



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 28, 2016 – 12:37 PM EDT

PDB ID : 4XCS
Title : Human peroxiredoxin-1 C83S mutant
Authors : Cho, K.J.; Lee, J.-H.; Khan, T.G.; Park, Y.; Cho, A.; Chang, T.-S.; Kim, K.H.
Deposited on : 2014-12-18
Resolution : 2.10 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.1 (RC1), CSD as537be (2016)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20027939
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20027939

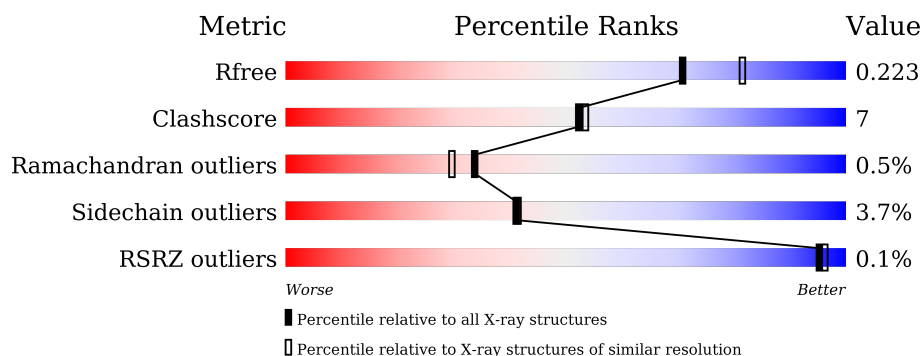
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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}	91344	3939 (2.10-2.10)
Clashscore	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)
RSRZ outliers	91569	3948 (2.10-2.10)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	219	<div> <div>63%</div> <div>15%</div> <div>•</div> <div>18%</div> </div>
1	B	219	<div> <div>72%</div> <div>8%</div> <div>•</div> <div>20%</div> </div>
1	C	219	<div> <div>67%</div> <div>14%</div> <div>•</div> <div>18%</div> </div>
1	D	219	<div> <div>68%</div> <div>11%</div> <div>•</div> <div>20%</div> </div>
1	E	219	<div> <div>70%</div> <div>8%</div> <div>•</div> <div>19%</div> </div>
1	F	219	<div> <div>66%</div> <div>14%</div> <div>•</div> <div>18%</div> </div>

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	201	-	-	-	X
2	GOL	C	201	-	-	-	X
2	GOL	F	201	-	-	-	X
3	CPS	A	202	-	-	-	X
3	CPS	E	201	-	-	-	X

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 8912 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 Peroxiredoxin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	179	Total	C	N	O	S	0	1	0
			1393	895	235	257	6			
1	B	176	Total	C	N	O	S	0	4	0
			1401	910	232	254	5			
1	C	179	Total	C	N	O	S	0	0	0
			1387	891	234	256	6			
1	D	176	Total	C	N	O	S	0	3	0
			1398	905	235	253	5			
1	E	177	Total	C	N	O	S	0	3	0
			1400	904	234	257	5			
1	F	179	Total	C	N	O	S	0	1	0
			1390	893	234	257	6			

There are 126 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP Q06830
A	-18	GLY	-	expression tag	UNP Q06830
A	-17	SER	-	expression tag	UNP Q06830
A	-16	SER	-	expression tag	UNP Q06830
A	-15	HIS	-	expression tag	UNP Q06830
A	-14	HIS	-	expression tag	UNP Q06830
A	-13	HIS	-	expression tag	UNP Q06830
A	-12	HIS	-	expression tag	UNP Q06830
A	-11	HIS	-	expression tag	UNP Q06830
A	-10	HIS	-	expression tag	UNP Q06830
A	-9	SER	-	expression tag	UNP Q06830
A	-8	SER	-	expression tag	UNP Q06830
A	-7	GLY	-	expression tag	UNP Q06830
A	-6	LEU	-	expression tag	UNP Q06830
A	-5	VAL	-	expression tag	UNP Q06830
A	-4	PRO	-	expression tag	UNP Q06830
A	-3	ARG	-	expression tag	UNP Q06830

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q06830
A	-1	SER	-	expression tag	UNP Q06830
A	0	HIS	-	expression tag	UNP Q06830
A	83	SER	CYS	engineered mutation	UNP Q06830
B	-19	MET	-	expression tag	UNP Q06830
B	-18	GLY	-	expression tag	UNP Q06830
B	-17	SER	-	expression tag	UNP Q06830
B	-16	SER	-	expression tag	UNP Q06830
B	-15	HIS	-	expression tag	UNP Q06830
B	-14	HIS	-	expression tag	UNP Q06830
B	-13	HIS	-	expression tag	UNP Q06830
B	-12	HIS	-	expression tag	UNP Q06830
B	-11	HIS	-	expression tag	UNP Q06830
B	-10	HIS	-	expression tag	UNP Q06830
B	-9	SER	-	expression tag	UNP Q06830
B	-8	SER	-	expression tag	UNP Q06830
B	-7	GLY	-	expression tag	UNP Q06830
B	-6	LEU	-	expression tag	UNP Q06830
B	-5	VAL	-	expression tag	UNP Q06830
B	-4	PRO	-	expression tag	UNP Q06830
B	-3	ARG	-	expression tag	UNP Q06830
B	-2	GLY	-	expression tag	UNP Q06830
B	-1	SER	-	expression tag	UNP Q06830
B	0	HIS	-	expression tag	UNP Q06830
B	83	SER	CYS	engineered mutation	UNP Q06830
C	-19	MET	-	expression tag	UNP Q06830
C	-18	GLY	-	expression tag	UNP Q06830
C	-17	SER	-	expression tag	UNP Q06830
C	-16	SER	-	expression tag	UNP Q06830
C	-15	HIS	-	expression tag	UNP Q06830
C	-14	HIS	-	expression tag	UNP Q06830
C	-13	HIS	-	expression tag	UNP Q06830
C	-12	HIS	-	expression tag	UNP Q06830
C	-11	HIS	-	expression tag	UNP Q06830
C	-10	HIS	-	expression tag	UNP Q06830
C	-9	SER	-	expression tag	UNP Q06830
C	-8	SER	-	expression tag	UNP Q06830
C	-7	GLY	-	expression tag	UNP Q06830
C	-6	LEU	-	expression tag	UNP Q06830
C	-5	VAL	-	expression tag	UNP Q06830
C	-4	PRO	-	expression tag	UNP Q06830
C	-3	ARG	-	expression tag	UNP Q06830

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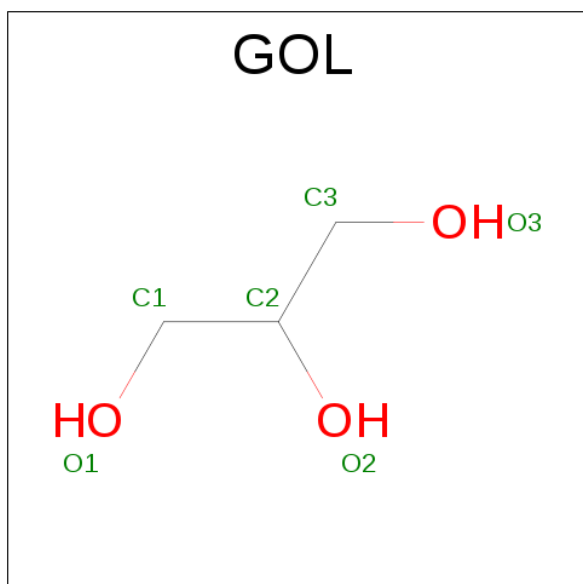
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C	-2	GLY	-	expression tag	UNP Q06830
C	-1	SER	-	expression tag	UNP Q06830
C	0	HIS	-	expression tag	UNP Q06830
C	83	SER	CYS	engineered mutation	UNP Q06830
D	-19	MET	-	expression tag	UNP Q06830
D	-18	GLY	-	expression tag	UNP Q06830
D	-17	SER	-	expression tag	UNP Q06830
D	-16	SER	-	expression tag	UNP Q06830
D	-15	HIS	-	expression tag	UNP Q06830
D	-14	HIS	-	expression tag	UNP Q06830
D	-13	HIS	-	expression tag	UNP Q06830
D	-12	HIS	-	expression tag	UNP Q06830
D	-11	HIS	-	expression tag	UNP Q06830
D	-10	HIS	-	expression tag	UNP Q06830
D	-9	SER	-	expression tag	UNP Q06830
D	-8	SER	-	expression tag	UNP Q06830
D	-7	GLY	-	expression tag	UNP Q06830
D	-6	LEU	-	expression tag	UNP Q06830
D	-5	VAL	-	expression tag	UNP Q06830
D	-4	PRO	-	expression tag	UNP Q06830
D	-3	ARG	-	expression tag	UNP Q06830
D	-2	GLY	-	expression tag	UNP Q06830
D	-1	SER	-	expression tag	UNP Q06830
D	0	HIS	-	expression tag	UNP Q06830
D	83	SER	CYS	engineered mutation	UNP Q06830
E	-19	MET	-	expression tag	UNP Q06830
E	-18	GLY	-	expression tag	UNP Q06830
E	-17	SER	-	expression tag	UNP Q06830
E	-16	SER	-	expression tag	UNP Q06830
E	-15	HIS	-	expression tag	UNP Q06830
E	-14	HIS	-	expression tag	UNP Q06830
E	-13	HIS	-	expression tag	UNP Q06830
E	-12	HIS	-	expression tag	UNP Q06830
E	-11	HIS	-	expression tag	UNP Q06830
E	-10	HIS	-	expression tag	UNP Q06830
E	-9	SER	-	expression tag	UNP Q06830
E	-8	SER	-	expression tag	UNP Q06830
E	-7	GLY	-	expression tag	UNP Q06830
E	-6	LEU	-	expression tag	UNP Q06830
E	-5	VAL	-	expression tag	UNP Q06830
E	-4	PRO	-	expression tag	UNP Q06830
E	-3	ARG	-	expression tag	UNP Q06830

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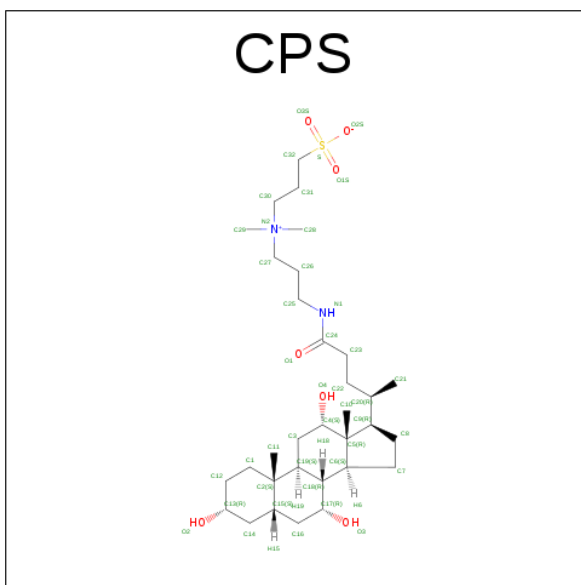
Chain	Residue	Modelled	Actual	Comment	Reference
E	-2	GLY	-	expression tag	UNP Q06830
E	-1	SER	-	expression tag	UNP Q06830
E	0	HIS	-	expression tag	UNP Q06830
E	83	SER	CYS	engineered mutation	UNP Q06830
F	-19	MET	-	expression tag	UNP Q06830
F	-18	GLY	-	expression tag	UNP Q06830
F	-17	SER	-	expression tag	UNP Q06830
F	-16	SER	-	expression tag	UNP Q06830
F	-15	HIS	-	expression tag	UNP Q06830
F	-14	HIS	-	expression tag	UNP Q06830
F	-13	HIS	-	expression tag	UNP Q06830
F	-12	HIS	-	expression tag	UNP Q06830
F	-11	HIS	-	expression tag	UNP Q06830
F	-10	HIS	-	expression tag	UNP Q06830
F	-9	SER	-	expression tag	UNP Q06830
F	-8	SER	-	expression tag	UNP Q06830
F	-7	GLY	-	expression tag	UNP Q06830
F	-6	LEU	-	expression tag	UNP Q06830
F	-5	VAL	-	expression tag	UNP Q06830
F	-4	PRO	-	expression tag	UNP Q06830
F	-3	ARG	-	expression tag	UNP Q06830
F	-2	GLY	-	expression tag	UNP Q06830
F	-1	SER	-	expression tag	UNP Q06830
F	0	HIS	-	expression tag	UNP Q06830
F	83	SER	CYS	engineered mutation	UNP Q06830

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 3 is 3-[(3-CHOLAMIDOPROPYL)DIMETHYLAMMONIO]-1-PROPANESULFONATE (three-letter code: CPS) (formula: $C_{32}H_{58}N_2O_7S$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O S 42 32 2 7 1	0	0
3	D	1	Total C N O S 42 32 2 7 1	0	0
3	E	1	Total C N O S 42 32 2 7 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	89	Total O 89 89	0	0
4	B	50	Total O 50 50	0	0
4	C	90	Total O 90 90	0	0

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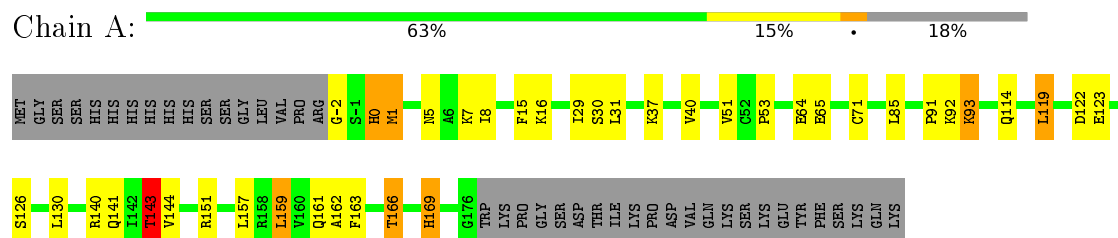
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	44	Total 44	O 44	0	0
4	E	52	Total 52	O 52	0	0
4	F	74	Total 74	O 74	0	0

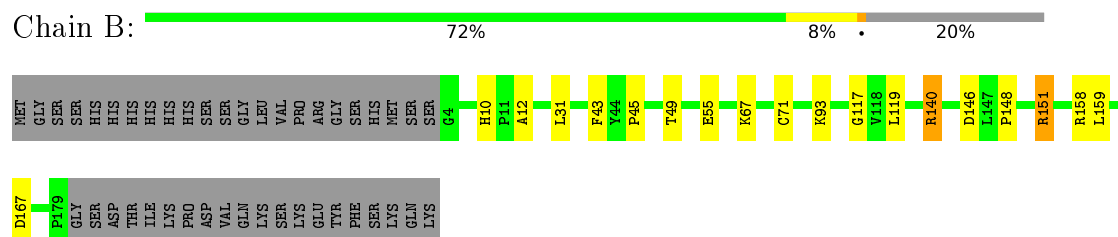
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

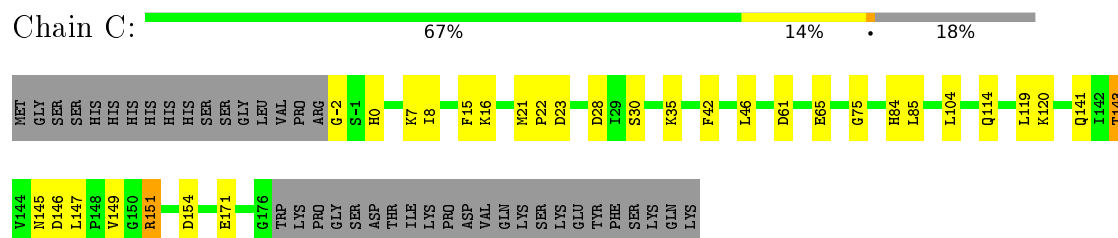
• Molecule 1: Peroxiredoxin-1



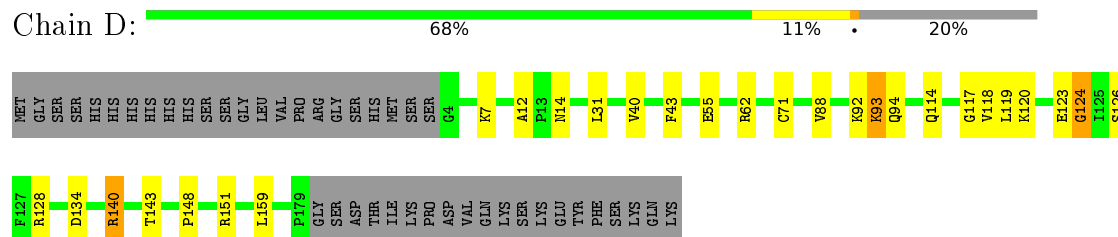
• Molecule 1: Peroxiredoxin-1



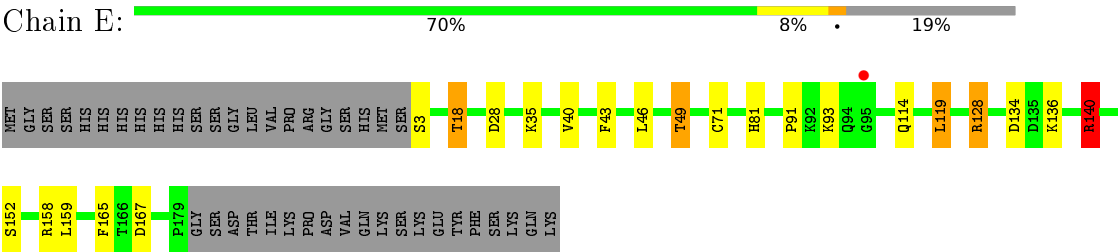
• Molecule 1: Peroxiredoxin-1



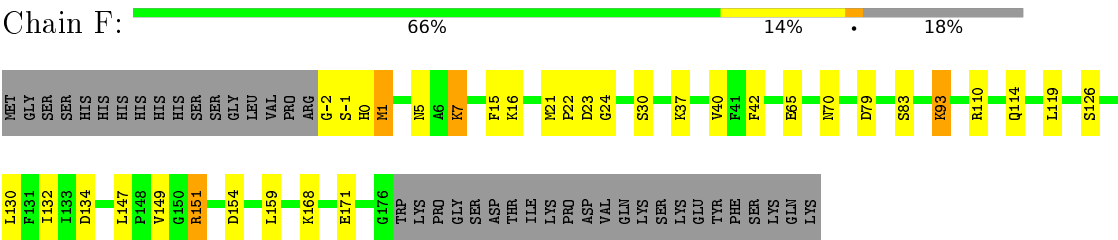
• Molecule 1: Peroxiredoxin-1



● Molecule 1: Peroxiredoxin-1



● Molecule 1: Peroxiredoxin-1



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	138.79Å 80.13Å 125.62Å 90.00° 89.99° 90.00°	Depositor
Resolution (Å)	50.00 – 2.10 46.57 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.00-2.10) 99.7 (46.57-2.10)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.38	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.04 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0071	Depositor
R, R_{free}	0.176 , 0.222 0.183 , 0.223	Depositor DCC
R_{free} test set	4013 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	29.3	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 35.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.032 for -1/2*h-3/2*k,-1/2*h+1/2*k,-l 0.033 for -1/2*h+3/2*k,1/2*h+1/2*k,-l 0.488 for 1/2*h-3/2*k,-1/2*h-1/2*k,-l 0.488 for 1/2*h+3/2*k,1/2*h-1/2*k,-l 0.029 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8912	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.92% 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

5.1 Standard geometry

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

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	2/1431 (0.1%)	1.03	5/1936 (0.3%)
1	B	0.92	0/1448	1.03	4/1962 (0.2%)
1	C	0.97	0/1422	0.99	5/1924 (0.3%)
1	D	0.92	0/1441	1.11	7/1952 (0.4%)
1	E	0.93	0/1443	1.15	9/1955 (0.5%)
1	F	0.99	2/1428 (0.1%)	1.04	5/1932 (0.3%)
All	All	0.96	4/8613 (0.0%)	1.06	35/11661 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	D	0	1
1	F	0	1
All	All	0	3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	65	GLU	CD-OE1	-5.82	1.19	1.25
1	A	126	SER	CB-OG	-5.55	1.35	1.42
1	F	126	SER	CB-OG	-5.16	1.35	1.42
1	A	65	GLU	CD-OE2	-5.07	1.20	1.25

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	128	ARG	NE-CZ-NH2	-15.68	112.46	120.30
1	E	140	ARG	NE-CZ-NH2	-14.99	112.80	120.30
1	E	128	ARG	NE-CZ-NH2	-13.48	113.56	120.30
1	D	128	ARG	NE-CZ-NH1	11.79	126.20	120.30
1	F	151	ARG	NE-CZ-NH2	-10.66	114.97	120.30
1	B	140	ARG	NE-CZ-NH1	10.07	125.34	120.30
1	E	128	ARG	NE-CZ-NH1	10.03	125.31	120.30
1	E	140	ARG	NE-CZ-NH1	9.94	125.27	120.30
1	F	151	ARG	NE-CZ-NH1	9.48	125.04	120.30
1	B	140	ARG	NE-CZ-NH2	-8.78	115.91	120.30
1	F	134	ASP	CB-CG-OD1	7.35	124.92	118.30
1	E	128	ARG	CG-CD-NE	-6.98	97.15	111.80
1	E	140	ARG	CG-CD-NE	-6.86	97.40	111.80
1	D	140	ARG	NE-CZ-NH1	6.83	123.72	120.30
1	A	169	HIS	N-CA-C	-6.80	92.63	111.00
1	C	61	ASP	CB-CG-OD2	-6.53	112.42	118.30
1	D	62	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	F	134	ASP	CB-CG-OD2	-6.01	112.89	118.30
1	F	154	ASP	CB-CG-OD1	6.00	123.70	118.30
1	A	119	LEU	CB-CG-CD2	-5.70	101.30	111.00
1	D	128	ARG	CG-CD-NE	-5.69	99.86	111.80
1	B	158	ARG	NE-CZ-NH1	5.58	123.09	120.30
1	D	134	ASP	CB-CG-OD1	5.56	123.31	118.30
1	C	154	ASP	CB-CG-OD1	5.55	123.29	118.30
1	C	65	GLU	OE1-CD-OE2	-5.51	116.69	123.30
1	A	151	ARG	NE-CZ-NH2	-5.48	117.56	120.30
1	E	134	ASP	CB-CG-OD1	5.46	123.21	118.30
1	A	159	LEU	CB-CG-CD2	5.42	120.22	111.00
1	C	61	ASP	CB-CG-OD1	5.26	123.03	118.30
1	A	143	THR	N-CA-CB	5.15	120.08	110.30
1	E	128	ARG	CD-NE-CZ	5.15	130.81	123.60
1	B	146	ASP	CB-CG-OD1	5.14	122.93	118.30
1	D	128	ARG	CD-NE-CZ	5.13	130.78	123.60
1	C	151	ARG	NE-CZ-NH2	-5.12	117.74	120.30
1	E	158	ARG	NE-CZ-NH1	5.01	122.81	120.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	0	HIS	Peptide
1	D	123	GLU	Peptide
1	F	0	HIS	Peptide

5.2 Too-close contacts ⓘ

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	1393	0	1379	41	0
1	B	1401	0	1392	9	0
1	C	1387	0	1371	21	0
1	D	1398	0	1391	15	0
1	E	1400	0	1385	13	0
1	F	1390	0	1376	23	0
2	A	6	0	8	0	0
2	C	6	0	8	0	0
2	F	6	0	8	2	0
3	A	42	0	57	0	0
3	D	42	0	57	0	0
3	E	42	0	57	2	0
4	A	89	0	0	4	0
4	B	50	0	0	1	0
4	C	90	0	0	2	0
4	D	44	0	0	3	0
4	E	52	0	0	3	0
4	F	74	0	0	0	0
All	All	8912	0	8489	114	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 7.

All (114) 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:151:ARG:NH2	4:B:236:HOH:O	1.88	1.05
1:C:0:HIS:HE1	1:C:8:ILE:H	1.30	0.78
1:A:166:THR:HG23	4:A:323:HOH:O	1.88	0.73
1:D:114:GLN:HG3	1:D:119:LEU:HD22	1.71	0.73
1:B:140:ARG:NH2	1:B:167:ASP:OD1	2.22	0.72
1:A:141:GLN:HE21	1:A:143:THR:CG2	2.04	0.71
1:F:110:ARG:O	1:F:114:GLN:HG3	1.90	0.71
1:C:141:GLN:HE21	1:C:143:THR:CG2	2.06	0.69
1:E:140:ARG:NH2	1:E:167:ASP:OD1	2.27	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:114:GLN:HA	1:A:119:LEU:CD2	2.24	0.67
1:A:114:GLN:HG3	1:A:119:LEU:HD21	1.77	0.66
1:F:79:ASP:HB3	1:F:83[A]:SER:OG	1.95	0.66
1:C:84:HIS:HD2	4:C:311:HOH:O	1.79	0.66
1:F:151:ARG:HE	2:F:201:GOL:H31	1.62	0.65
1:E:114[A]:GLN:HG3	1:E:119:LEU:HD12	1.80	0.64
1:E:3:SER:HB2	1:F:1:MET:O	1.98	0.63
1:F:132:ILE:HD11	1:F:159:LEU:HD23	1.83	0.61
1:A:0:HIS:HE1	1:A:8:ILE:H	1.48	0.61
1:F:151:ARG:HE	2:F:201:GOL:C3	2.15	0.59
1:F:132:ILE:HD11	1:F:159:LEU:CD2	2.33	0.59
1:C:0:HIS:CE1	1:C:8:ILE:H	2.16	0.57
1:A:114:GLN:CG	1:A:119:LEU:HD21	2.33	0.57
1:C:171:GLU:HG3	1:D:148:PRO:HB2	1.86	0.57
1:A:-2:GLY:N	1:A:5:ASN:HD22	2.03	0.56
1:A:0:HIS:HD2	1:B:117:GLY:O	1.89	0.56
1:E:81:HIS:HD2	4:E:307:HOH:O	1.90	0.55
1:C:-2:GLY:O	1:C:7:LYS:HE3	2.07	0.55
1:A:114:GLN:HA	1:A:119:LEU:HD21	1.89	0.55
1:C:114:GLN:HG2	1:C:119:LEU:HD11	1.90	0.54
1:D:120:LYS:O	1:D:124:GLY:HA2	2.08	0.53
1:D:31:LEU:HB2	4:D:329:HOH:O	2.08	0.52
1:A:162:ALA:O	1:A:166:THR:HB	2.08	0.52
1:C:0:HIS:HE1	1:C:8:ILE:N	2.04	0.52
1:D:55:GLU:OE2	1:D:151[B]:ARG:NH1	2.43	0.52
1:F:114:GLN:HG2	1:F:119:LEU:HD11	1.92	0.51
1:A:93:LYS:CD	1:A:93:LYS:H	2.24	0.51
1:C:0:HIS:HD2	1:D:117:GLY:O	1.94	0.50
1:A:91:PRO:CB	1:A:93:LYS:HE2	2.42	0.49
1:A:15:PHE:O	1:A:30:SER:HA	2.13	0.49
1:A:92:LYS:H	1:A:93:LYS:NZ	2.11	0.49
1:A:123:GLU:CD	1:A:123:GLU:H	2.16	0.48
1:A:166:THR:HG21	1:B:148:PRO:HD2	1.94	0.48
1:A:64:GLU:HG2	4:A:358:HOH:O	2.12	0.48
1:A:166:THR:O	1:A:169:HIS:O	2.32	0.48
1:C:143:THR:HG22	1:D:143:THR:HG23	1.96	0.47
1:C:16:LYS:HE3	1:C:28:ASP:HB3	1.95	0.47
1:C:141:GLN:HE21	1:C:143:THR:HG23	1.78	0.47
1:F:15:PHE:O	1:F:30:SER:HA	2.14	0.47
1:D:140:ARG:NH2	4:D:330:HOH:O	2.31	0.47
1:A:166:THR:CG2	4:A:323:HOH:O	2.54	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:93:LYS:N	1:F:93:LYS:HD3	2.30	0.47
3:E:201:CPS:H4	3:E:201:CPS:H21A	1.97	0.46
1:A:93:LYS:N	1:A:93:LYS:HD3	2.30	0.46
1:D:55:GLU:O	1:D:55:GLU:HG2	2.16	0.46
1:F:147:LEU:HG	1:F:149:VAL:HG13	1.97	0.46
4:C:315:HOH:O	1:E:49:THR:HG21	2.14	0.46
1:F:-2:GLY:N	1:F:5:ASN:HD22	2.12	0.46
1:A:51:VAL:O	1:A:53:PRO:HD3	2.16	0.46
1:F:37:LYS:HG2	1:F:70:ASN:ND2	2.30	0.46
3:E:201:CPS:O1S	1:F:93:LYS:HD2	2.15	0.46
1:A:122:ASP:OD2	1:B:10:HIS:NE2	2.49	0.46
1:E:18:THR:CG2	4:E:335:HOH:O	2.64	0.46
1:E:114[A]:GLN:CG	1:E:119:LEU:HD12	2.44	0.45
1:A:40:VAL:HG23	1:A:71:CYS:SG	2.57	0.45
1:C:42:PHE:HE1	1:C:151:ARG:HD2	1.79	0.45
1:E:40:VAL:HG23	1:E:71:CYS:SG	2.57	0.45
1:C:46:LEU:HG	1:C:120:LYS:HG3	1.97	0.45
1:A:91:PRO:HB3	1:A:93:LYS:HE2	1.98	0.45
1:F:-1:SER:HA	1:F:7:LYS:HD2	1.99	0.45
1:F:40:VAL:HG13	1:F:130:LEU:HD11	1.99	0.45
1:F:23:ASP:OD1	1:F:24:GLY:N	2.50	0.44
1:F:42:PHE:HE1	1:F:151:ARG:HD2	1.82	0.44
1:C:145:ASN:C	1:C:145:ASN:OD1	2.56	0.43
1:A:114:GLN:CA	1:A:119:LEU:HD21	2.48	0.43
1:C:146:ASP:OD1	1:D:140:ARG:NH1	2.35	0.43
1:A:40:VAL:HG13	1:A:130:LEU:HD11	1.99	0.43
1:A:140:ARG:HB3	1:A:163:PHE:CE1	2.54	0.43
1:B:55:GLU:OE2	1:B:151:ARG:NH1	2.52	0.43
1:A:37:LYS:HE3	4:A:365:HOH:O	2.18	0.43
1:A:92:LYS:HB2	1:A:93:LYS:HD3	2.00	0.43
1:A:0:HIS:O	1:B:117:GLY:HA2	2.18	0.43
1:C:21:MET:HB3	1:C:22:PRO:HD2	2.01	0.43
1:D:92:LYS:O	1:D:94:GLN:N	2.52	0.43
1:A:93:LYS:N	1:A:93:LYS:CD	2.82	0.42
1:A:93:LYS:HE2	1:A:93:LYS:H	1.84	0.42
1:D:14:ASN:HA	4:D:329:HOH:O	2.19	0.42
1:E:91:PRO:C	1:E:93:LYS:H	2.22	0.42
1:A:141:GLN:HE21	1:A:143:THR:HG23	1.82	0.42
1:B:67:LYS:HD2	1:B:71:CYS:O	2.20	0.42
1:C:23:ASP:C	1:C:23:ASP:OD1	2.58	0.42
1:C:75:GLY:O	1:C:104:LEU:HA	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:40:VAL:HG23	1:D:71:CYS:SG	2.59	0.42
1:C:15:PHE:O	1:C:30:SER:HA	2.19	0.42
1:A:-2:GLY:H2	1:A:5:ASN:HD22	1.68	0.42
1:E:35:LYS:HE3	1:E:35:LYS:HB2	1.81	0.42
1:F:132:ILE:CD1	1:F:159:LEU:CD2	2.98	0.42
1:B:12:ALA:HB3	1:B:31:LEU:HD21	2.02	0.41
1:F:171:GLU:CD	1:F:171:GLU:H	2.22	0.41
1:A:0:HIS:CD2	1:A:1:MET:H	2.38	0.41
1:C:147:LEU:HG	1:C:149:VAL:HG13	2.02	0.41
1:F:-2:GLY:O	1:F:7:LYS:HD2	2.21	0.41
1:E:18:THR:HB	1:E:28:ASP:OD1	2.21	0.41
1:A:157:LEU:O	1:A:161:GLN:HG3	2.20	0.41
1:A:-2:GLY:O	1:A:7:LYS:HE3	2.20	0.41
1:E:128:ARG:NH2	4:E:345:HOH:O	2.27	0.41
1:A:15:PHE:CE2	1:A:31:LEU:HB2	2.55	0.41
1:A:91:PRO:HB3	1:A:93:LYS:CE	2.51	0.41
1:E:165:PHE:CD1	1:E:165:PHE:C	2.95	0.40
1:A:0:HIS:CE1	1:A:8:ILE:H	2.32	0.40
1:F:79:ASP:HB3	1:F:83[A]:SER:HG	1.84	0.40
1:D:118:VAL:O	1:D:126:SER:HA	2.22	0.40
1:D:12:ALA:HB3	1:D:31:LEU:HD21	2.02	0.40
1:A:16:LYS:HA	1:A:29:ILE:O	2.22	0.40
1:F:21:MET:HB3	1:F:22:PRO:HD2	2.03	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	178/219 (81%)	171 (96%)	6 (3%)	1 (1%)	30 24
1	B	178/219 (81%)	175 (98%)	2 (1%)	1 (1%)	30 24

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	177/219 (81%)	174 (98%)	3 (2%)	0	100	100
1	D	177/219 (81%)	170 (96%)	5 (3%)	2 (1%)	17	11
1	E	178/219 (81%)	172 (97%)	6 (3%)	0	100	100
1	F	178/219 (81%)	171 (96%)	6 (3%)	1 (1%)	30	24
All	All	1066/1314 (81%)	1033 (97%)	28 (3%)	5 (0%)	34	30

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	F	1	MET
1	D	124	GLY
1	D	93	LYS
1	B	45	PRO

5.3.2 Protein sidechains ⓘ

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	152/188 (81%)	146 (96%)	6 (4%)	39	39
1	B	153/188 (81%)	147 (96%)	6 (4%)	39	39
1	C	151/188 (80%)	148 (98%)	3 (2%)	63	68
1	D	152/188 (81%)	147 (97%)	5 (3%)	45	47
1	E	153/188 (81%)	144 (94%)	9 (6%)	24	20
1	F	152/188 (81%)	148 (97%)	4 (3%)	54	58
All	All	913/1128 (81%)	880 (96%)	33 (4%)	41	43

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	85	LEU
1	A	93	LYS

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Mol	Chain	Res	Type
1	A	143	THR
1	A	144	VAL
1	A	159	LEU
1	A	166	THR
1	B	43	PHE
1	B	49	THR
1	B	93	LYS
1	B	119	LEU
1	B	151	ARG
1	B	159	LEU
1	C	35	LYS
1	C	85	LEU
1	C	143	THR
1	D	7	LYS
1	D	43	PHE
1	D	88	VAL
1	D	93	LYS
1	D	159	LEU
1	E	18	THR
1	E	43	PHE
1	E	46	LEU
1	E	49	THR
1	E	119	LEU
1	E	136	LYS
1	E	140	ARG
1	E	152	SER
1	E	159	LEU
1	F	7	LYS
1	F	16	LYS
1	F	93	LYS
1	F	168	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	0	HIS
1	A	5	ASN
1	A	25	GLN
1	A	70	ASN
1	A	72	GLN
1	A	81	HIS
1	A	101	ASN

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Mol	Chain	Res	Type
1	A	169	HIS
1	B	72	GLN
1	B	101	ASN
1	C	0	HIS
1	C	70	ASN
1	C	72	GLN
1	C	84	HIS
1	C	101	ASN
1	C	141	GLN
1	C	169	HIS
1	D	70	ASN
1	D	72	GLN
1	D	101	ASN
1	E	5	ASN
1	E	70	ASN
1	E	72	GLN
1	E	81	HIS
1	E	101	ASN
1	F	5	ASN
1	F	70	ASN
1	F	72	GLN
1	F	101	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

6 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	201	-	5,5,5	0.48	0	5,5,5	0.50	0
3	CPS	A	202	-	45,45,45	1.50	3 (6%)	69,70,70	2.17	19 (27%)
2	GOL	C	201	-	5,5,5	0.33	0	5,5,5	0.51	0
3	CPS	D	201	-	45,45,45	1.38	4 (8%)	69,70,70	2.16	19 (27%)
3	CPS	E	201	-	45,45,45	1.34	3 (6%)	69,70,70	2.15	16 (23%)
2	GOL	F	201	-	5,5,5	0.70	0	5,5,5	1.17	0

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	201	-	-	0/4/4/4	0/0/0/0
3	CPS	A	202	-	-	0/25/90/90	0/4/4/4
2	GOL	C	201	-	-	0/4/4/4	0/0/0/0
3	CPS	D	201	-	-	1/25/90/90	0/4/4/4
3	CPS	E	201	-	-	1/25/90/90	0/4/4/4
2	GOL	F	201	-	-	0/4/4/4	0/0/0/0

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	CPS	C32-S	-7.22	1.66	1.77
3	D	201	CPS	C32-S	-6.33	1.68	1.77
3	E	201	CPS	C32-S	-5.71	1.68	1.77
3	A	202	CPS	C7-C6	-3.23	1.47	1.54
3	E	201	CPS	C7-C6	-3.09	1.47	1.54
3	E	201	CPS	C5-C4	-2.34	1.51	1.54
3	D	201	CPS	C5-C4	-2.34	1.51	1.54
3	A	202	CPS	C5-C9	-2.33	1.51	1.55
3	D	201	CPS	C11-C2	-2.14	1.50	1.54
3	D	201	CPS	O4-C4	-2.09	1.40	1.43

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	202	CPS	C14-C15-C2	-4.28	108.06	112.66
3	A	202	CPS	C1-C12-C13	-4.02	105.06	110.41
3	D	201	CPS	C1-C12-C13	-3.97	105.13	110.41
3	E	201	CPS	C1-C12-C13	-3.95	105.16	110.41
3	A	202	CPS	C11-C2-C1	-3.39	102.49	108.23
3	D	201	CPS	C2-C19-C18	-3.33	108.25	111.86
3	A	202	CPS	C15-C14-C13	-3.28	108.02	112.88
3	A	202	CPS	C8-C9-C5	-3.19	100.51	103.59
3	E	201	CPS	C14-C15-C2	-2.97	109.47	112.66
3	A	202	CPS	O1-C24-C23	-2.70	117.28	121.97
3	A	202	CPS	C2-C19-C18	-2.60	109.04	111.86
3	D	201	CPS	C23-C22-C20	-2.54	109.73	114.46
3	D	201	CPS	C11-C2-C15	-2.41	106.02	110.28
3	D	201	CPS	C21-C20-C22	-2.39	106.44	110.33
3	D	201	CPS	C27-C26-C25	-2.30	106.62	111.34
3	E	201	CPS	C10-C5-C9	-2.26	107.63	111.20
3	D	201	CPS	O4-C4-C3	-2.24	104.45	109.09
3	E	201	CPS	O2-C13-C14	-2.15	105.51	109.86
3	D	201	CPS	O1S-S-O3S	-2.03	108.21	113.96
3	A	202	CPS	C16-C15-C2	2.05	114.85	112.66
3	E	201	CPS	C9-C5-C4	2.08	119.50	117.68
3	E	201	CPS	C9-C5-C6	2.10	102.21	100.08
3	D	201	CPS	O1-C24-N1	2.11	127.14	122.96
3	D	201	CPS	C9-C5-C6	2.14	102.25	100.08
3	E	201	CPS	O2S-S-C32	2.18	109.52	104.99
3	A	202	CPS	C9-C5-C6	2.26	102.36	100.08
3	E	201	CPS	C19-C18-C17	2.31	114.68	111.89
3	A	202	CPS	C6-C5-C4	2.35	109.49	107.37
3	A	202	CPS	C7-C8-C9	2.54	110.21	105.11
3	E	201	CPS	C6-C5-C4	2.66	109.78	107.37
3	A	202	CPS	C19-C18-C17	2.90	115.39	111.89
3	E	201	CPS	C1-C2-C15	2.97	111.03	107.76
3	D	201	CPS	C1-C2-C15	3.02	111.09	107.76
3	A	202	CPS	C5-C6-C18	3.26	119.01	114.73
3	D	201	CPS	C19-C18-C17	3.31	115.89	111.89
3	D	201	CPS	C6-C5-C4	3.51	110.55	107.37
3	A	202	CPS	C7-C6-C18	3.72	123.85	118.34
3	D	201	CPS	C5-C6-C18	3.77	119.68	114.73
3	D	201	CPS	C7-C6-C18	3.83	124.02	118.34
3	D	201	CPS	C3-C4-C5	3.93	115.18	111.22
3	A	202	CPS	C3-C4-C5	4.00	115.26	111.22
3	E	201	CPS	C5-C6-C18	4.10	120.11	114.73
3	E	201	CPS	C3-C4-C5	4.17	115.43	111.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	201	CPS	C7-C6-C5	4.19	107.63	103.59
3	E	201	CPS	O1S-S-C32	4.56	110.09	106.87
3	E	201	CPS	C7-C6-C18	4.95	125.68	118.34
3	A	202	CPS	O1S-S-C32	4.97	110.38	106.87
3	A	202	CPS	C1-C2-C15	5.09	113.37	107.76
3	E	201	CPS	C7-C6-C5	5.89	109.26	103.59
3	D	201	CPS	O1S-S-C32	6.01	111.12	106.87
3	A	202	CPS	O3S-S-C32	6.18	111.23	106.87
3	A	202	CPS	C7-C6-C5	6.40	109.76	103.59
3	D	201	CPS	O3S-S-C32	7.49	112.16	106.87
3	E	201	CPS	O3S-S-C32	8.56	112.92	106.87

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	201	CPS	C32-C31-C30-N2
3	E	201	CPS	C32-C31-C30-N2

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	201	CPS	2	0
2	F	201	GOL	2	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 [i](#)

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

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	179/219 (81%)	-0.53	0	100 100	20, 28, 47, 62	0
1	B	176/219 (80%)	-0.40	0	100 100	22, 34, 53, 76	0
1	C	179/219 (81%)	-0.57	0	100 100	19, 28, 47, 68	0
1	D	176/219 (80%)	-0.48	0	100 100	22, 34, 52, 71	0
1	E	177/219 (80%)	-0.47	1 (0%)	90 92	22, 34, 52, 73	0
1	F	179/219 (81%)	-0.58	0	100 100	20, 28, 48, 76	0
All	All	1066/1314 (81%)	-0.51	1 (0%)	95 96	19, 30, 50, 76	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	95	GLY	2.7

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
2	GOL	F	201	6/6	0.94	0.20	8.32	30,37,39,57	0
2	GOL	C	201	6/6	0.90	0.17	5.07	30,35,37,37	0
3	CPS	A	202	42/42	0.94	0.14	3.20	24,30,147,167	0
3	CPS	E	201	42/42	0.95	0.14	2.64	22,30,179,192	0
2	GOL	A	201	6/6	0.93	0.13	2.38	31,33,33,34	0
3	CPS	D	201	42/42	0.95	0.13	1.40	23,29,163,174	0

6.5 Other polymers [i](#)

There are no such residues in this entry.