



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 6, 2022 – 10:11 pm BST

PDB ID : 8AGF
Title : Crystal structure of human Thiosulfate sulfurtransferase amino acids 2-297
Authors : Goor, H.v.; Grove, M.R.; AL-Dahmani, Z.m.
Deposited on : 2022-07-19
Resolution : 3.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at <http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.30
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0267
CCP4 : 7.1.010 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.30

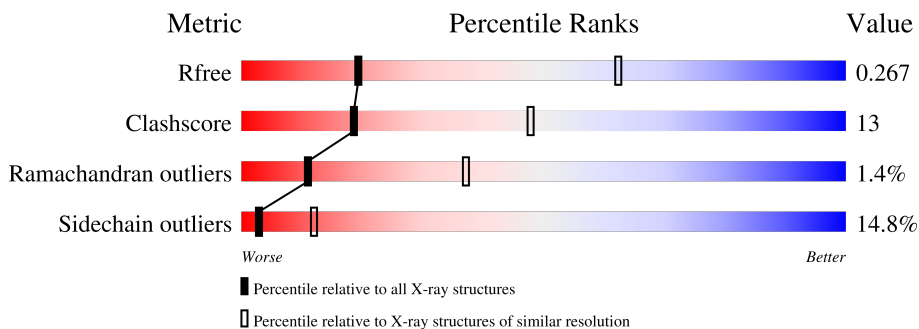
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	290	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 4557 atoms, of which 2255 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

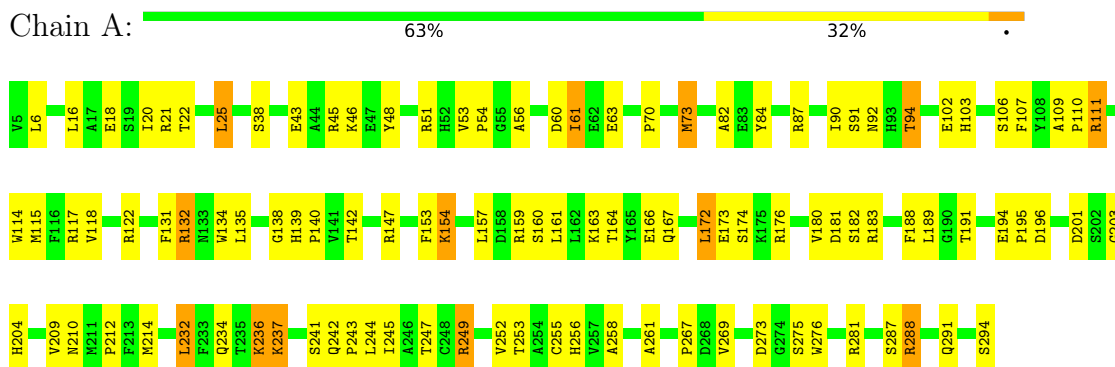
- Molecule 1 is a protein called Thiosulfate sulfurtransferase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	290	4557	1465	2255	406	422	9	67	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Thiosulfate sulfurtransferase



4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	41.93Å 48.54Å 152.50Å 90.00° 96.37° 90.00°	Depositor
Resolution (Å)	46.27 – 3.40 46.23 – 3.40	Depositor EDS
% Data completeness (in resolution range)	98.5 (46.27-3.40) 98.2 (46.23-3.40)	Depositor EDS
R_{merge}	0.60	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.36 (at 3.40Å)	Xtrriage
Refinement program	REFMAC 5.8.0267, REFMAC 5.8.0267	Depositor
R, R_{free}	0.196 , 0.278 0.200 , 0.267	Depositor DCC
R_{free} test set	225 reflections (5.29%)	wwPDB-VP
Wilson B-factor (Å ²)	30.9	Xtrriage
Anisotropy	0.351	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	4557	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.02% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.69	0/2366	0.90	0/3207

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2302	2255	2244	60	1
All	All	2302	2255	2244	60	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 13.

All (60) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:73:MET:O	1:A:273:ASP:OD1	1.87	0.92
1:A:84:TYR:O	1:A:87:ARG:HG2	1.84	0.78
1:A:48:TYR:OH	1:A:56:ALA:O	2.05	0.72
1:A:18:GLU:O	1:A:22:THR:OG1	2.08	0.70
1:A:111:ARG:HA	1:A:255:CYS:SG	2.31	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:111:ARG:O	1:A:111:ARG:HD3	1.95	0.67
1:A:188:PHE:O	1:A:204:HIS:ND1	2.23	0.66
1:A:203:GLY:O	1:A:276:TRP:CH2	2.52	0.62
1:A:188:PHE:CG	1:A:210:ASN:HB2	2.33	0.62
1:A:103:HIS:O	1:A:132:ARG:NH1	2.33	0.61
1:A:210:ASN:O	1:A:236:LYS:NZ	2.32	0.60
1:A:20:ILE:HD12	1:A:25:LEU:HD12	1.87	0.57
1:A:291:GLN:HA	1:A:291:GLN:OE1	2.05	0.57
1:A:109:ALA:HB3	1:A:110:PRO:HD3	1.85	0.56
1:A:16:LEU:HD11	1:A:20:ILE:HD11	1.86	0.56
1:A:92:ASN:OD1	1:A:154:LYS:O	2.25	0.54
1:A:237:LYS:O	1:A:237:LYS:HD3	2.06	0.54
1:A:61:ILE:HD13	1:A:61:ILE:N	2.23	0.54
1:A:172:LEU:HD11	1:A:287:SER:HB2	1.89	0.54
1:A:183:ARG:NH1	1:A:194:GLU:OE2	2.37	0.53
1:A:253:THR:O	1:A:256:HIS:HB2	2.08	0.53
1:A:163:LYS:HG3	1:A:245:ILE:HG12	1.90	0.52
1:A:91:SER:O	1:A:94:THR:HG23	2.10	0.51
1:A:114:TRP:O	1:A:117:ARG:N	2.44	0.51
1:A:111:ARG:HG2	1:A:252:VAL:HA	1.93	0.50
1:A:157:LEU:HD21	1:A:159:ARG:HD3	1.93	0.49
1:A:203:GLY:O	1:A:276:TRP:CZ2	2.65	0.49
1:A:195:PRO:O	1:A:249:ARG:NH2	2.46	0.49
1:A:182:SER:O	1:A:212:PRO:HA	2.12	0.49
1:A:131:PHE:O	1:A:134:TRP:HB3	2.13	0.48
1:A:261:ALA:CB	1:A:269:VAL:HG21	2.43	0.48
1:A:20:ILE:C	1:A:22:THR:H	2.16	0.48
1:A:82:ALA:HB1	1:A:153:PHE:O	2.14	0.48
1:A:188:PHE:CD1	1:A:210:ASN:HB2	2.48	0.48
1:A:102:GLU:HG2	1:A:107:PHE:HB2	1.96	0.48
1:A:53:VAL:HG22	1:A:134:TRP:CE2	2.50	0.47
1:A:90:ILE:HA	1:A:94:THR:HG21	1.97	0.47
1:A:6:LEU:HD21	1:A:267:PRO:HG3	1.98	0.46
1:A:288:ARG:HB2	1:A:288:ARG:HH11	1.81	0.46
1:A:188:PHE:CD2	1:A:210:ASN:HB2	2.51	0.45
1:A:60:ASP:OD1	1:A:60:ASP:C	2.56	0.45
1:A:110:PRO:HG2	1:A:256:HIS:CE1	2.52	0.44
1:A:115:MET:HA	1:A:118:VAL:HG12	1.99	0.44
1:A:157:LEU:CD2	1:A:159:ARG:HD3	2.48	0.44
1:A:111:ARG:HD3	1:A:111:ARG:C	2.37	0.44
1:A:189:LEU:O	1:A:291:GLN:N	2.47	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:135:LEU:O	1:A:138:GLY:N	2.39	0.43
1:A:180:VAL:HG23	1:A:244:LEU:HD21	1.99	0.43
1:A:111:ARG:HB2	1:A:252:VAL:HG13	2.01	0.42
1:A:180:VAL:CG2	1:A:244:LEU:HD21	2.49	0.42
1:A:255:CYS:O	1:A:258:ALA:HB3	2.20	0.42
1:A:53:VAL:O	1:A:54:PRO:C	2.58	0.41
1:A:48:TYR:CD2	1:A:48:TYR:C	2.92	0.41
1:A:164:THR:HG23	1:A:167:GLN:NE2	2.36	0.41
1:A:118:VAL:HA	1:A:161:LEU:HD12	2.02	0.41
1:A:16:LEU:CD1	1:A:20:ILE:HD11	2.49	0.41
1:A:60:ASP:OD1	1:A:63:GLU:N	2.50	0.41
1:A:139:HIS:O	1:A:140:PRO:C	2.59	0.41
1:A:275:SER:HB3	1:A:276:TRP:H	1.72	0.41
1:A:242:GLN:HA	1:A:243:PRO:HD3	1.89	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:173:GLU:OE2	1:A:173:GLU:OE2[2_555]	1.71	0.49

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	288/290 (99%)	244 (85%)	40 (14%)	4 (1%)	11 37

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	232	LEU
1	A	21	ARG

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Mol	Chain	Res	Type
1	A	70	PRO
1	A	132	ARG

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	244/244 (100%)	208 (85%)	36 (15%)	3 12

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	LEU
1	A	38	SER
1	A	43	GLU
1	A	45	ARG
1	A	46	LYS
1	A	51	ARG
1	A	61	ILE
1	A	73	MET
1	A	94	THR
1	A	106	SER
1	A	111	ARG
1	A	122	ARG
1	A	142	THR
1	A	147	ARG
1	A	154	LYS
1	A	160	SER
1	A	166	GLU
1	A	172	LEU
1	A	174	SER
1	A	176	ARG
1	A	181	ASP
1	A	191	THR
1	A	196	ASP
1	A	201	ASP

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Mol	Chain	Res	Type
1	A	209	VAL
1	A	214	MET
1	A	232	LEU
1	A	234	GLN
1	A	236	LYS
1	A	237	LYS
1	A	241	SER
1	A	247	THR
1	A	249	ARG
1	A	281	ARG
1	A	288	ARG
1	A	294	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	52	HIS
1	A	92	ASN
1	A	133	ASN
1	A	167	GLN
1	A	171	ASN
1	A	256	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.