



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 04:44 AM UTC

PDB ID : 4PVF / pdb_00004pvf
Title : Crystal structure of Homo sapiens holo serine hydroxymethyltransferase 2 (mitochondrial) (SHMT2), isoform 3, transcript variant 5, 483 aa, at 2.6 ang. resolution
Authors : Giardina, G.; Brunotti, P.; Fiascarelli, A.; Contestabile, R.; Cutruzzola, F.
Deposited on : 2014-03-17
Resolution : 2.60 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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

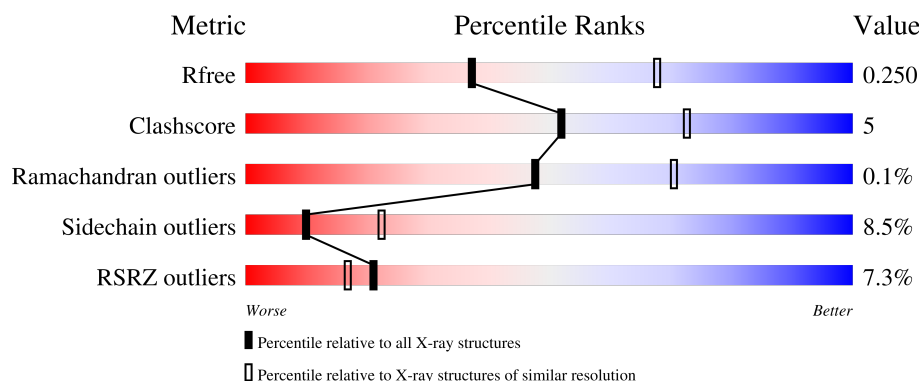
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

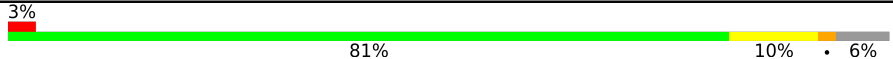
The reported resolution of this entry is 2.60 Å.

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}	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	483	
1	B	483	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GOL	A	501	-	-	X	-
2	GOL	B	501	-	-	X	-
3	PEG	A	502	-	-	X	-

2 Entry composition [i](#)

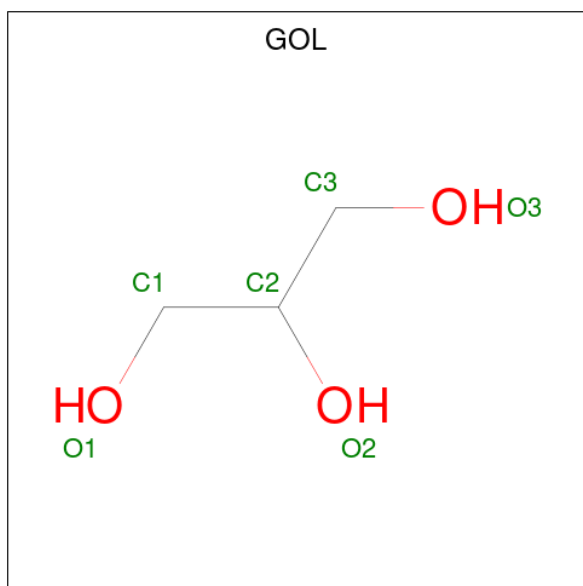
There are 4 unique types of molecules in this entry. The entry contains 7229 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Serine hydroxymethyltransferase, mitochondrial.

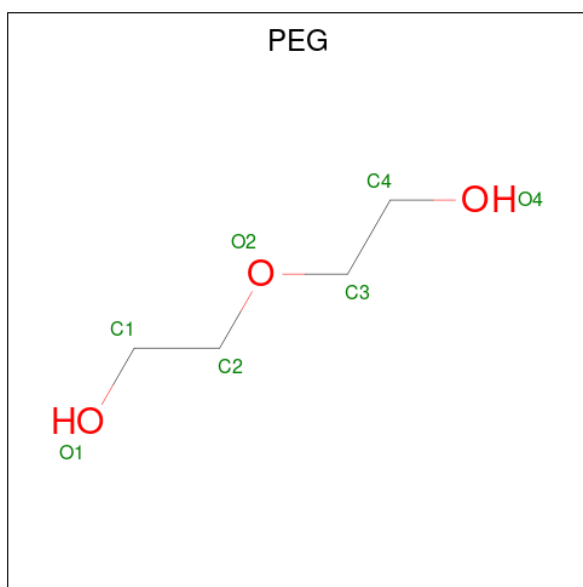
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	454	Total	C	N	O	P	S	0	0	0
			3561	2244	637	663	1	16			
1	B	447	Total	C	N	O	P	S	0	2	0
			3523	2222	629	655	1	16			

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	4	3		

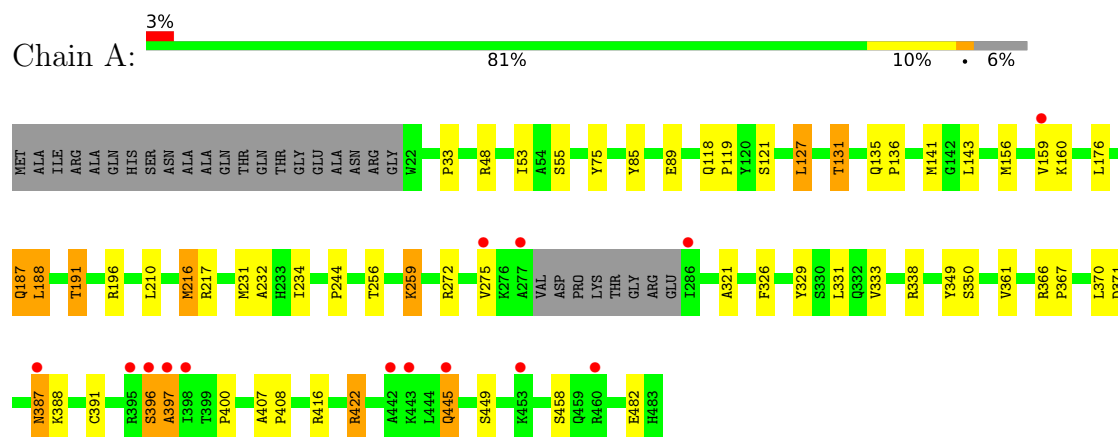
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	78	Total	O	0	0
			78	78		
4	B	48	Total	O	0	0
			48	48		

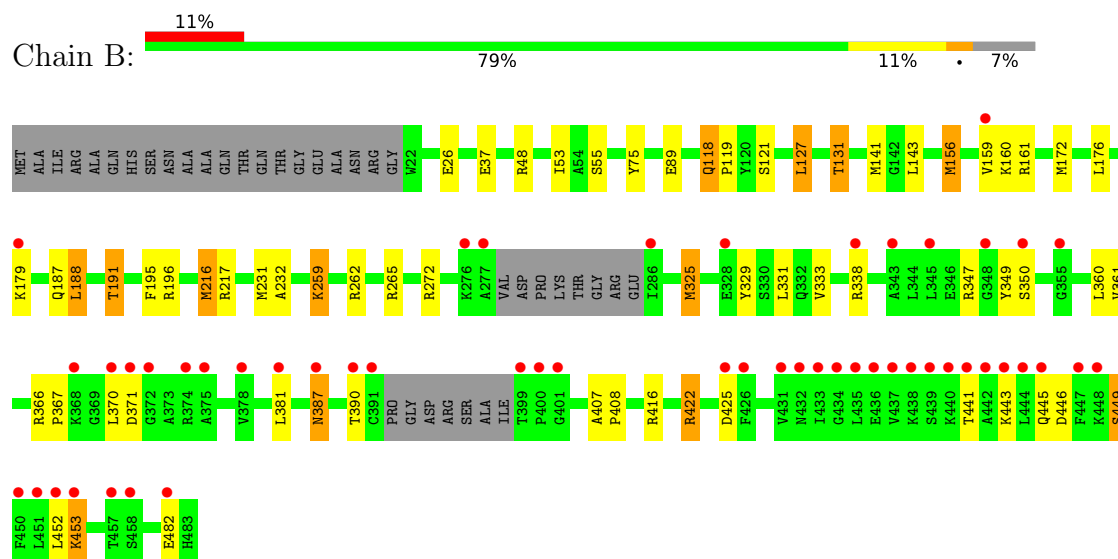
3 Residue-property plots

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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: Serine hydroxymethyltransferase, mitochondrial



- Molecule 1: Serine hydroxymethyltransferase, mitochondrial



4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	160.46Å 160.46Å 211.46Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	138.96 – 2.60 138.96 – 2.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (138.96-2.60) 100.0 (138.96-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.90 (at 2.61Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.206 , 0.243 0.213 , 0.250	Depositor DCC
R_{free} test set	2531 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	30.7	Xtriage
Anisotropy	0.331	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 14.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	7229	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.59% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: LLP, GOL, PEG

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	0.99	0/3607	1.08	5/4876 (0.1%)
1	B	0.97	0/3573	1.06	7/4828 (0.1%)
All	All	0.98	0/7180	1.07	12/9704 (0.1%)

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	391	CYS	CB-CA-C	6.96	119.26	108.61
1	A	387	ASN	CB-CA-C	-6.91	96.17	109.37
1	A	160	LYS	N-CA-C	6.79	119.18	108.79
1	B	387	ASN	CB-CA-C	-6.77	96.44	109.37
1	B	160	LYS	N-CA-C	6.44	118.64	108.79
1	B	265	ARG	CG-CD-NE	-6.19	98.37	112.00
1	A	349	TYR	N-CA-C	-5.64	101.67	110.42
1	B	453	LYS	N-CA-C	5.29	119.06	111.02
1	B	118	GLN	CA-C-N	-5.18	114.42	119.76
1	B	118	GLN	C-N-CA	-5.18	114.42	119.76
1	A	275	VAL	N-CA-C	5.09	115.61	108.89
1	B	349	TYR	N-CA-C	-5.08	102.55	110.42

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	3561	0	3545	41	0
1	B	3523	0	3510	30	0
2	A	6	0	8	6	0
2	B	6	0	8	6	0
3	A	7	0	10	8	0
4	A	78	0	0	2	0
4	B	48	0	0	1	0
All	All	7229	0	7081	72	0

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 5.

All (72) 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:B:191:THR:HG21	4:B:605:HOH:O	1.68	0.91
1:A:85:TYR:HH	2:B:501:GOL:HO1	1.15	0.85
1:B:262:ARG:HH22	1:B:325:MET:HE1	1.41	0.85
1:A:55:SER:OG	2:A:501:GOL:H2	1.84	0.77
1:A:127:LEU:O	1:A:131:THR:HG23	1.88	0.74
1:A:388:LYS:HD2	1:A:400:PRO:HG2	1.70	0.74
1:B:127:LEU:O	1:B:131:THR:HG23	1.88	0.74
1:B:259:LLP:H4'1	2:B:501:GOL:H2	1.72	0.71
1:A:210:LEU:HA	3:A:502:PEG:C4	2.20	0.71
1:A:259:LLP:H4'1	2:A:501:GOL:H12	1.75	0.69
1:A:234:ILE:CD1	3:A:502:PEG:H32	2.25	0.66
1:A:55:SER:OG	2:A:501:GOL:C2	2.43	0.65
1:A:55:SER:CB	2:A:501:GOL:H2	2.27	0.65
1:A:210:LEU:HA	3:A:502:PEG:H42	1.81	0.63
1:A:191:THR:HG21	4:A:654:HOH:O	1.99	0.63
1:A:210:LEU:HA	3:A:502:PEG:H41	1.80	0.62
1:A:188:LEU:HD12	1:A:216:MET:HE3	1.83	0.60
1:B:141:MET:HE1	1:B:191:THR:CG2	2.32	0.60
1:B:449:SER:O	1:B:453:LYS:CG	2.50	0.59
1:A:85:TYR:OH	2:B:501:GOL:O1	2.07	0.59
1:A:141:MET:HE1	1:A:191:THR:CG2	2.33	0.58
1:B:55:SER:OG	2:B:501:GOL:O3	2.21	0.57
1:B:188:LEU:HD12	1:B:216:MET:HE3	1.86	0.56
1:B:422:ARG:HG3	1:B:422:ARG:HH11	1.71	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:449:SER:O	1:B:453:LYS:HG2	2.06	0.55
1:A:244:PRO:HD2	3:A:502:PEG:H12	1.89	0.53
2:B:501:GOL:O1	2:B:501:GOL:O3	2.25	0.53
1:A:55:SER:HB3	2:A:501:GOL:H2	1.92	0.52
1:A:234:ILE:HD12	3:A:502:PEG:H32	1.93	0.51
1:A:338:ARG:HG3	1:A:338:ARG:HH11	1.75	0.51
1:B:338:ARG:HH11	1:B:338:ARG:HG3	1.77	0.50
1:A:422:ARG:HH11	1:A:422:ARG:HG3	1.76	0.49
1:B:188:LEU:CD1	1:B:216:MET:CE	2.91	0.49
1:A:370:LEU:HG	1:A:371:ASP:H	1.78	0.49
1:A:188:LEU:CD1	1:A:216:MET:CE	2.91	0.49
1:A:234:ILE:HD13	3:A:502:PEG:H32	1.95	0.49
1:A:33:PRO:HD2	4:A:672:HOH:O	2.12	0.48
1:B:188:LEU:HD11	1:B:216:MET:CE	2.42	0.48
1:B:370:LEU:HG	1:B:371:ASP:H	1.78	0.48
1:A:445:GLN:NE2	1:A:445:GLN:HA	2.27	0.48
1:A:329:TYR:O	1:A:333:VAL:HG23	2.14	0.47
1:A:187:GLN:O	1:A:191:THR:HB	2.14	0.47
1:B:187:GLN:O	1:B:191:THR:HB	2.15	0.46
1:A:396:SER:O	1:A:397:ALA:CB	2.63	0.46
1:B:329:TYR:O	1:B:333:VAL:HG23	2.15	0.46
1:A:55:SER:OG	2:A:501:GOL:O3	2.32	0.46
1:A:217:ARG:HA	1:A:217:ARG:HD3	1.74	0.46
1:B:407:ALA:N	1:B:408:PRO:HD3	2.31	0.46
1:A:188:LEU:HD11	1:A:216:MET:CE	2.46	0.45
1:A:422:ARG:HG3	1:A:422:ARG:NH1	2.32	0.45
1:B:366:ARG:HB2	1:B:367:PRO:HD3	1.98	0.44
1:B:407:ALA:N	1:B:408:PRO:CD	2.80	0.44
1:B:231:MET:O	1:B:232:ALA:C	2.61	0.44
1:A:407:ALA:N	1:A:408:PRO:CD	2.81	0.43
1:A:407:ALA:N	1:A:408:PRO:HD3	2.33	0.43
1:A:244:PRO:CD	3:A:502:PEG:H12	2.49	0.42
1:B:360:LEU:C	1:B:360:LEU:HD12	2.43	0.42
1:B:422:ARG:NH1	1:B:422:ARG:CG	2.82	0.42
1:B:449:SER:O	1:B:453:LYS:HG3	2.19	0.42
1:B:118:GLN:N	1:B:119:PRO:CD	2.83	0.42
1:A:321:ALA:HA	1:A:326:PHE:CG	2.55	0.42
1:A:118:GLN:N	1:A:119:PRO:CD	2.83	0.41
1:B:259:LLP:C4'	2:B:501:GOL:H2	2.45	0.41
1:A:366:ARG:HB2	1:A:367:PRO:HD3	2.01	0.41
1:B:416:ARG:HG3	1:B:416:ARG:NH1	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:135:GLN:O	1:A:136:PRO:C	2.62	0.41
1:B:172:MET:HE1	1:B:195:PHE:HB2	2.03	0.40
1:A:256:THR:HG21	1:A:259:LLP:HE2	2.03	0.40
1:B:407:ALA:H	1:B:408:PRO:HD3	1.86	0.40
1:B:156:MET:HB3	1:B:161:ARG:HA	2.04	0.40
1:B:347:ARG:NH2	1:B:425:ASP:HA	2.36	0.40
1:A:231:MET:O	1:A:232:ALA:C	2.63	0.40

There are no symmetry-related clashes.

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	449/483 (93%)	433 (96%)	15 (3%)	1 (0%)	43	66
1	B	442/483 (92%)	424 (96%)	18 (4%)	0	100	100
All	All	891/966 (92%)	857 (96%)	33 (4%)	1 (0%)	48	70

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	397	ALA

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	373/394 (95%)	345 (92%)	28 (8%)	12	28
1	B	370/394 (94%)	335 (90%)	35 (10%)	8	18
All	All	743/788 (94%)	680 (92%)	63 (8%)	10	22

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	ARG
1	A	53	ILE
1	A	75	TYR
1	A	89	GLU
1	A	121	SER
1	A	127	LEU
1	A	131	THR
1	A	143	LEU
1	A	156	MET
1	A	159	VAL
1	A	176	LEU
1	A	187	GLN
1	A	188	LEU
1	A	191	THR
1	A	196	ARG
1	A	216	MET
1	A	272	ARG
1	A	331	LEU
1	A	350	SER
1	A	361	VAL
1	A	387	ASN
1	A	396	SER
1	A	416	ARG
1	A	422	ARG
1	A	445	GLN
1	A	449	SER
1	A	458	SER
1	A	482	GLU
1	B	26	GLU
1	B	37	GLU
1	B	48	ARG
1	B	53	ILE
1	B	75	TYR
1	B	89	GLU
1	B	121	SER

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Mol	Chain	Res	Type
1	B	127	LEU
1	B	131	THR
1	B	143	LEU
1	B	156	MET
1	B	159	VAL
1	B	176	LEU
1	B	179	LYS
1	B	188	LEU
1	B	191	THR
1	B	196	ARG
1	B	216	MET
1	B	217	ARG
1	B	272	ARG
1	B	325	MET
1	B	331	LEU
1	B	350	SER
1	B	361	VAL
1	B	381	LEU
1	B	387	ASN
1	B	390	THR
1	B	422	ARG
1	B	441	THR
1	B	443	LYS
1	B	445	GLN
1	B	446	ASP
1	B	449	SER
1	B	452	LEU
1	B	482	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	GLN
1	A	308	ASN
1	A	445	GLN
1	A	466	GLN
1	A	470	GLN
1	B	99	GLN
1	B	249	HIS
1	B	308	ASN
1	B	389	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
1	LLP	B	259	1	23,24,25	1.86	4 (17%)	25,32,34	2.06	6 (24%)
1	LLP	A	259	1	23,24,25	2.05	4 (17%)	25,32,34	1.94	7 (28%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LLP	B	259	1	-	7/16/17/19	0/1/1/1
1	LLP	A	259	1	-	7/16/17/19	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	259	LLP	C4'-NZ	6.03	1.47	1.27
1	B	259	LLP	C4'-NZ	5.61	1.45	1.27
1	B	259	LLP	C3-C2	4.66	1.45	1.41
1	A	259	LLP	C3-C2	4.48	1.45	1.41
1	A	259	LLP	C4-C5	3.98	1.47	1.42
1	A	259	LLP	C4-C3	3.84	1.47	1.41
1	B	259	LLP	C4-C3	3.19	1.46	1.41
1	B	259	LLP	C4-C5	2.31	1.45	1.42

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	259	LLP	OP4-C5'-C5	5.68	120.01	109.36
1	B	259	LLP	OP4-C5'-C5	5.61	119.88	109.36
1	B	259	LLP	C4-C4'-NZ	-5.07	100.64	124.04
1	A	259	LLP	C4-C4'-NZ	-3.28	108.90	124.04
1	B	259	LLP	C5-C4-C4'	3.01	126.12	121.47
1	A	259	LLP	C6-N1-C2	2.86	124.38	119.20
1	A	259	LLP	C5-C4-C4'	2.67	125.58	121.47
1	A	259	LLP	C3-C2-N1	-2.39	117.94	120.96
1	A	259	LLP	C2'-C2-N1	2.34	122.05	117.64
1	B	259	LLP	CE-NZ-C4'	2.26	125.96	118.72
1	B	259	LLP	C2'-C2-N1	2.10	121.61	117.64
1	A	259	LLP	OP2-P-OP1	2.09	119.00	110.83
1	B	259	LLP	C3-C4-C4'	-2.07	116.67	120.40

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	259	LLP	C4-C4'-NZ-CE
1	A	259	LLP	C5'-OP4-P-OP2
1	A	259	LLP	O-C-CA-CB
1	B	259	LLP	C5'-OP4-P-OP2
1	B	259	LLP	O-C-CA-CB
1	B	259	LLP	CG-CD-CE-NZ
1	B	259	LLP	C3-C4-C4'-NZ
1	A	259	LLP	C5'-OP4-P-OP1
1	B	259	LLP	C5'-OP4-P-OP1
1	B	259	LLP	C5-C4-C4'-NZ
1	A	259	LLP	CD-CE-NZ-C4'
1	B	259	LLP	CD-CE-NZ-C4'
1	A	259	LLP	C3-C4-C4'-NZ
1	A	259	LLP	CG-CD-CE-NZ

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	259	LLP	2	0
1	A	259	LLP	2	0

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

3 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	GOL	A	501	-	5,5,5	0.54	0	5,5,5	1.42	1 (20%)
2	GOL	B	501	-	5,5,5	0.57	0	5,5,5	0.45	0
3	PEG	A	502	-	6,6,6	1.31	0	5,5,5	1.53	2 (40%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	501	-	-	2/4/4/4	-
2	GOL	B	501	-	-	2/4/4/4	-
3	PEG	A	502	-	-	1/4/4/4	-

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502	PEG	O1-C1-C2	2.09	124.11	111.82
2	A	501	GOL	C3-C2-C1	-2.07	104.21	111.80
3	A	502	PEG	C3-O2-C2	2.06	122.28	113.26

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	GOL	O1-C1-C2-C3
2	B	501	GOL	O1-C1-C2-C3
2	A	501	GOL	O1-C1-C2-O2
3	A	502	PEG	O1-C1-C2-O2
2	B	501	GOL	O1-C1-C2-O2

There are no ring outliers.

3 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	GOL	6	0
2	B	501	GOL	6	0
3	A	502	PEG	8	0

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

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	453/483 (93%)	-0.26	14 (3%) 51 45	20, 24, 55, 89	0
1	B	446/483 (92%)	0.47	52 (11%) 9 7	13, 35, 78, 119	2 (0%)
All	All	899/966 (93%)	0.10	66 (7%) 21 17	13, 29, 70, 119	2 (0%)

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	450	PHE	6.6
1	B	399	THR	5.9
1	B	277	ALA	5.8
1	A	277	ALA	5.4
1	B	452	LEU	5.2
1	B	286	ILE	4.8
1	B	350	SER	4.0
1	B	439	SER	3.9
1	A	395	ARG	3.8
1	B	435	LEU	3.8
1	B	444	LEU	3.6
1	B	437	VAL	3.6
1	B	179	LYS	3.6
1	B	442	ALA	3.5
1	B	453	LYS	3.5
1	B	391	CYS	3.4
1	B	368	LYS	3.3
1	A	397	ALA	3.3
1	B	348	GLY	3.2
1	A	275	VAL	3.2
1	B	378	VAL	3.2
1	B	441	THR	3.2
1	A	286	ILE	3.2
1	B	443	LYS	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	440	LYS	3.0
1	B	448	LYS	3.0
1	B	445	GLN	2.9
1	B	390	THR	2.8
1	B	447	PHE	2.8
1	B	438	LYS	2.8
1	B	355	GLY	2.7
1	B	401	GLY	2.7
1	B	375	ALA	2.7
1	B	338	ARG	2.7
1	A	453	LYS	2.7
1	B	372	GLY	2.6
1	B	276	LYS	2.5
1	B	432	ASN	2.5
1	A	398	ILE	2.5
1	B	433	ILE	2.5
1	B	387	ASN	2.4
1	B	426	PHE	2.4
1	A	159	VAL	2.4
1	A	460	ARG	2.4
1	A	442	ALA	2.4
1	B	370	LEU	2.3
1	B	451	LEU	2.3
1	A	396	SER	2.3
1	B	159	VAL	2.3
1	B	381	LEU	2.3
1	B	482	GLU	2.3
1	B	400	PRO	2.3
1	B	371	ASP	2.3
1	B	458	SER	2.3
1	A	443	LYS	2.2
1	A	387	ASN	2.2
1	B	431	VAL	2.2
1	B	434	GLY	2.1
1	B	457	THR	2.1
1	B	425	ASP	2.1
1	B	374	ARG	2.1
1	A	445	GLN	2.1
1	B	436	GLU	2.1
1	B	328	GLU	2.0
1	B	343	ALA	2.0
1	B	345	LEU	2.0

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	LLP	B	259	24/25	0.96	0.08	23,29,32,34	0
1	LLP	A	259	24/25	0.98	0.06	20,20,20,22	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	GOL	A	501	6/6	0.85	0.32	20,20,20,20	6
3	PEG	A	502	7/7	0.85	0.20	20,20,21,22	7
2	GOL	B	501	6/6	0.92	0.13	39,46,49,54	0

6.5 Other polymers [i](#)

There are no such residues in this entry.