



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 14, 2023 – 09:17 AM EDT

PDB ID : 4RQX
Title : Crystal structure of human peroxiredoxin 4(THIOREDOXIN PEROXIDASE) with MESNA
Authors : Badger, J.; Sridhar, V.; Logan, C.; Hausheer, F.H.; Nienaber, V.L.
Deposited on : 2014-11-05
Resolution : 2.26 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

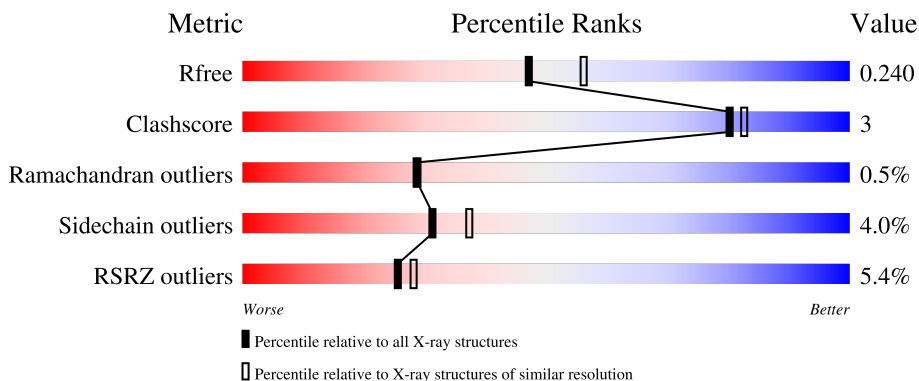
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.26 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	226	
1	B	226	
1	C	226	
1	D	226	
1	E	226	

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	COM	A	301	-	X	-	-
2	COM	B	301[A]	-	X	-	X
2	COM	B	301[B]	-	X	-	X
2	COM	C	301	-	X	-	X
2	COM	D	301[A]	-	X	-	X
2	COM	D	301[B]	-	X	-	X
2	COM	E	301[A]	-	X	-	X
2	COM	E	301[B]	-	-	-	X

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6836 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-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	166	1313	848	215	248	2	0	1	0
1	B	166	1319	853	217	247	2	0	0	0
1	C	166	1317	853	215	247	2	0	1	0
1	D	166	1316	850	216	248	2	0	2	0
1	E	166	1324	854	217	251	2	0	2	0

There are 165 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	46	MET	-	expression tag	UNP Q13162
A	47	GLY	-	expression tag	UNP Q13162
A	48	SER	-	expression tag	UNP Q13162
A	49	SER	-	expression tag	UNP Q13162
A	50	HIS	-	expression tag	UNP Q13162
A	51	HIS	-	expression tag	UNP Q13162
A	52	HIS	-	expression tag	UNP Q13162
A	53	HIS	-	expression tag	UNP Q13162
A	54	HIS	-	expression tag	UNP Q13162
A	55	HIS	-	expression tag	UNP Q13162
A	56	SER	-	expression tag	UNP Q13162
A	57	SER	-	expression tag	UNP Q13162
A	58	GLY	-	expression tag	UNP Q13162
A	59	LEU	-	expression tag	UNP Q13162
A	60	VAL	-	expression tag	UNP Q13162
A	61	PRO	-	expression tag	UNP Q13162
A	62	ARG	-	expression tag	UNP Q13162
A	63	GLY	-	expression tag	UNP Q13162
A	64	SER	-	expression tag	UNP Q13162

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Chain	Residue	Modelled	Actual	Comment	Reference
A	65	HIS	-	expression tag	UNP Q13162
A	66	MET	-	expression tag	UNP Q13162
A	67	THR	-	expression tag	UNP Q13162
A	68	THR	-	expression tag	UNP Q13162
A	69	GLU	-	expression tag	UNP Q13162
A	70	ASN	-	expression tag	UNP Q13162
A	71	LEU	-	expression tag	UNP Q13162
A	72	TYR	-	expression tag	UNP Q13162
A	73	PHE	-	expression tag	UNP Q13162
A	74	GLN	-	expression tag	UNP Q13162
A	75	GLY	-	expression tag	UNP Q13162
A	76	ALA	-	expression tag	UNP Q13162
A	77	GLY	-	expression tag	UNP Q13162
A	78	THR	-	expression tag	UNP Q13162
B	46	MET	-	expression tag	UNP Q13162
B	47	GLY	-	expression tag	UNP Q13162
B	48	SER	-	expression tag	UNP Q13162
B	49	SER	-	expression tag	UNP Q13162
B	50	HIS	-	expression tag	UNP Q13162
B	51	HIS	-	expression tag	UNP Q13162
B	52	HIS	-	expression tag	UNP Q13162
B	53	HIS	-	expression tag	UNP Q13162
B	54	HIS	-	expression tag	UNP Q13162
B	55	HIS	-	expression tag	UNP Q13162
B	56	SER	-	expression tag	UNP Q13162
B	57	SER	-	expression tag	UNP Q13162
B	58	GLY	-	expression tag	UNP Q13162
B	59	LEU	-	expression tag	UNP Q13162
B	60	VAL	-	expression tag	UNP Q13162
B	61	PRO	-	expression tag	UNP Q13162
B	62	ARG	-	expression tag	UNP Q13162
B	63	GLY	-	expression tag	UNP Q13162
B	64	SER	-	expression tag	UNP Q13162
B	65	HIS	-	expression tag	UNP Q13162
B	66	MET	-	expression tag	UNP Q13162
B	67	THR	-	expression tag	UNP Q13162
B	68	THR	-	expression tag	UNP Q13162
B	69	GLU	-	expression tag	UNP Q13162
B	70	ASN	-	expression tag	UNP Q13162
B	71	LEU	-	expression tag	UNP Q13162
B	72	TYR	-	expression tag	UNP Q13162
B	73	PHE	-	expression tag	UNP Q13162

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Chain	Residue	Modelled	Actual	Comment	Reference
B	74	GLN	-	expression tag	UNP Q13162
B	75	GLY	-	expression tag	UNP Q13162
B	76	ALA	-	expression tag	UNP Q13162
B	77	GLY	-	expression tag	UNP Q13162
B	78	THR	-	expression tag	UNP Q13162
C	46	MET	-	expression tag	UNP Q13162
C	47	GLY	-	expression tag	UNP Q13162
C	48	SER	-	expression tag	UNP Q13162
C	49	SER	-	expression tag	UNP Q13162
C	50	HIS	-	expression tag	UNP Q13162
C	51	HIS	-	expression tag	UNP Q13162
C	52	HIS	-	expression tag	UNP Q13162
C	53	HIS	-	expression tag	UNP Q13162
C	54	HIS	-	expression tag	UNP Q13162
C	55	HIS	-	expression tag	UNP Q13162
C	56	SER	-	expression tag	UNP Q13162
C	57	SER	-	expression tag	UNP Q13162
C	58	GLY	-	expression tag	UNP Q13162
C	59	LEU	-	expression tag	UNP Q13162
C	60	VAL	-	expression tag	UNP Q13162
C	61	PRO	-	expression tag	UNP Q13162
C	62	ARG	-	expression tag	UNP Q13162
C	63	GLY	-	expression tag	UNP Q13162
C	64	SER	-	expression tag	UNP Q13162
C	65	HIS	-	expression tag	UNP Q13162
C	66	MET	-	expression tag	UNP Q13162
C	67	THR	-	expression tag	UNP Q13162
C	68	THR	-	expression tag	UNP Q13162
C	69	GLU	-	expression tag	UNP Q13162
C	70	ASN	-	expression tag	UNP Q13162
C	71	LEU	-	expression tag	UNP Q13162
C	72	TYR	-	expression tag	UNP Q13162
C	73	PHE	-	expression tag	UNP Q13162
C	74	GLN	-	expression tag	UNP Q13162
C	75	GLY	-	expression tag	UNP Q13162
C	76	ALA	-	expression tag	UNP Q13162
C	77	GLY	-	expression tag	UNP Q13162
C	78	THR	-	expression tag	UNP Q13162
D	46	MET	-	expression tag	UNP Q13162
D	47	GLY	-	expression tag	UNP Q13162
D	48	SER	-	expression tag	UNP Q13162
D	49	SER	-	expression tag	UNP Q13162

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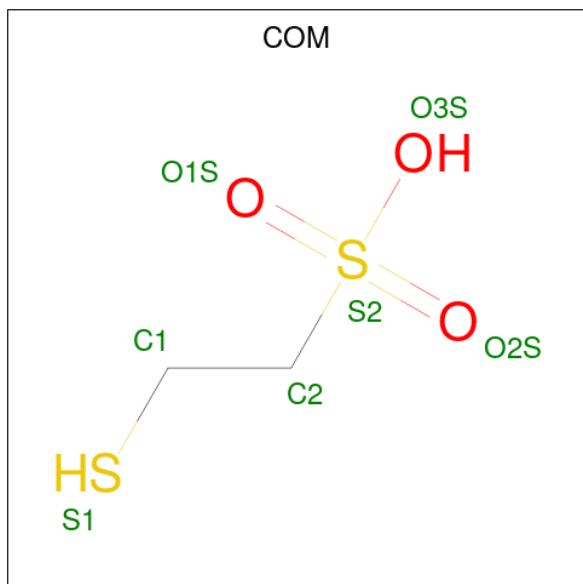
Chain	Residue	Modelled	Actual	Comment	Reference
D	50	HIS	-	expression tag	UNP Q13162
D	51	HIS	-	expression tag	UNP Q13162
D	52	HIS	-	expression tag	UNP Q13162
D	53	HIS	-	expression tag	UNP Q13162
D	54	HIS	-	expression tag	UNP Q13162
D	55	HIS	-	expression tag	UNP Q13162
D	56	SER	-	expression tag	UNP Q13162
D	57	SER	-	expression tag	UNP Q13162
D	58	GLY	-	expression tag	UNP Q13162
D	59	LEU	-	expression tag	UNP Q13162
D	60	VAL	-	expression tag	UNP Q13162
D	61	PRO	-	expression tag	UNP Q13162
D	62	ARG	-	expression tag	UNP Q13162
D	63	GLY	-	expression tag	UNP Q13162
D	64	SER	-	expression tag	UNP Q13162
D	65	HIS	-	expression tag	UNP Q13162
D	66	MET	-	expression tag	UNP Q13162
D	67	THR	-	expression tag	UNP Q13162
D	68	THR	-	expression tag	UNP Q13162
D	69	GLU	-	expression tag	UNP Q13162
D	70	ASN	-	expression tag	UNP Q13162
D	71	LEU	-	expression tag	UNP Q13162
D	72	TYR	-	expression tag	UNP Q13162
D	73	PHE	-	expression tag	UNP Q13162
D	74	GLN	-	expression tag	UNP Q13162
D	75	GLY	-	expression tag	UNP Q13162
D	76	ALA	-	expression tag	UNP Q13162
D	77	GLY	-	expression tag	UNP Q13162
D	78	THR	-	expression tag	UNP Q13162
E	46	MET	-	expression tag	UNP Q13162
E	47	GLY	-	expression tag	UNP Q13162
E	48	SER	-	expression tag	UNP Q13162
E	49	SER	-	expression tag	UNP Q13162
E	50	HIS	-	expression tag	UNP Q13162
E	51	HIS	-	expression tag	UNP Q13162
E	52	HIS	-	expression tag	UNP Q13162
E	53	HIS	-	expression tag	UNP Q13162
E	54	HIS	-	expression tag	UNP Q13162
E	55	HIS	-	expression tag	UNP Q13162
E	56	SER	-	expression tag	UNP Q13162
E	57	SER	-	expression tag	UNP Q13162
E	58	GLY	-	expression tag	UNP Q13162

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Chain	Residue	Modelled	Actual	Comment	Reference
E	59	LEU	-	expression tag	UNP Q13162
E	60	VAL	-	expression tag	UNP Q13162
E	61	PRO	-	expression tag	UNP Q13162
E	62	ARG	-	expression tag	UNP Q13162
E	63	GLY	-	expression tag	UNP Q13162
E	64	SER	-	expression tag	UNP Q13162
E	65	HIS	-	expression tag	UNP Q13162
E	66	MET	-	expression tag	UNP Q13162
E	67	THR	-	expression tag	UNP Q13162
E	68	THR	-	expression tag	UNP Q13162
E	69	GLU	-	expression tag	UNP Q13162
E	70	ASN	-	expression tag	UNP Q13162
E	71	LEU	-	expression tag	UNP Q13162
E	72	TYR	-	expression tag	UNP Q13162
E	73	PHE	-	expression tag	UNP Q13162
E	74	GLN	-	expression tag	UNP Q13162
E	75	GLY	-	expression tag	UNP Q13162
E	76	ALA	-	expression tag	UNP Q13162
E	77	GLY	-	expression tag	UNP Q13162
E	78	THR	-	expression tag	UNP Q13162

- Molecule 2 is 1-THIOETHANESULFONIC ACID (three-letter code: COM) (formula: C₂H₆O₃S₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	O			S
2	A	1	7	2	3	2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total	C	O	S	0	1
			14	4	6	4		
2	C	1	Total	C	O	S	0	0
			7	2	3	2		
2	D	1	Total	C	O	S	0	1
			14	4	6	4		
2	E	1	Total	C	O	S	0	1
			14	4	6	4		

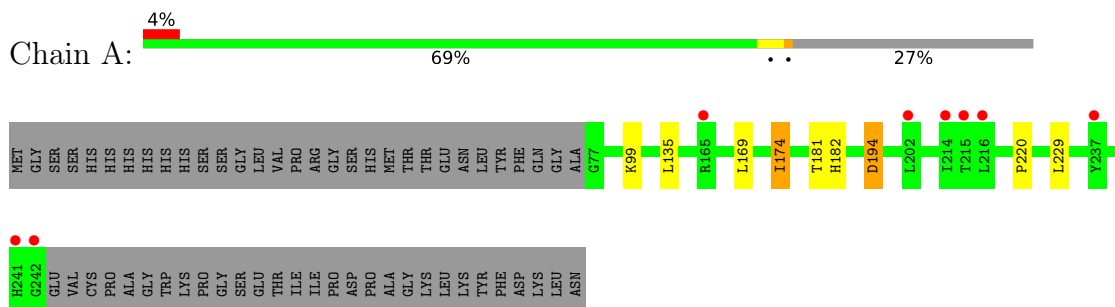
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	43	Total	O	0	0
			43	43		
3	B	43	Total	O	0	0
			43	43		
3	C	25	Total	O	0	0
			25	25		
3	D	33	Total	O	0	0
			33	33		
3	E	47	Total	O	0	0
			47	47		

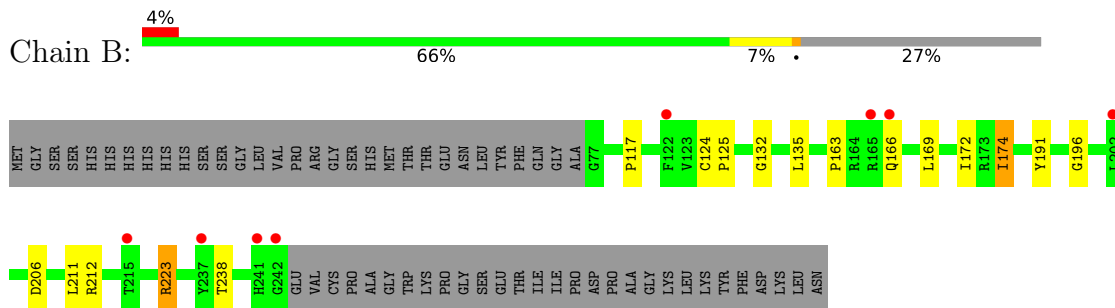
3 Residue-property plots [i](#)

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.

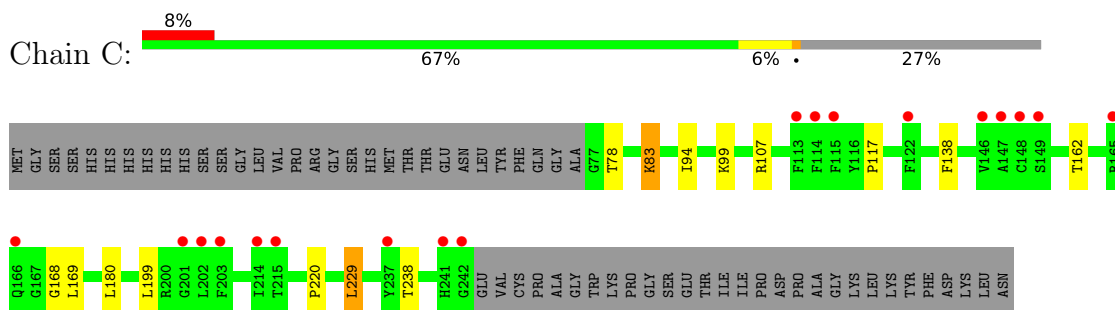
- Molecule 1: Peroxiredoxin-4



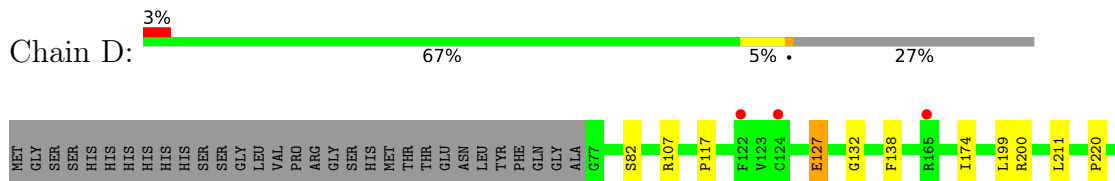
- Molecule 1: Peroxiredoxin-4

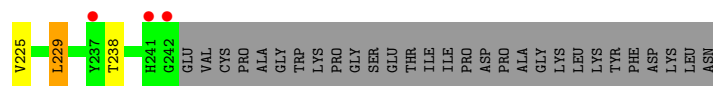


- Molecule 1: Peroxiredoxin-4

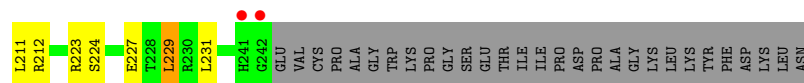
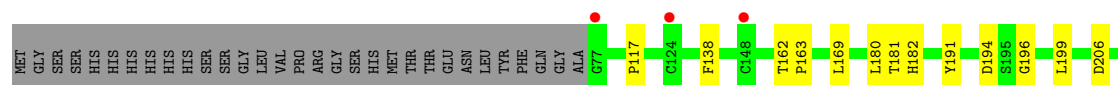


- Molecule 1: Peroxiredoxin-4





- Molecule 1: Peroxiredoxin-4



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	108.00Å 139.68Å 96.19Å 90.00° 103.17° 90.00°	Depositor
Resolution (Å)	33.06 – 2.26 33.06 – 2.26	Depositor EDS
% Data completeness (in resolution range)	(Not available) (33.06-2.26) 95.9 (33.06-2.26)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.51 (at 2.27Å)	Xtrriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.208 , 0.250 0.202 , 0.240	Depositor DCC
R_{free} test set	3168 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	48.0	Xtrriage
Anisotropy	0.552	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 38.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6836	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.68% 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: COM

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	0.71	0/1351	0.72	0/1840
1	B	0.63	0/1352	0.71	1/1839 (0.1%)
1	C	0.54	0/1356	0.65	0/1847
1	D	0.60	0/1359	0.71	0/1851
1	E	0.67	0/1367	0.69	0/1860
All	All	0.63	0/6785	0.70	1/9237 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	223	ARG	NE-CZ-NH1	-5.29	117.66	120.30

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	1313	0	1262	4	0
1	B	1319	0	1281	11	0
1	C	1317	0	1264	8	0
1	D	1316	0	1263	9	0
1	E	1324	0	1279	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	7	0	5	0	0
2	B	14	0	10	2	0
2	C	7	0	5	0	0
2	D	14	0	10	0	0
2	E	14	0	10	0	0
3	A	43	0	0	0	0
3	B	43	0	0	0	0
3	C	25	0	0	0	0
3	D	33	0	0	0	0
3	E	47	0	0	2	0
All	All	6836	0	6389	35	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 3.

All (35) 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:132:GLY:HA2	1:B:174:ILE:HD13	1.75	0.69
1:A:135:LEU:HD13	1:A:174:ILE:HD11	1.76	0.68
1:C:238:THR:HG21	1:D:220:PRO:CB	2.32	0.60
1:E:224:SER:HB3	1:E:227:GLU:HB3	1.83	0.59
1:B:124:CYS:H	2:B:301[B]:COM:H12	1.68	0.59
1:D:138:PHE:CE2	1:D:229:LEU:HD13	2.39	0.57
1:D:132:GLY:HA2	1:D:174:ILE:HD12	1.87	0.57
1:B:132:GLY:HA2	1:B:174:ILE:CD1	2.35	0.55
1:B:163:PRO:HD2	1:B:166:GLN:NE2	2.22	0.54
1:A:181:THR:O	1:A:182:HIS:HB2	2.09	0.52
1:E:223:ARG:HD3	3:E:440:HOH:O	2.08	0.52
1:A:220:PRO:HG2	1:B:238:THR:HG21	1.94	0.49
1:E:138:PHE:CE2	1:E:229:LEU:HD13	2.50	0.47
1:B:124:CYS:H	2:B:301[B]:COM:C1	2.27	0.47
1:E:206:ASP:OD2	1:E:212:ARG:HD3	2.15	0.47
1:C:94:ILE:HD12	1:C:99:LYS:HB2	1.97	0.46
1:E:231:LEU:HD11	3:E:406:HOH:O	2.16	0.45
1:B:163:PRO:HD2	1:B:166:GLN:HE21	1.80	0.45
1:B:135:LEU:HD13	1:B:174:ILE:HD11	2.00	0.44
1:C:138:PHE:CE2	1:C:229:LEU:HD13	2.52	0.44
1:E:191:TYR:OH	1:E:196:GLY:HA2	2.17	0.44
1:B:125:PRO:HG2	1:B:169:LEU:HD23	2.00	0.44
1:B:191:TYR:OH	1:B:196:GLY:HA2	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:238:THR:HG21	1:D:220:PRO:HB2	1.99	0.43
1:D:225:VAL:HG12	1:D:229:LEU:HD22	2.01	0.43
1:D:127:GLU:OE1	1:D:200:ARG:NH1	2.50	0.43
1:D:138:PHE:CZ	1:D:229:LEU:HD13	2.54	0.43
1:C:162:THR:HB	1:C:168:GLY:HA3	2.02	0.42
1:C:220:PRO:HG2	1:D:238:THR:HG21	2.03	0.41
1:E:181:THR:O	1:E:182:HIS:HB2	2.19	0.41
1:B:206:ASP:OD2	1:B:212:ARG:HD3	2.20	0.41
1:C:238:THR:HG21	1:D:220:PRO:CG	2.51	0.41
1:E:162:THR:HA	1:E:163:PRO:HD3	1.94	0.40
1:C:83:LYS:HA	1:C:83:LYS:HD2	1.87	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	165/226 (73%)	161 (98%)	4 (2%)	0	100	100
1	B	164/226 (73%)	157 (96%)	6 (4%)	1 (1%)	25	25
1	C	165/226 (73%)	161 (98%)	3 (2%)	1 (1%)	25	25
1	D	166/226 (74%)	160 (96%)	5 (3%)	1 (1%)	25	25
1	E	166/226 (74%)	163 (98%)	2 (1%)	1 (1%)	25	25
All	All	826/1130 (73%)	802 (97%)	20 (2%)	4 (0%)	29	29

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	117	PRO
1	E	117	PRO
1	B	117	PRO

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Mol	Chain	Res	Type
1	C	117	PRO

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	140/195 (72%)	134 (96%)	6 (4%)	29	33
1	B	141/195 (72%)	137 (97%)	4 (3%)	43	52
1	C	140/195 (72%)	133 (95%)	7 (5%)	24	26
1	D	140/195 (72%)	134 (96%)	6 (4%)	29	33
1	E	143/195 (73%)	136 (95%)	7 (5%)	25	27
All	All	704/975 (72%)	674 (96%)	30 (4%)	31	33

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	99	LYS
1	A	169	LEU
1	A	174	ILE
1	A	194[A]	ASP
1	A	194[B]	ASP
1	A	229	LEU
1	B	172	ILE
1	B	174	ILE
1	B	211	LEU
1	B	223	ARG
1	C	78	THR
1	C	83	LYS
1	C	107	ARG
1	C	169	LEU
1	C	180	LEU
1	C	199	LEU
1	C	229	LEU
1	D	82	SER

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Mol	Chain	Res	Type
1	D	107	ARG
1	D	127	GLU
1	D	199	LEU
1	D	211	LEU
1	D	229	LEU
1	E	169	LEU
1	E	180	LEU
1	E	194[A]	ASP
1	E	194[B]	ASP
1	E	199	LEU
1	E	211	LEU
1	E	229	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	182	HIS
1	B	166	GLN
1	B	182	HIS
1	C	182	HIS
1	D	166	GLN
1	D	182	HIS
1	D	241	HIS
1	E	182	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

8 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	COM	E	301[B]	1	6,6,6	3.26	2 (33%)	7,8,8	3.98	5 (71%)
2	COM	D	301[B]	1	6,6,6	3.18	2 (33%)	7,8,8	4.04	5 (71%)
2	COM	C	301	1	6,6,6	3.25	2 (33%)	7,8,8	4.06	5 (71%)
2	COM	D	301[A]	1	6,6,6	3.46	2 (33%)	7,8,8	3.73	5 (71%)
2	COM	B	301[A]	1	6,6,6	3.33	2 (33%)	7,8,8	3.79	5 (71%)
2	COM	E	301[A]	1	6,6,6	3.29	2 (33%)	7,8,8	3.91	5 (71%)
2	COM	A	301	1	6,6,6	3.39	2 (33%)	7,8,8	3.70	5 (71%)
2	COM	B	301[B]	1	6,6,6	3.43	2 (33%)	7,8,8	3.87	6 (85%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	COM	E	301[B]	1	-	0/4/4/4	-
2	COM	D	301[B]	1	-	3/4/4/4	-
2	COM	C	301	1	-	1/4/4/4	-
2	COM	D	301[A]	1	-	4/4/4/4	-
2	COM	B	301[A]	1	-	4/4/4/4	-
2	COM	E	301[A]	1	-	4/4/4/4	-
2	COM	A	301	1	-	3/4/4/4	-
2	COM	B	301[B]	1	-	4/4/4/4	-

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	COM	O3S-S2	6.68	1.71	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301[A]	COM	O3S-S2	6.67	1.71	1.47
2	D	301[A]	COM	O3S-S2	6.67	1.71	1.47
2	B	301[B]	COM	O3S-S2	6.67	1.71	1.47
2	D	301[B]	COM	O3S-S2	6.57	1.70	1.47
2	E	301[A]	COM	O3S-S2	6.55	1.70	1.47
2	E	301[B]	COM	O3S-S2	6.54	1.70	1.47
2	C	301	COM	O3S-S2	6.52	1.70	1.47
2	D	301[A]	COM	C2-S2	-5.17	1.70	1.77
2	B	301[B]	COM	C2-S2	-5.06	1.70	1.77
2	A	301	COM	C2-S2	-4.83	1.70	1.77
2	B	301[A]	COM	C2-S2	-4.62	1.70	1.77
2	E	301[A]	COM	C2-S2	-4.62	1.70	1.77
2	E	301[B]	COM	C2-S2	-4.51	1.71	1.77
2	C	301	COM	C2-S2	-4.47	1.71	1.77
2	D	301[B]	COM	C2-S2	-4.04	1.71	1.77

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301[B]	COM	O1S-S2-C2	6.84	115.15	106.92
2	C	301	COM	O1S-S2-C2	6.63	114.89	106.92
2	E	301[B]	COM	O1S-S2-C2	6.46	114.69	106.92
2	E	301[A]	COM	O1S-S2-C2	6.26	114.46	106.92
2	D	301[A]	COM	O1S-S2-C2	6.09	114.25	106.92
2	B	301[A]	COM	O1S-S2-C2	5.80	113.90	106.92
2	B	301[B]	COM	O1S-S2-C2	5.70	113.78	106.92
2	A	301	COM	O2S-S2-C2	5.60	113.65	106.92
2	E	301[B]	COM	O2S-S2-C2	5.24	113.23	106.92
2	B	301[B]	COM	O2S-S2-C2	5.20	113.17	106.92
2	A	301	COM	O1S-S2-C2	4.99	112.93	106.92
2	D	301[B]	COM	O2S-S2-C2	4.99	112.93	106.92
2	C	301	COM	O2S-S2-C2	4.74	112.62	106.92
2	B	301[A]	COM	O2S-S2-C2	4.73	112.61	106.92
2	E	301[A]	COM	O2S-S2-C2	4.61	112.47	106.92
2	B	301[A]	COM	O3S-S2-O2S	-4.44	100.43	111.27
2	C	301	COM	O3S-S2-O2S	-4.38	100.58	111.27
2	D	301[A]	COM	O3S-S2-O2S	-4.31	100.75	111.27
2	E	301[A]	COM	O3S-S2-O1S	-4.30	100.76	111.27
2	C	301	COM	O3S-S2-O1S	-4.26	100.87	111.27
2	E	301[B]	COM	O3S-S2-O1S	-4.23	100.94	111.27
2	D	301[B]	COM	O3S-S2-O1S	-4.20	101.00	111.27
2	A	301	COM	O3S-S2-O2S	-4.12	101.20	111.27

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301[B]	COM	O3S-S2-O2S	-4.05	101.39	111.27
2	B	301[B]	COM	O3S-S2-O2S	-4.03	101.44	111.27
2	E	301[B]	COM	O3S-S2-O2S	-3.92	101.70	111.27
2	E	301[A]	COM	O3S-S2-O2S	-3.86	101.85	111.27
2	B	301[B]	COM	O3S-S2-O1S	-3.83	101.91	111.27
2	B	301[A]	COM	O3S-S2-O1S	-3.80	102.00	111.27
2	D	301[A]	COM	O3S-S2-O1S	-3.71	102.20	111.27
2	D	301[A]	COM	O2S-S2-C2	3.70	111.38	106.92
2	A	301	COM	O3S-S2-O1S	-3.68	102.29	111.27
2	E	301[A]	COM	O3S-S2-C2	3.34	111.17	105.77
2	C	301	COM	O3S-S2-C2	3.21	110.95	105.77
2	D	301[A]	COM	O3S-S2-C2	3.18	110.91	105.77
2	B	301[A]	COM	O3S-S2-C2	3.14	110.85	105.77
2	B	301[B]	COM	O3S-S2-C2	2.91	110.48	105.77
2	D	301[B]	COM	O3S-S2-C2	2.84	110.36	105.77
2	E	301[B]	COM	O3S-S2-C2	2.76	110.23	105.77
2	A	301	COM	O3S-S2-C2	2.48	109.77	105.77
2	B	301[B]	COM	C2-C1-S1	-2.40	107.01	113.10

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	COM	C1-C2-S2-O1S
2	B	301[A]	COM	S1-C1-C2-S2
2	B	301[A]	COM	C1-C2-S2-O1S
2	B	301[A]	COM	C1-C2-S2-O2S
2	B	301[B]	COM	S1-C1-C2-S2
2	B	301[B]	COM	C1-C2-S2-O1S
2	B	301[B]	COM	C1-C2-S2-O2S
2	B	301[B]	COM	C1-C2-S2-O3S
2	D	301[A]	COM	S1-C1-C2-S2
2	D	301[A]	COM	C1-C2-S2-O1S
2	D	301[A]	COM	C1-C2-S2-O2S
2	D	301[A]	COM	C1-C2-S2-O3S
2	D	301[B]	COM	C1-C2-S2-O2S
2	E	301[A]	COM	C1-C2-S2-O1S
2	E	301[A]	COM	C1-C2-S2-O3S
2	A	301	COM	S1-C1-C2-S2
2	D	301[B]	COM	S1-C1-C2-S2
2	B	301[A]	COM	C1-C2-S2-O3S
2	C	301	COM	S1-C1-C2-S2

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Mol	Chain	Res	Type	Atoms
2	E	301[A]	COM	S1-C1-C2-S2
2	E	301[A]	COM	C1-C2-S2-O2S
2	D	301[B]	COM	C1-C2-S2-O3S
2	A	301	COM	C1-C2-S2-O3S

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301[B]	COM	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	166/226 (73%)	-0.09	8 (4%) 30 33	34, 46, 66, 80	0
1	B	166/226 (73%)	-0.06	8 (4%) 30 33	35, 49, 69, 86	0
1	C	166/226 (73%)	0.30	18 (10%) 5 5	42, 55, 78, 96	0
1	D	166/226 (73%)	-0.10	6 (3%) 42 44	38, 49, 69, 91	0
1	E	166/226 (73%)	-0.10	5 (3%) 50 53	36, 49, 72, 88	0
All	All	830/1130 (73%)	-0.01	45 (5%) 25 28	34, 50, 73, 96	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	242	GLY	5.6
1	B	242	GLY	5.2
1	C	241	HIS	4.6
1	C	237	TYR	4.6
1	B	122	PHE	3.9
1	D	241	HIS	3.7
1	C	166	GLN	3.7
1	C	201	GLY	3.7
1	B	241	HIS	3.6
1	C	202	LEU	3.5
1	A	241	HIS	3.4
1	C	165	ARG	3.4
1	C	242	GLY	3.3
1	A	242	GLY	3.3
1	E	242	GLY	3.1
1	C	215	THR	3.1
1	A	237	TYR	3.0
1	C	115	PHE	2.9
1	D	237	TYR	2.9
1	C	122[A]	PHE	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	202	LEU	2.7
1	A	215	THR	2.6
1	D	124	CYS	2.5
1	E	77	GLY	2.5
1	C	114	PHE	2.4
1	D	165	ARG	2.4
1	B	202	LEU	2.4
1	C	149	SER	2.4
1	E	241	HIS	2.3
1	C	148	CYS	2.3
1	A	216	LEU	2.3
1	C	203	PHE	2.3
1	C	146	VAL	2.2
1	B	237	TYR	2.2
1	C	147	ALA	2.2
1	A	214	ILE	2.2
1	C	214	ILE	2.2
1	C	113	PHE	2.1
1	B	215	THR	2.1
1	E	148	CYS	2.1
1	D	122	PHE	2.1
1	B	166	GLN	2.0
1	A	165	ARG	2.0
1	E	124	CYS	2.0
1	B	165	ARG	2.0

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 monosaccharides 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(\AA^2)	Q<0.9
2	COM	E	301[A]	7/7	0.55	0.75	86,87,87,88	7
2	COM	E	301[B]	7/7	0.55	0.75	86,88,89,90	7
2	COM	B	301[A]	7/7	0.56	0.46	74,78,79,80	7
2	COM	B	301[B]	7/7	0.56	0.46	74,77,78,79	7
2	COM	C	301	7/7	0.60	0.64	87,91,92,92	7
2	COM	A	301	7/7	0.62	0.32	77,82,83,84	7
2	COM	D	301[A]	7/7	0.67	0.56	78,79,79,80	7
2	COM	D	301[B]	7/7	0.67	0.56	80,84,85,85	7

6.5 Other polymers [i](#)

There are no such residues in this entry.