Full wwPDB X-ray Structure Validation Report (i)

Jun 12, 2024 – 01:22 pm BST

PDB ID	:	8RPK
Title	:	AMP-forming Acetyl-CoA synthetase from Chloroflexota bacterium without bound ligand
Authors	:	Striska, K.; Palm, G.J.; Lammers, M.
Deposited on	:	2024-01-16
Resolution	:	2.62 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
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)	:	2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.62 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	Percentile Ranks	Value
Rfree		0.224
Clashscore		4
Ramachandran outliers		0.5%
Sidechain outliers		3.0%
RSRZ outliers		2.9%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
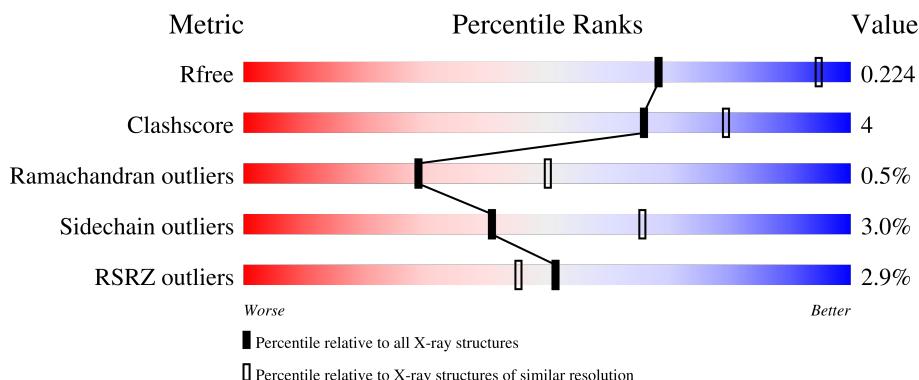
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	3797 (2.64-2.60)
Clashscore	141614	4168 (2.64-2.60)
Ramachandran outliers	138981	4093 (2.64-2.60)
Sidechain outliers	138945	4093 (2.64-2.60)
RSRZ outliers	127900	3731 (2.64-2.60)

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 <=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	657	2% — 86% · 9% · 5%
1	B	657	2% — 82% · 12% · 5%
1	C	657	5% — 83% · 11% · 5%
1	D	657	3% — 81% · 12% · 5%
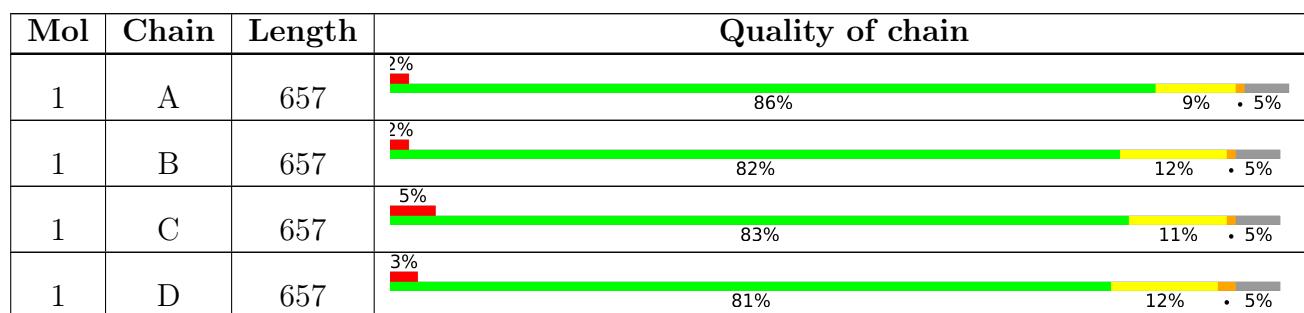
2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 40056 atoms, of which 19884 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 Acetate–CoA ligase.

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf	Trace
1	A	626	Total	C	H	N	O	P	S	126	7	0
			9994	3238	4966	842	919	1	28			
1	B	626	Total	C	H	N	O	P	S	126	8	0
			10009	3243	4976	842	919	1	28			
1	C	626	Total	C	H	N	O	P	S	126	7	0
			9994	3238	4966	842	919	1	28			
1	D	626	Total	C	H	N	O	P	S	126	8	0
			10009	3243	4976	842	919	1	28			

There are 44 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	initiating methionine	UNP A0A535FEC2
A	-8	ALA	-	expression tag	UNP A0A535FEC2
A	-7	HIS	-	expression tag	UNP A0A535FEC2
A	-6	HIS	-	expression tag	UNP A0A535FEC2
A	-5	HIS	-	expression tag	UNP A0A535FEC2
A	-4	HIS	-	expression tag	UNP A0A535FEC2
A	-3	HIS	-	expression tag	UNP A0A535FEC2
A	-2	HIS	-	expression tag	UNP A0A535FEC2
A	-1	VAL	-	expression tag	UNP A0A535FEC2
A	0	GLY	-	expression tag	UNP A0A535FEC2
A	1	THR	-	expression tag	UNP A0A535FEC2
B	-9	MET	-	initiating methionine	UNP A0A535FEC2
B	-8	ALA	-	expression tag	UNP A0A535FEC2
B	-7	HIS	-	expression tag	UNP A0A535FEC2
B	-6	HIS	-	expression tag	UNP A0A535FEC2
B	-5	HIS	-	expression tag	UNP A0A535FEC2
B	-4	HIS	-	expression tag	UNP A0A535FEC2
B	-3	HIS	-	expression tag	UNP A0A535FEC2
B	-2	HIS	-	expression tag	UNP A0A535FEC2
B	-1	VAL	-	expression tag	UNP A0A535FEC2
B	0	GLY	-	expression tag	UNP A0A535FEC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	1	THR	-	expression tag	UNP A0A535FEC2
C	-9	MET	-	initiating methionine	UNP A0A535FEC2
C	-8	ALA	-	expression tag	UNP A0A535FEC2
C	-7	HIS	-	expression tag	UNP A0A535FEC2
C	-6	HIS	-	expression tag	UNP A0A535FEC2
C	-5	HIS	-	expression tag	UNP A0A535FEC2
C	-4	HIS	-	expression tag	UNP A0A535FEC2
C	-3	HIS	-	expression tag	UNP A0A535FEC2
C	-2	HIS	-	expression tag	UNP A0A535FEC2
C	-1	VAL	-	expression tag	UNP A0A535FEC2
C	0	GLY	-	expression tag	UNP A0A535FEC2
C	1	THR	-	expression tag	UNP A0A535FEC2
D	-9	MET	-	initiating methionine	UNP A0A535FEC2
D	-8	ALA	-	expression tag	UNP A0A535FEC2
D	-7	HIS	-	expression tag	UNP A0A535FEC2
D	-6	HIS	-	expression tag	UNP A0A535FEC2
D	-5	HIS	-	expression tag	UNP A0A535FEC2
D	-4	HIS	-	expression tag	UNP A0A535FEC2
D	-3	HIS	-	expression tag	UNP A0A535FEC2
D	-2	HIS	-	expression tag	UNP A0A535FEC2
D	-1	VAL	-	expression tag	UNP A0A535FEC2
D	0	GLY	-	expression tag	UNP A0A535FEC2
D	1	THR	-	expression tag	UNP A0A535FEC2

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total 1	Mg 1	0	0
2	B	1	Total 1	Mg 1	0	0
2	C	1	Total 1	Mg 1	0	0
2	D	1	Total 1	Mg 1	0	0

- Molecule 3 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	K 1	0	0

- Molecule 4 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	11	Total 11	O 11	0	0
4	B	11	Total 11	O 11	0	0
4	C	12	Total 12	O 12	0	0
4	D	11	Total 11	O 11	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 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: Acetate–CoA ligase


- Molecule 1: Acetate–CoA ligase

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• Molecule 1: Acetate–CoA ligase

Chain D:
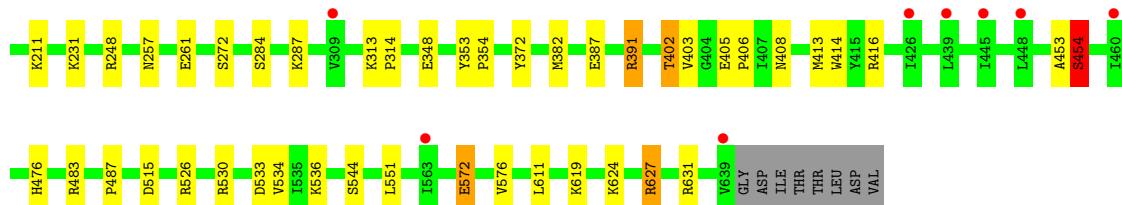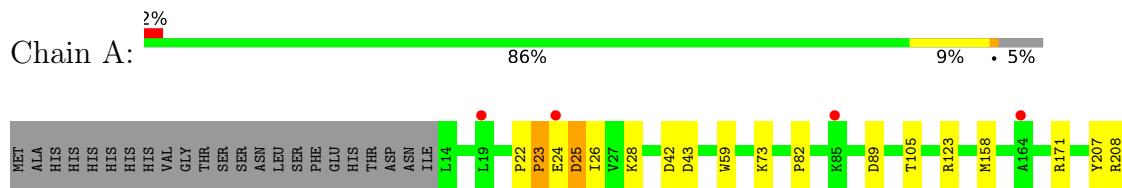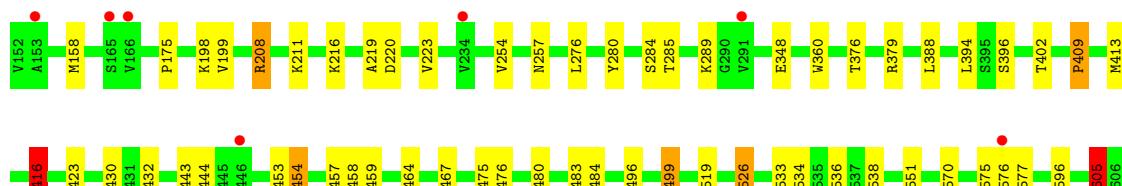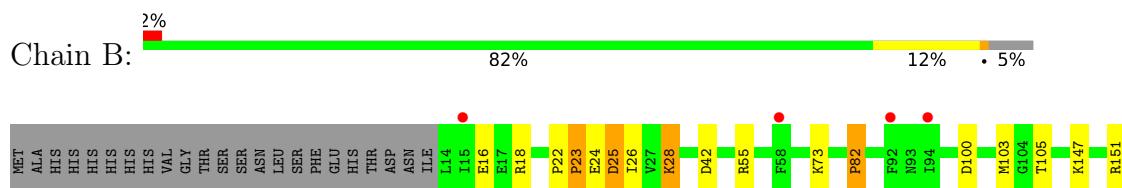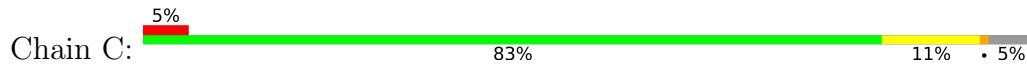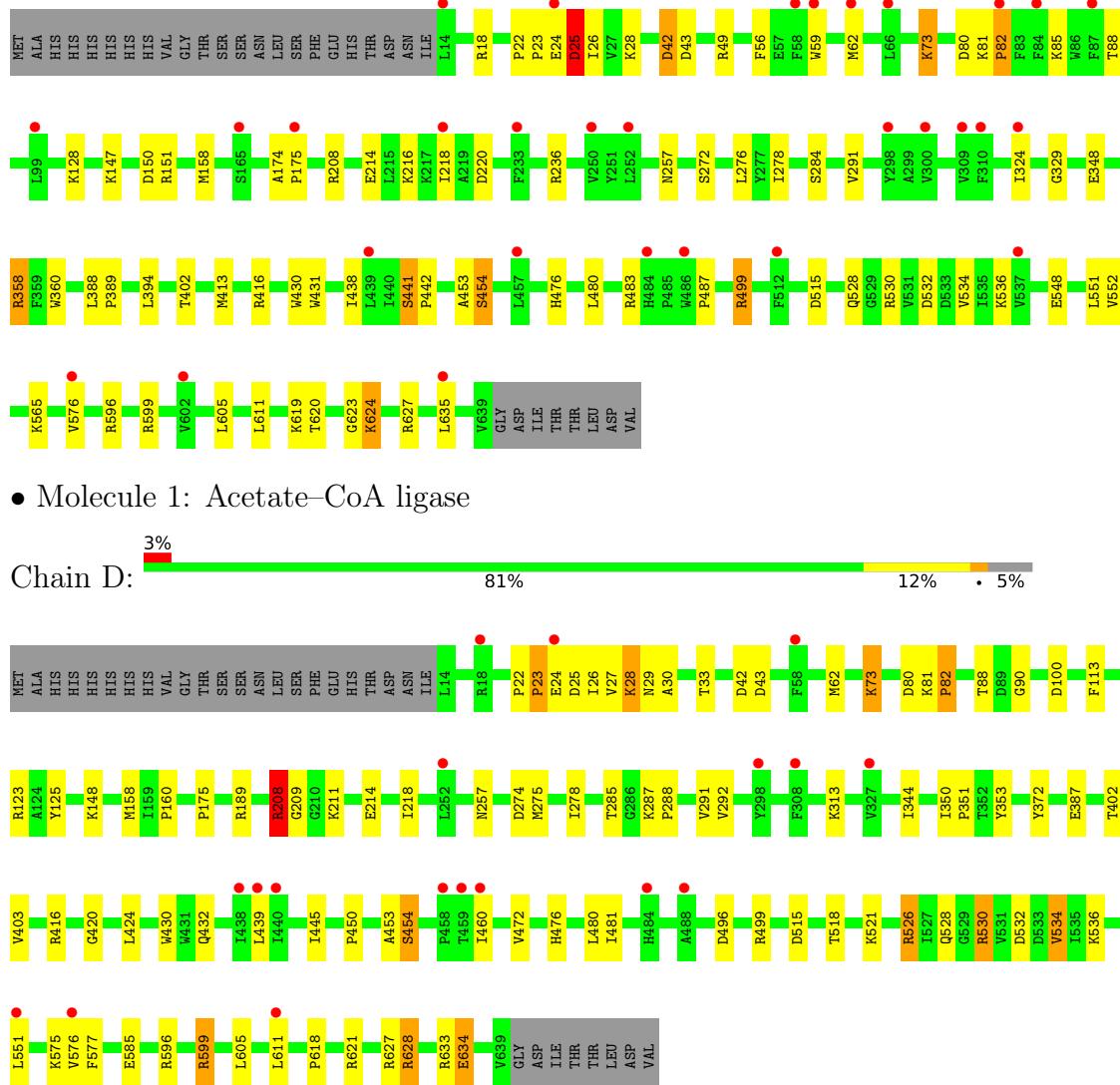
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α, β, γ	161.35Å 161.35Å 814.18Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	272.00 – 2.62 271.39 – 2.61	Depositor EDS
% Data completeness (in resolution range)	81.5 (272.00-2.62) 81.5 (271.39-2.61)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.84 (at 2.62Å)	Xtriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.163 , 0.221 0.172 , 0.224	Depositor DCC
R_{free} test set	5010 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å^2)	82.1	Xtriage
Anisotropy	0.027	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 45.1	EDS
L-test for twinning[2]	$< |L| > = 0.52, < L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	40056	wwPDB-VP
Average B, all atoms (Å^2)	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.16% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: NEP, K, MG

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	0.47	1/5162 (0.0%)	0.97	10/7018 (0.1%)
1	B	0.46	0/5170	0.98	13/7029 (0.2%)
1	C	0.45	0/5162	0.99	15/7018 (0.2%)
1	D	0.49	0/5170	1.00	16/7029 (0.2%)
All	All	0.47	1/20664 (0.0%)	0.98	54/28094 (0.2%)

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	7
1	B	0	7
1	C	0	8
1	D	0	10
All	All	0	32

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	261	GLU	CD-OE2	5.43	1.31	1.25

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	42	ASP	CB-CA-C	-8.22	93.95	110.40
1	D	526	ARG	NE-CZ-NH1	7.54	124.07	120.30
1	C	624	LYS	CB-CA-C	-7.44	95.51	110.40
1	C	62	MET	CG-SD-CE	7.39	112.02	100.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	413	MET	CG-SD-CE	7.36	111.97	100.20
1	D	387	GLU	CB-CA-C	7.08	124.57	110.40
1	D	416	ARG	NE-CZ-NH2	-6.72	116.94	120.30
1	B	42	ASP	CB-CA-C	-6.62	97.15	110.40
1	C	624	LYS	N-CA-CB	6.52	122.33	110.60
1	A	42	ASP	CB-CA-C	-6.51	97.39	110.40
1	D	62	MET	CG-SD-CE	6.45	110.51	100.20
1	C	42	ASP	CB-CA-C	-6.09	98.22	110.40
1	D	82	PRO	N-CA-CB	-6.08	95.91	102.60
1	B	607	THR	CA-CB-OG1	-5.91	96.58	109.00
1	C	413	MET	CG-SD-CE	5.90	109.63	100.20
1	A	572	GLU	CB-CA-C	5.81	122.03	110.40
1	A	416	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	B	388	LEU	CB-CG-CD2	5.77	120.81	111.00
1	C	536	LYS	CB-CA-C	-5.72	98.96	110.40
1	C	624	LYS	CA-CB-CG	5.53	125.57	113.40
1	A	526	ARG	NE-CZ-NH1	5.52	123.06	120.30
1	D	123	ARG	NE-CZ-NH1	-5.51	117.54	120.30
1	D	536	LYS	CB-CA-C	-5.50	99.41	110.40
1	C	151	ARG	NE-CZ-NH2	-5.47	117.56	120.30
1	B	605	LEU	CB-CG-CD2	5.45	120.27	111.00
1	A	413	MET	CG-SD-CE	5.43	108.89	100.20
1	B	16	GLU	CB-CA-C	-5.36	99.67	110.40
1	D	158	MET	CG-SD-CE	5.36	108.78	100.20
1	A	391	ARG	CB-CA-C	-5.33	99.73	110.40
1	A	416	ARG	NE-CZ-NH1	5.33	122.97	120.30
1	B	423	GLU	CB-CA-C	-5.33	99.74	110.40
1	C	49	ARG	NE-CZ-NH1	5.31	122.95	120.30
1	B	475	GLU	N-CA-CB	5.31	120.15	110.60
1	D	599	ARG	CG-CD-NE	-5.29	100.68	111.80
1	B	82	PRO	N-CA-CB	-5.28	96.79	102.60
1	C	416	ARG	NE-CZ-NH1	5.27	122.93	120.30
1	D	387	GLU	OE1-CD-OE2	-5.25	117.00	123.30
1	D	605	LEU	CB-CG-CD2	5.22	119.88	111.00
1	B	376	THR	CA-CB-OG1	-5.21	98.05	109.00
1	B	409	PRO	N-CA-CB	-5.20	96.88	102.60
1	A	627	ARG	NE-CZ-NH2	-5.20	117.70	120.30
1	C	499	ARG	NE-CZ-NH1	-5.20	117.70	120.30
1	D	73	LYS	CB-CG-CD	5.17	125.03	111.60
1	D	526	ARG	NE-CZ-NH2	-5.16	117.72	120.30
1	A	207	TYR	CB-CG-CD1	5.13	124.08	121.00
1	D	416	ARG	NE-CZ-NH1	5.12	122.86	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	599	ARG	NE-CZ-NH2	-5.11	117.75	120.30
1	C	358	ARG	NE-CZ-NH1	5.11	122.85	120.30
1	C	56	PHE	CB-CA-C	5.09	120.58	110.40
1	B	526	ARG	NE-CZ-NH2	-5.06	117.77	120.30
1	C	82	PRO	N-CA-C	5.06	125.26	112.10
1	A	402	THR	CA-CB-OG1	-5.04	98.41	109.00
1	C	82	PRO	N-CA-CB	-5.03	97.06	102.60
1	B	416	ARG	NE-CZ-NH2	-5.01	117.80	120.30

There are no chirality outliers.

All (32) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	123	ARG	Sidechain
1	A	208[A]	ARG	Sidechain
1	A	208[B]	ARG	Sidechain
1	A	25[A]	ASP	Peptide
1	A	391	ARG	Sidechain
1	A	627	ARG	Sidechain
1	A	631	ARG	Sidechain
1	B	18	ARG	Sidechain
1	B	22	PRO	Peptide
1	B	416	ARG	Sidechain
1	B	499	ARG	Sidechain
1	B	526	ARG	Sidechain
1	B	596	ARG	Sidechain
1	B	627	ARG	Sidechain
1	C	18	ARG	Sidechain
1	C	208[A]	ARG	Sidechain
1	C	208[B]	ARG	Sidechain
1	C	22	PRO	Peptide
1	C	236	ARG	Sidechain
1	C	499	ARG	Sidechain
1	C	596	ARG	Sidechain
1	C	599	ARG	Sidechain
1	D	189	ARG	Sidechain
1	D	208[A]	ARG	Sidechain
1	D	208[B]	ARG	Sidechain
1	D	22	PRO	Peptide,Mainchain
1	D	530	ARG	Sidechain
1	D	596	ARG	Sidechain
1	D	599	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	D	627	ARG	Sidechain
1	D	628	ARG	Sidechain

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	5028	4966	4953	30	0
1	B	5033	4976	4964	46	0
1	C	5028	4966	4953	36	0
1	D	5033	4976	4963	51	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	1	0	0	0	0
4	A	11	0	0	1	0
4	B	11	0	0	1	0
4	C	12	0	0	0	0
4	D	11	0	0	0	0
All	All	20172	19884	19833	160	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 4.

All (160) 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:D:23[A]:PRO:O	1:D:25[A]:ASP:N	1.56	1.34
1:A:23[A]:PRO:O	1:A:25[A]:ASP:N	1.83	1.11
1:B:23[A]:PRO:O	1:B:25[A]:ASP:N	1.91	1.01
1:B:24[A]:GLU:O	1:B:25[A]:ASP:OD1	1.81	0.98
1:A:24[A]:GLU:HG3	1:A:25[A]:ASP:OD1	1.69	0.92
1:D:453:ALA:O	1:D:454:SER:HB3	1.73	0.89
1:B:576[A]:VAL:HB	1:B:611[A]:LEU:CD2	2.04	0.88
1:A:23[A]:PRO:C	1:A:25[A]:ASP:H	1.86	0.79

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:453:ALA:O	1:D:454:SER:CB	2.32	0.78
1:D:23[A]:PRO:C	1:D:25[A]:ASP:N	2.36	0.78
1:B:416:ARG:NH2	1:D:633:ARG:O	2.23	0.69
1:B:284:SER:HB3	1:B:534:VAL:HA	1.76	0.68
1:D:576[A]:VAL:HB	1:D:611[A]:LEU:HD23	1.76	0.66
1:B:23[A]:PRO:O	1:B:26[A]:ILE:HG22	1.94	0.66
1:D:208[A]:ARG:HH11	1:D:208[A]:ARG:HG3	1.58	0.66
1:D:576[A]:VAL:HB	1:D:611[A]:LEU:CD2	2.26	0.66
1:C:216:LYS:NZ	1:C:220:ASP:OD1	2.29	0.65
1:A:551:LEU:CD1	1:A:576[A]:VAL:HG11	2.27	0.65
1:C:453:ALA:O	1:C:454:SER:HB3	1.96	0.65
1:B:576[A]:VAL:HB	1:B:611[A]:LEU:HD23	1.80	0.64
1:C:85:LYS:HE3	1:C:88:THR:HG22	1.79	0.64
1:B:24[A]:GLU:O	1:B:24[A]:GLU:HG3	1.97	0.64
1:B:605:LEU:H	1:B:605:LEU:HD23	1.62	0.63
1:A:231:LYS:HD2	1:A:248:ARG:O	1.99	0.63
1:B:216:LYS:NZ	1:B:220:ASP:OD1	2.31	0.62
1:D:496:ASP:OD2	1:D:499:ARG:HD2	1.99	0.62
1:C:619:LYS:HA	1:C:624:LYS:O	2.00	0.61
1:B:453:ALA:O	1:B:454:SER:CB	2.49	0.60
1:A:453:ALA:O	1:A:454:SER:CB	2.49	0.60
1:B:360:TRP:HB3	1:B:394:LEU:HD21	1.84	0.60
1:C:453:ALA:O	1:C:454:SER:CB	2.49	0.59
1:C:388:LEU:HB2	1:C:389:PRO:HD3	1.84	0.59
1:B:24[A]:GLU:O	1:B:25[A]:ASP:CG	2.42	0.58
1:B:611[B]:LEU:HD21	1:B:613:PHE:CE1	2.38	0.58
1:C:284:SER:HB3	1:C:534:VAL:HA	1.85	0.57
1:D:275:MET:HE3	1:D:278:ILE:HG13	1.85	0.57
1:B:551:LEU:CD1	1:B:576[A]:VAL:HG11	2.34	0.57
1:D:551:LEU:CD1	1:D:576[A]:VAL:HG11	2.34	0.57
1:D:275:MET:HE3	1:D:278:ILE:CG1	2.33	0.57
1:D:350:ILE:HB	1:D:351:PRO:CD	2.35	0.56
1:D:23[A]:PRO:HB2	1:D:26[A]:ILE:HG22	1.88	0.56
1:C:551:LEU:CD1	1:C:576[A]:VAL:HG11	2.35	0.56
1:A:405:GLU:HB2	1:A:406:PRO:HD2	1.87	0.56
1:A:23[A]:PRO:O	1:A:26[A]:ILE:N	2.36	0.55
1:D:25[A]:ASP:HA	1:D:28:LYS:HD2	1.89	0.55
1:B:483:ARG:HG2	1:B:483:ARG:HH11	1.71	0.54
1:B:575:LYS:HE2	1:B:577:PHE:CZ	2.42	0.54
1:B:551:LEU:HD13	1:B:576[A]:VAL:HG11	1.89	0.54
1:D:420:GLY:HA2	1:D:424:LEU:HD12	1.88	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:23[A]:PRO:C	1:B:25[A]:ASP:N	2.60	0.53
1:B:605:LEU:H	1:B:605:LEU:CD2	2.21	0.53
1:B:103:MET:HE2	1:B:103:MET:HA	1.91	0.53
1:A:408:ASN:ND2	4:A:801:HOH:O	2.41	0.53
1:C:24[B]:GLU:O	1:C:25[B]:ASP:HB2	2.08	0.52
1:B:576[A]:VAL:HB	1:B:611[A]:LEU:HD21	1.91	0.52
1:A:382:MET:HG2	1:A:414:TRP:CD1	2.44	0.52
1:B:208[A]:ARG:HH11	1:B:208[A]:ARG:HG3	1.76	0.51
1:C:620:THR:O	1:C:623:GLY:N	2.43	0.51
1:B:538:SER:OG	1:B:570:LYS:HG2	2.12	0.50
1:A:372:TYR:CZ	1:A:403:VAL:HB	2.46	0.50
1:D:30:ALA:O	1:D:33:THR:HB	2.11	0.50
1:A:372:TYR:CE1	1:A:403:VAL:HB	2.46	0.50
1:C:24[B]:GLU:OE1	1:C:24[B]:GLU:N	2.38	0.50
1:B:443:THR:HB	1:B:444:PRO:CD	2.42	0.50
1:B:379:ARG:HD3	4:B:801:HOH:O	2.12	0.49
1:C:360:TRP:HB3	1:C:394:LEU:HD21	1.94	0.49
1:D:287:LYS:HB2	1:D:288:PRO:HD2	1.94	0.49
1:A:22:PRO:O	1:A:24[A]:GLU:N	2.44	0.49
1:A:515:ASP:OD1	1:A:530:ARG:HD2	2.12	0.49
1:A:348:GLU:OE1	1:D:585:GLU:OE1	2.31	0.49
1:C:23[A]:PRO:O	1:C:26[A]:ILE:HG22	2.13	0.48
1:C:431:TRP:HB3	1:C:438:ILE:HA	1.95	0.48
1:C:548:GLU:OE2	1:C:627:ARG:NH2	2.40	0.48
1:D:208[B]:ARG:HG2	1:D:208[B]:ARG:HH11	1.77	0.48
1:A:158:MET:HB2	1:A:348:GLU:HA	1.95	0.48
1:B:158:MET:HB2	1:B:348:GLU:HA	1.95	0.48
1:A:284:SER:O	1:A:544:SER:HB2	2.13	0.48
1:D:175:PRO:HB3	1:D:275:MET:HB3	1.95	0.48
1:D:24[A]:GLU:O	1:D:25[A]:ASP:OD1	2.31	0.48
1:A:24[A]:GLU:CG	1:A:25[A]:ASP:OD1	2.52	0.47
1:D:430:TRP:CZ2	1:D:480:LEU:HD23	2.49	0.47
1:C:441:SER:OG	1:C:442:PRO:O	2.33	0.47
1:D:532:ASP:OD2	1:D:534:VAL:HB	2.14	0.47
1:D:481:ILE:HD12	1:D:481:ILE:C	2.35	0.47
1:B:24[A]:GLU:C	1:B:25[A]:ASP:CG	2.72	0.47
1:C:548:GLU:O	1:C:552:VAL:HG23	2.14	0.47
1:C:565:LYS:HE3	1:C:635:LEU:HD21	1.95	0.47
1:B:453:ALA:O	1:B:454:SER:HB3	2.16	0.46
1:B:457:LEU:HB3	1:B:458:PRO:CD	2.45	0.46
1:D:575:LYS:HE2	1:D:577:PHE:CZ	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:324:ILE:HA	1:C:329:GLY:HA3	1.97	0.46
1:D:450:PRO:O	1:D:526:ARG:NH2	2.48	0.46
1:B:464:VAL:HG23	1:B:519:MET:HE2	1.97	0.46
1:D:214:GLU:O	1:D:218:ILE:HG13	2.16	0.46
1:A:551:LEU:HD13	1:A:576[A]:VAL:HG11	1.97	0.46
1:D:439:LEU:HD22	1:D:460:ILE:HD12	1.98	0.46
1:B:219:ALA:O	1:B:223:VAL:HG23	2.17	0.45
1:B:25[A]:ASP:HA	1:B:28:LYS:HD2	1.99	0.45
1:D:29:ASN:O	1:D:313:LYS:NZ	2.46	0.45
1:B:616:SER:OG	1:C:24[B]:GLU:HG3	2.16	0.45
1:C:214:GLU:O	1:C:218:ILE:HG13	2.17	0.45
1:C:605:LEU:HD23	1:C:605:LEU:H	1.82	0.45
1:A:313:LYS:HB3	1:A:314:PRO:CD	2.46	0.45
1:C:483:ARG:HG2	1:C:483:ARG:HH11	1.81	0.45
1:C:59:TRP:CD2	1:C:487:PRO:HG2	2.52	0.45
1:D:24[A]:GLU:C	1:D:25[A]:ASP:CG	2.75	0.45
1:D:209:GLY:HA2	1:D:353:TYR:CG	2.52	0.45
1:D:577:PHE:HZ	1:D:634:GLU:HG3	1.82	0.45
1:B:430:TRP:CZ2	1:B:480:LEU:HD23	2.52	0.44
1:B:483:ARG:HG2	1:B:483:ARG:NH1	2.32	0.44
1:B:496:ASP:OD2	1:B:499:ARG:HD3	2.17	0.44
1:A:24[B]:GLU:O	1:A:25[B]:ASP:HB2	2.17	0.44
1:A:59:TRP:CE3	1:A:487:PRO:HG2	2.52	0.44
1:A:73:LYS:HG2	1:A:89:ASP:HB2	1.99	0.44
1:C:515:ASP:OD1	1:C:530:ARG:HD2	2.18	0.44
1:B:55:ARG:HD2	1:B:484[B]:HIS:CE1	2.53	0.44
1:B:280:TYR:HA	1:B:289:LYS:O	2.18	0.44
1:B:458:PRO:C	1:B:459:THR:HG23	2.38	0.43
1:A:483:ARG:HH11	1:A:483:ARG:HG2	1.83	0.43
1:D:618:PRO:HD3	1:D:633:ARG:HH12	1.82	0.43
1:D:278:ILE:HA	1:D:291:VAL:O	2.18	0.43
1:D:551:LEU:HD13	1:D:576[A]:VAL:HG11	1.99	0.43
1:B:254:VAL:O	1:B:257:ASN:HB3	2.19	0.43
1:B:576[A]:VAL:HG23	1:B:608:PRO:HB3	2.01	0.43
1:A:353:TYR:HA	1:A:354:PRO:C	2.39	0.42
1:C:150:ASP:O	1:C:175:PRO:HD2	2.19	0.42
1:D:80:ASP:O	1:D:81:LYS:C	2.55	0.42
1:A:536:LYS:O	1:A:572:GLU:HG2	2.19	0.42
1:D:350:ILE:HB	1:D:351:PRO:HD3	2.00	0.42
1:C:59:TRP:CE3	1:C:487:PRO:HG2	2.55	0.42
1:D:23[A]:PRO:O	1:D:26[A]:ILE:N	2.52	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:125:TYR:CE1	1:D:160:PRO:HG2	2.55	0.42
1:B:208[A]:ARG:HG3	1:B:208[A]:ARG:NH1	2.35	0.42
1:C:175:PRO:HA	1:C:276:LEU:O	2.19	0.42
1:B:175:PRO:HA	1:B:276:LEU:O	2.20	0.42
1:C:174:ALA:HA	1:C:175:PRO:HD3	1.87	0.42
1:C:358:ARG:HG2	1:C:358:ARG:HH11	1.84	0.42
1:B:198:LYS:HG2	1:B:199:VAL:HG13	2.01	0.42
1:C:278:ILE:HA	1:C:291:VAL:O	2.19	0.42
1:D:275:MET:HG2	1:D:292:VAL:HG13	2.02	0.42
1:D:372:TYR:CZ	1:D:403:VAL:HB	2.55	0.42
1:D:611[A]:LEU:HD23	1:D:611[A]:LEU:HA	1.91	0.42
1:A:619:LYS:HA	1:A:624:LYS:O	2.19	0.41
1:C:430:TRP:CZ2	1:C:480:LEU:HD23	2.54	0.41
1:C:158:MET:HB2	1:C:348:GLU:HA	2.02	0.41
1:D:25[A]:ASP:C	1:D:27:VAL:N	2.72	0.41
1:D:27:VAL:HG13	1:D:445:ILE:HG22	2.03	0.41
1:C:551:LEU:HD13	1:C:576[A]:VAL:HG11	2.03	0.41
1:D:148:LYS:NZ	1:D:274:ASP:OD2	2.54	0.41
1:D:515:ASP:OD1	1:D:530:ARG:HD2	2.21	0.41
1:A:387:GLU:HA	1:A:387:GLU:OE1	2.19	0.41
1:A:284:SER:HB3	1:A:534:VAL:HA	2.02	0.41
1:D:88:THR:C	1:D:90:GLY:H	2.25	0.41
1:A:611:LEU:C	1:A:611:LEU:HD23	2.41	0.41
1:C:576[B]:VAL:HG23	1:C:611:LEU:HG	2.02	0.41
1:D:113:PHE:HA	1:D:344:ILE:O	2.20	0.41
1:C:81:LYS:HA	1:C:82:PRO:HA	1.86	0.40
1:B:619:LYS:HA	1:B:624:LYS:O	2.22	0.40

There are no symmetry-related clashes.

5.3   Torsion angles ⓘ

5.3.1   Protein backbone ⓘ

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	630/657 (96%)	599 (95%)	28 (4%)	3 (0%)	29	50
1	B	631/657 (96%)	598 (95%)	28 (4%)	5 (1%)	19	36
1	C	630/657 (96%)	593 (94%)	32 (5%)	5 (1%)	19	36
1	D	631/657 (96%)	599 (95%)	28 (4%)	4 (1%)	25	45
All	All	2522/2628 (96%)	2389 (95%)	116 (5%)	17 (1%)	29	41

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	454	SER
1	B	454	SER
1	C	454	SER
1	D	454	SER
1	C	73	LYS
1	C	25[A]	ASP
1	C	25[B]	ASP
1	A	23[A]	PRO
1	A	23[B]	PRO
1	B	25[A]	ASP
1	B	25[B]	ASP
1	D	534	VAL
1	D	23[A]	PRO
1	D	23[B]	PRO
1	C	272	SER
1	B	23[A]	PRO
1	B	23[B]	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	536/557 (96%)	524 (98%)	12 (2%)	52	74
1	B	537/557 (96%)	515 (96%)	22 (4%)	30	55
1	C	536/557 (96%)	522 (97%)	14 (3%)	46	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	537/557 (96%)	518 (96%)	19 (4%)	36	60
All	All	2146/2228 (96%)	2079 (97%)	67 (3%)	41	65

All (67) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	LYS
1	A	43	ASP
1	A	82	PRO
1	A	105	THR
1	A	171	ARG
1	A	211	LYS
1	A	257	ASN
1	A	272	SER
1	A	287	LYS
1	A	402	THR
1	A	454	SER
1	A	533	ASP
1	B	28	LYS
1	B	73	LYS
1	B	82	PRO
1	B	100	ASP
1	B	105	THR
1	B	147	LYS
1	B	151	ARG
1	B	208[A]	ARG
1	B	208[B]	ARG
1	B	211	LYS
1	B	285	THR
1	B	396	SER
1	B	402	THR
1	B	409	PRO
1	B	432	GLN
1	B	467	LYS
1	B	533	ASP
1	B	536	LYS
1	B	605	LEU
1	B	621	ARG
1	B	622	SER
1	B	628	ARG
1	C	25[A]	ASP
1	C	25[B]	ASP

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Mol	Chain	Res	Type
1	C	28	LYS
1	C	42	ASP
1	C	43	ASP
1	C	73	LYS
1	C	80	ASP
1	C	128	LYS
1	C	147	LYS
1	C	257	ASN
1	C	402	THR
1	C	441	SER
1	C	528	GLN
1	C	532	ASP
1	D	28	LYS
1	D	43	ASP
1	D	73	LYS
1	D	82	PRO
1	D	100	ASP
1	D	208[A]	ARG
1	D	208[B]	ARG
1	D	211	LYS
1	D	257	ASN
1	D	285	THR
1	D	402	THR
1	D	432	GLN
1	D	472	VAL
1	D	518	THR
1	D	521	LYS
1	D	528	GLN
1	D	621	ARG
1	D	628	ARG
1	D	634	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	67	HIS
1	A	540	HIS
1	A	597	HIS
1	B	54	ASN
1	B	67	HIS
1	B	528	GLN
1	D	67	HIS

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Mol	Chain	Res	Type
1	D	432	GLN
1	D	528	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

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

4 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	NEP	D	476	1	10,14,15	2.08	2 (20%)	5,20,22	0.55	0
1	NEP	C	476	1	10,14,15	2.23	2 (20%)	5,20,22	0.75	0
1	NEP	B	476	1	10,14,15	1.92	2 (20%)	5,20,22	1.05	0
1	NEP	A	476	1	10,14,15	2.35	2 (20%)	5,20,22	0.89	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
1	NEP	D	476	1	-	0/5/12/14	0/1/1/1
1	NEP	C	476	1	-	1/5/12/14	0/1/1/1
1	NEP	B	476	1	-	1/5/12/14	0/1/1/1
1	NEP	A	476	1	-	0/5/12/14	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	476	NEP	P-O3P	6.52	1.53	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	476	NEP	P-O3P	6.42	1.52	1.47
1	D	476	NEP	P-O3P	5.85	1.52	1.47
1	B	476	NEP	P-O3P	5.24	1.51	1.47
1	B	476	NEP	CE1-ND1	-2.17	1.31	1.35
1	A	476	NEP	CE1-ND1	-2.16	1.31	1.35
1	D	476	NEP	CE1-ND1	-2.13	1.31	1.35
1	C	476	NEP	CE1-ND1	-2.01	1.31	1.35

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	B	476	NEP	CA-CB-CG-ND1
1	C	476	NEP	CA-CB-CG-ND1

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 5 ligands modelled in this entry, 5 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	625/657 (95%)	0.59	12 (1%)	66	62	58, 73, 101, 153	0
1	B	625/657 (95%)	0.57	12 (1%)	66	62	57, 76, 100, 142	0
1	C	625/657 (95%)	0.64	30 (4%)	30	24	60, 82, 112, 142	0
1	D	625/657 (95%)	0.58	18 (2%)	51	45	56, 74, 102, 147	0
All	All	2500/2628 (95%)	0.60	72 (2%)	51	45	56, 76, 106, 153	0

All (72) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	87	PHE	3.8
1	C	300	VAL	3.6
1	C	59	TRP	3.5
1	C	99	LEU	3.0
1	C	84	PHE	3.0
1	D	24[A]	GLU	3.0
1	B	611[A]	LEU	3.0
1	D	460	ILE	2.9
1	B	94	ILE	2.9
1	D	488	ALA	2.9
1	D	308	PHE	2.8
1	C	82	PRO	2.7
1	D	298	TYR	2.7
1	A	309	VAL	2.7
1	A	24[A]	GLU	2.7
1	B	576[A]	VAL	2.6
1	A	639	VAL	2.6
1	D	440	ILE	2.6
1	A	164	ALA	2.6
1	D	484[A]	HIS	2.6
1	C	576[A]	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	458	PRO	2.5
1	C	14	LEU	2.5
1	C	298	TYR	2.5
1	C	324	ILE	2.5
1	C	66	LEU	2.5
1	B	234	VAL	2.4
1	B	166	VAL	2.4
1	A	448	LEU	2.4
1	D	459	THR	2.4
1	B	58	PHE	2.4
1	C	58	PHE	2.4
1	C	439	LEU	2.4
1	D	611[A]	LEU	2.4
1	A	19	LEU	2.4
1	C	252	LEU	2.4
1	A	445	ILE	2.4
1	C	24[A]	GLU	2.3
1	B	92	PHE	2.3
1	D	58	PHE	2.3
1	C	175	PRO	2.3
1	B	291	VAL	2.3
1	C	512	PHE	2.3
1	C	486	TRP	2.3
1	B	15	ILE	2.3
1	C	309	VAL	2.3
1	D	252	LEU	2.3
1	C	218	ILE	2.3
1	A	439	LEU	2.2
1	A	426	ILE	2.2
1	D	576[A]	VAL	2.2
1	C	537	VAL	2.2
1	A	85	LYS	2.1
1	A	460	ILE	2.1
1	D	18	ARG	2.1
1	B	153	ALA	2.1
1	C	165	SER	2.1
1	D	327	VAL	2.1
1	C	602	VAL	2.1
1	D	439	LEU	2.1
1	C	62	MET	2.1
1	C	310	PHE	2.1
1	C	250	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	457	LEU	2.1
1	C	635	LEU	2.1
1	B	446	LEU	2.0
1	C	484[A]	HIS	2.0
1	D	438	ILE	2.0
1	A	563	ILE	2.0
1	B	165	SER	2.0
1	C	233	PHE	2.0
1	D	551	LEU	2.0

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

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($Å^2$)	Q<0.9
1	NEP	B	476	14/15	0.84	0.18	74,116,142,143	0
1	NEP	A	476	14/15	0.85	0.16	89,121,143,152	0
1	NEP	C	476	14/15	0.86	0.20	95,123,145,148	0
1	NEP	D	476	14/15	0.86	0.15	78,124,149,166	0

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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($Å^2$)	Q<0.9
2	MG	A	701	1/1	0.85	0.08	87,87,87,87	0
2	MG	C	701	1/1	0.95	0.05	87,87,87,87	0
2	MG	D	701	1/1	0.95	0.08	72,72,72,72	0
3	K	A	702	1/1	0.95	0.18	109,109,109,109	0
2	MG	B	701	1/1	0.96	0.10	82,82,82,82	0

6.5 Other polymers ⓘ

There are no such residues in this entry.