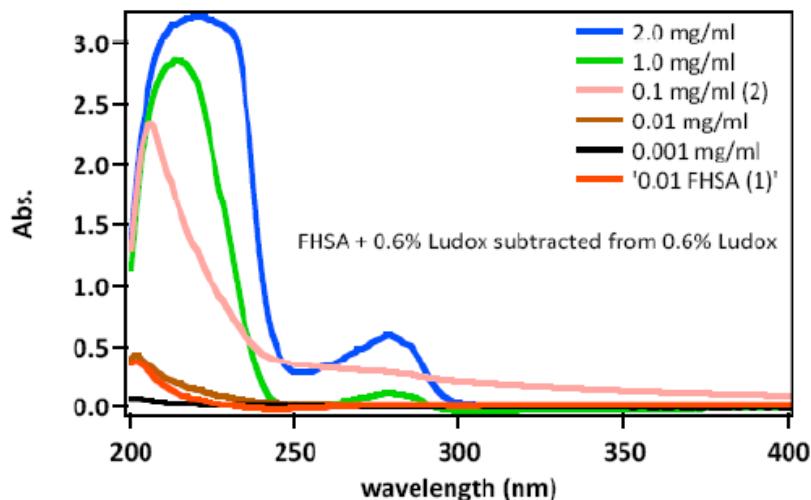
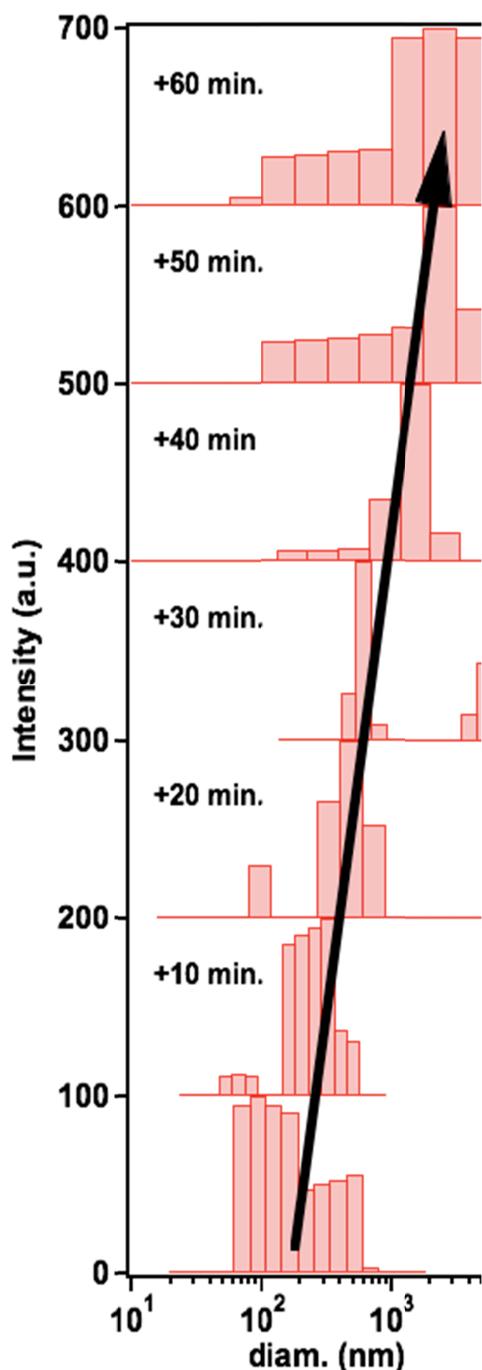


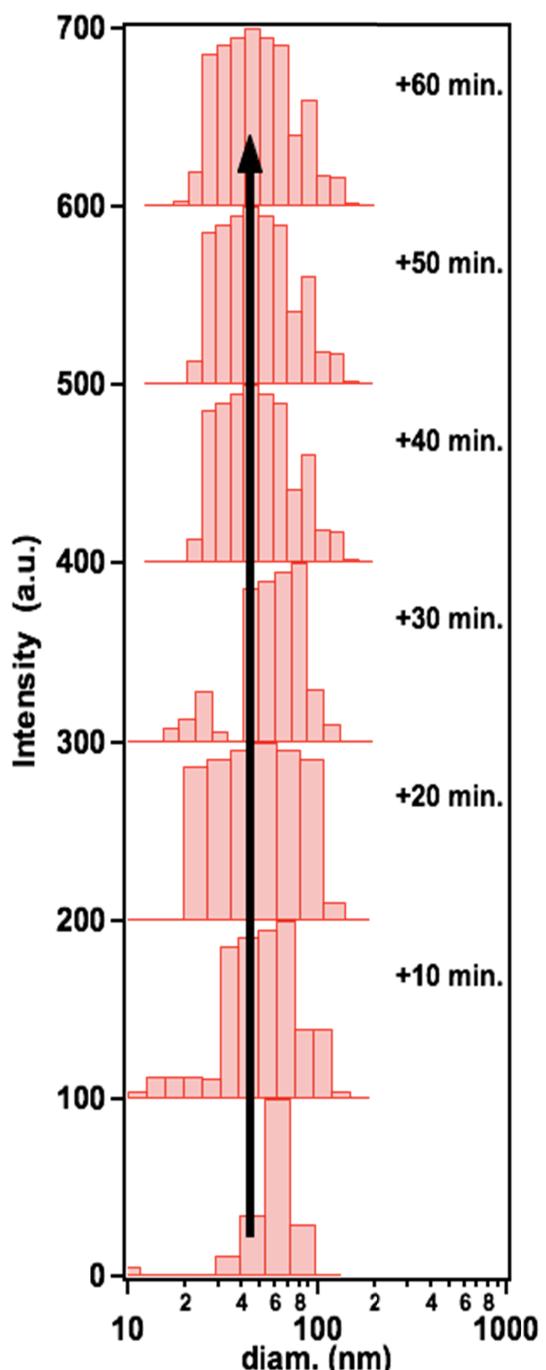
Figure SI3 Optical “absorption” spectra for D<sub>2</sub>O solutions from Platypus.

### Dynamic Light Scattering -solutions from LS-30 experiment on Platypus

At the end of the experiment and in a subsequent repeat experiment the light scattering for the LS-30 FHSA and DFHSA solutions was studied. The data are given in Figure 2 – again demonstrating the differences between these two proteins.



**Figure SI4 (a).** Size distribution as a function of time of 0.1 mg/ml FHSA with 0.6% v/v SiO<sub>2</sub> nanoparticles at pH 7.0.

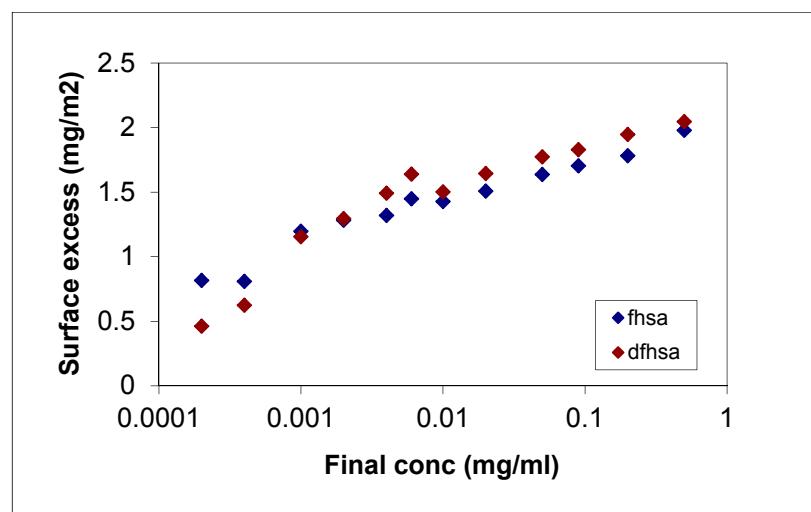


**Figure SI4 (b).** Size distribution as a function of time of 0.01 mg/ml FHSA with 0.6% v/v SiO<sub>2</sub> nanoparticles at pH 7.0.

## Adsorbed amount

### Premixed solutions

FIGARO was configured to optimise data collection from the lowest angle with good statistics and to measure changes over four hours. FHSA solution was added drop-wise to the buffer substrate and  $R(Q)$  vs  $Q$ , fitted with a thickness of 16 Å gave the surface excess (in mg/m<sup>2</sup>) and its time dependence. (Figure SI5). The surface excess for the protein was quickly established.



**Figure SI5** Surface excess measured for premixed F\_HSA and DF\_HSA ACMW solutions in SPB at 25°C

This experiment establishes the similarities in the adsorbed amounts for the two proteins and does not indicate dissociation of the fatty acid from FHSA. These measurements agree quite well with surface excess measure by x-ray reflectivity. (Joo MPhil Thesis Australian National University 2013)

**TABLE 1 Fatted and Defatted Human Serum Albumin (Sigma Aldrich) properties**

**05420**  
**Albumin from human serum**  
**(HSA, Human Albumin, Human Serum Albumin)**

CAS Number: 70024-90-7

Product No.	Preparation / Purification	Specification
05420	Prepared by using method IV of Cohn, et al. (crystallized and lyophilized Cohn Fraction V) <sup>3</sup>	Lyophilized powder ≥95.0% (agarose gel electrophoresis) pH 7.0 +/- 0.2

The source material has been tested negative for HIV and HBSAG.

**Product Description:**<sup>5, 15</sup>

Molecular weight: ~68'000 g/mol

Strukture:<sup>5</sup>

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
Residues:	39	15	30	22	60	23	25	12	63	35	39	6	8

Amino Acid:	Leu	Tyr	Phe	His	Lys	Trp	Arg
Residues:	61	18	30	16	58	1	23

Sedimentation constant, S<sub>20,W</sub> x 10<sup>13</sup>: 4.6 (monomer), 6.5 (dimer)

Diffusion constant, D<sub>20,W</sub> x 10<sup>7</sup>: 6.1

Partial specific volume, V<sub>20</sub>: 0.733

Intrinsic viscosity,  $\eta$ : 0.042

Frictional ratio, f/f<sub>0</sub>: 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<sup>-3</sup>: 1.89

Optical absorbance, A<sub>279 nm</sub> (1 gram/liter): 0.531

Mean residue rotation, [m]̅<sub>233</sub>: 8590

Mean residue ellipticity: 17 [θ]209 nm; 16 [θ]222 nm

Estimated  $\alpha$ -helix: 48%

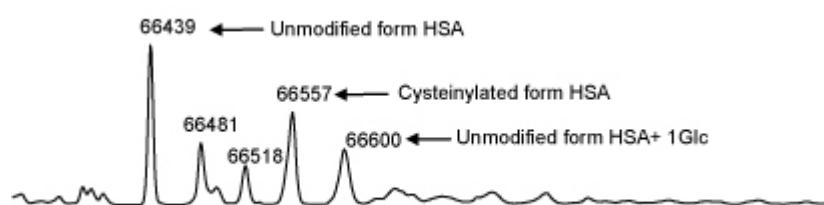
Estimated  $\beta$ -form: 15%

**Methods of Preparation:**

Sigma-Aldrich produces human serum albumin using a cold alcohol fractionation process derived from the traditional Cohn<sup>1,3</sup> method as well heat shock methods.<sup>2,4</sup>

**Molecular Weight:**

66,437 Da<sup>8</sup> (based on amino acid composition). Commercial preparations contain varying degrees of post-translational modifications and genetic variants with molecular weight components mainly in the range of 66,437 to 66,600 Da



**Deconvoluted mass spectrum of intact Native HSA**

### Fatty Acid Composition of Human Albumin.

Circulating plasma albumin typically contains 0.5-1.5 moles of fatty acid bound to one mole of albumin. Upper ranges of 4-9 moles per mole have been reported.<sup>9,10</sup>  
Alternatively, Sigma offers fatty acid depleted native human albumins.

Saturated Fatty Acids		Native .HSA	rHSA expressed in Rice
Lauric	12:0	<1%	0.2%
	13:0	<1%	
Myristic	14:0	1.50%	1.5%
Pentadecenoic	15:0	< 1%	0.1%
<b>Palmitic</b>	16:0	<b>24.70%</b>	12.5%
	17:0	<1%	
Stearic	18:0	1.50%	0.5%
Arachidic	20:0	<1%	0.0%
Bohenic	22:0	Not Tested	0.0%
Lignoceric	24:0	Not Tested	0.0%
Monosaturated Fatty Acids			
Myristoleic	14:1	<1%	0.0%
Palmitoleic	16:1w7	<3.1%	0.8%
	18:1w9	<b>&lt;33.1%</b>	35.9%
<b>Oleic</b>	18:1w7	<1%	0.0%
	24:1	<1%	0.0%
Diunsaturated Fatty Acids			
<b>Linoleic</b>	18:2w6	<b>&lt;20.0%</b>	44.8%
Polyunsaturated Fatty Acids			
a-Linolenic	18:3w3	<1%	3.6%
	18:3w6	<1%	0.0%
	20:1w9	<1%	0.0%
	20:1w9	<1%	0.0%
	20:2w6	<1%	0.0%
	20:3	1.40%	0.0%
	20:4	5.00%	0.0%
	20:5	<1%	0.0%
	22:1w9	<1%	0.0%
Arachidonic	22:4w6	<1%	0.0%
	22:5w6	<1%	0.0%
	22:5w3	<1%	0.0%
	22:6w3	<1%	0.0%

A3782 SIGMA

## Albumin from human serum

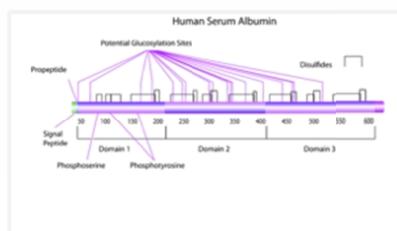
Lyophilized powder, Fatty acid free, Globulin free, ≥99% (agarose gel electrophoresis)

◇ [DOWNLOAD MSDS \(PDF\)](#)

Synonym: HSA

CAS Number 70024-90-7 | EC Number 274-272-6 | MDL number MFCD00081418

POPULAR DOCUMENTS: [PRODUCT INFORMATION SHEET \(PDF\)](#) | [SPECIFICATION SHEET \(PDF\)](#)



## Properties

Related Categories	<a href="#">Albumin, Bioactives and Supplements for Stem Cell Expansion</a> , <a href="#">Bioactives/Supplements</a> , <a href="#">Biochemicals and Reagents</a> , <a href="#">Cell Biology</a> , <a href="#">More...</a>
assay	≥99% (agarose gel electrophoresis)
form	lyophilized powder
mol wt	monomer calculated mol wt 66478 Da
impurities	HIV I and HIVII, HCV and HBsAg, tested negative ≤0.02% Fatty acids
storage temp.	2-8°C
Gene Information	<a href="#">human ... ALB(213)</a>