Full wwPDB X-ray Structure Validation Report ⓘ

Nov 5, 2023 – 10:28 pm GMT

|		
PDB ID	:	8Q2M
Title	:	18mer DNA mimic Foldamer with an Aliphatic linker in complex with Sac7d V26A/M29A protein
Authors	:	Deepak, D.; Corvaglia, V.; Wu, J.; Huc, I.
Deposited on	:	2023-08-02
Resolution	:	3.21 Å(reported)

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.21 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		0.341
Clashscore		28
Ramachandran outliers		0
Sidechain outliers		2.1%
RSRZ outliers		11.1%

Worse — *Better*

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution
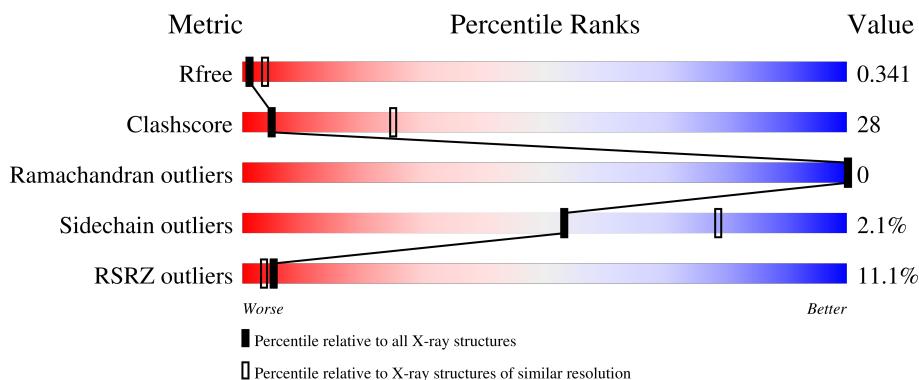
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1335 (3.24-3.20)
Clashscore	141614	1460 (3.24-3.20)
Ramachandran outliers	138981	1437 (3.24-3.20)
Sidechain outliers	138945	1436 (3.24-3.20)
RSRZ outliers	127900	1291 (3.24-3.20)

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	AA	66	11% / 56% / 36% / • 5%
2	A	10	70% / 30%
2	B	10	40% / 20% / 40%
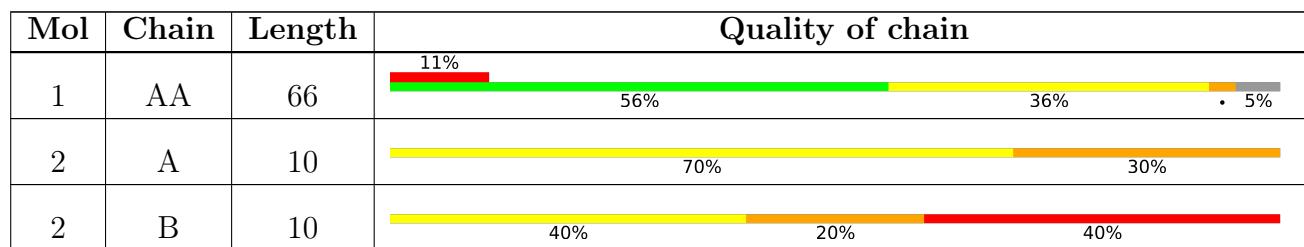
The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	V4F	B	112	-	X	-	-
2	V4F	B	114	-	X	-	-

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 820 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 DNA-binding protein 7b.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AA	63	Total	C	N	O	S	0	0	0
			474	294	86	92	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AA	26	ALA	VAL	conflict	UNP P13123
AA	29	ALA	MET	conflict	UNP P13123

- Molecule 2 is a protein called DNA mimic Foldamer.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	10	Total	C	N	O	P	0	0	0
			173	103	17	45	8			
2	B	10	Total	C	N	O	P	0	0	0
			173	103	17	45	8			

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: DNA-binding protein 7b

Chain AA:

• Molecule 2: DNA mimic Foldamer

Chain A:

• Molecule 2: DNA mimic Foldamer

Chain B:
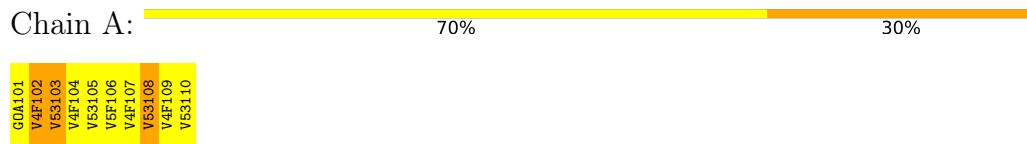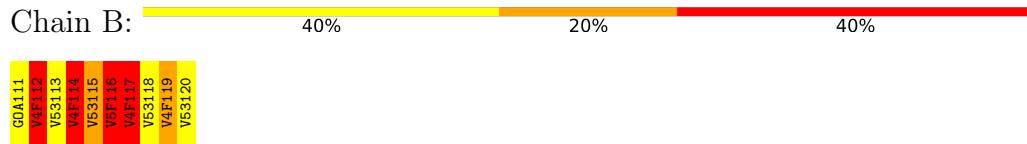
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 64 2 2	Depositor
Cell constants a, b, c, α, β, γ	70.92Å 70.92Å 119.29Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	30.71 – 3.21	Depositor
	42.79 – 3.21	EDS
% Data completeness (in resolution range)	99.8 (30.71-3.21)	Depositor
	100.0 (42.79-3.21)	EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.94 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487, PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.325 , 0.335	Depositor
	0.328 , 0.341	DCC
R_{free} test set	323 reflections (10.00%)	wwPDB-VP
Wilson B-factor (Å^2)	113.9	Xtriage
Anisotropy	0.447	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 113.8	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.77	EDS
Total number of atoms	820	wwPDB-VP
Average B, all atoms (Å^2)	129.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.53% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[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: V5F, V4F, V53, GOA

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	AA	0.89	0/477	1.11	1/633 (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	AA	0	1
2	B	0	5
All	All	0	6

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	AA	22	LYS	CD-CE-NZ	6.15	125.85	111.70

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	AA	61	ALA	Mainchain
2	B	112	V4F	Mainchain
2	B	114	V4F	Mainchain
2	B	116	V5F	Mainchain,Peptide
2	B	117	V4F	Mainchain

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	AA	474	0	480	26	1
2	A	173	0	0	4	2
2	B	173	0	0	8	3
All	All	820	0	480	36	5

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 28.

All (36) 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:AA:15:VAL:HG23	1:AA:19:LYS:HE3	1.75	0.69
1:AA:52:LYS:NZ	1:AA:56:ASP:OD2	2.24	0.68
1:AA:61:ALA:O	1:AA:63:ARG:HD3	1.94	0.67
2:A:102:V4F:N	2:A:102:V4F:NAH	2.44	0.65
1:AA:3:LYS:HD3	1:AA:5:LYS:HE2	1.78	0.65
1:AA:17:THR:HG23	1:AA:57:MET:SD	2.37	0.65
2:B:119:V4F:N	2:B:119:V4F:NAH	2.46	0.64
2:B:112:V4F:C01	2:B:112:V4F:CAI	2.78	0.61
1:AA:2:VAL:HB	1:AA:17:THR:OG1	2.02	0.60
1:AA:57:MET:HG2	1:AA:60:ARG:NH1	2.17	0.60
1:AA:17:THR:HA	1:AA:20:ILE:HD12	1.85	0.58
2:B:112:V4F:N	2:B:112:V4F:NAH	2.49	0.58
1:AA:2:VAL:HG21	1:AA:53:GLU:HB2	1.86	0.58
1:AA:15:VAL:CG2	1:AA:19:LYS:HE3	2.34	0.57
1:AA:2:VAL:HG21	1:AA:53:GLU:CB	2.35	0.57
1:AA:27:GLY:HA3	2:A:103:V53:O1	2.05	0.57
2:B:117:V4F:NAH	2:B:117:V4F:N	2.54	0.56
2:A:102:V4F:C01	2:A:102:V4F:CAI	2.84	0.55
1:AA:6:PHE:CZ	1:AA:13:LYS:HB2	2.44	0.52
1:AA:33:THR:O	1:AA:33:THR:OG1	2.29	0.50
1:AA:53:GLU:O	1:AA:57:MET:HG3	2.13	0.48
2:B:114:V4F:O	2:B:115:V53:CAK	2.62	0.48
1:AA:16:ASP:H	1:AA:19:LYS:CE	2.27	0.47
1:AA:21:LYS:HD3	1:AA:35:ASP:HB2	1.96	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:AA:17:THR:HG21	1:AA:53:GLU:HG2	1.98	0.46
1:AA:17:THR:HA	1:AA:20:ILE:CD1	2.45	0.46
1:AA:57:MET:O	1:AA:60:ARG:HB2	2.16	0.46
2:B:114:V4F:CAE	2:B:116:V5F:O	2.65	0.44
1:AA:50:ALA:HB1	1:AA:54:LEU:HD23	2.00	0.44
2:B:114:V4F:C01	2:B:114:V4F:CAI	2.96	0.43
1:AA:16:ASP:H	1:AA:19:LYS:HE3	1.84	0.42
1:AA:35:ASP:OD2	1:AA:37:ASN:O	2.38	0.42
1:AA:57:MET:HG2	1:AA:60:ARG:HH12	1.82	0.42
1:AA:3:LYS:CD	1:AA:5:LYS:HE2	2.49	0.40
2:B:119:V4F:CAI	2:B:119:V4F:C01	2.99	0.40
1:AA:42:ARG:NH1	2:A:102:V4F:CAK	2.84	0.40

All (5) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:AA:5:LYS:NZ	2:A:108:V53:O1[11_555]	1.30	0.90
2:B:111:GOA:CA	2:B:111:GOA:O2[4_545]	1.42	0.78
2:A:101:GOA:CA	2:A:101:GOA:O2[7_555]	1.47	0.73
2:B:111:GOA:CA	2:B:111:GOA:CA[4_545]	1.85	0.35
2:B:112:V4F:O3	2:B:112:V4F:O3[4_545]	1.99	0.21

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	AA	61/66 (92%)	58 (95%)	3 (5%)	0	100	100

There are no Ramachandran outliers to report.

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	AA	47/55 (86%)	46 (98%)	1 (2%)	53	79

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AA	63	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

18 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
2	V4F	A	102	2	21,21,22	2.76	6 (28%)	27,30,32	2.60	12 (44%)
2	V53	B	113	2	20,20,21	2.86	6 (30%)	25,29,31	3.01	9 (36%)
2	V53	A	105	2	20,20,21	2.56	3 (15%)	25,29,31	2.25	10 (40%)
2	V53	A	108	2	20,20,21	2.90	6 (30%)	25,29,31	2.49	15 (60%)
2	V53	B	115	2	20,20,21	2.86	8 (40%)	25,29,31	3.03	11 (44%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	V4F	B	117	2	21,21,22	2.61	8 (38%)	27,30,32	2.33	10 (37%)
2	V53	A	103	2	20,20,21	2.85	8 (40%)	25,29,31	2.62	9 (36%)
2	V53	A	110	2	21,21,21	3.26	7 (33%)	29,31,31	2.22	9 (31%)
2	V53	B	120	2	21,21,21	2.00	5 (23%)	29,31,31	3.10	14 (48%)
2	V4F	A	107	2	21,21,22	3.31	7 (33%)	27,30,32	2.50	8 (29%)
2	V4F	A	109	2	21,21,22	2.30	4 (19%)	27,30,32	3.04	10 (37%)
2	V4F	B	119	2	21,21,22	2.40	5 (23%)	27,30,32	3.42	15 (55%)
2	V53	B	118	2	20,20,21	2.06	4 (20%)	25,29,31	2.84	7 (28%)
2	V5F	A	106	2	11,12,13	1.23	1 (9%)	14,15,17	2.37	6 (42%)
2	V4F	A	104	2	21,21,22	2.30	5 (23%)	27,30,32	2.26	8 (29%)
2	V5F	B	116	2	11,12,13	1.28	1 (9%)	14,15,17	3.69	5 (35%)
2	V4F	B	112	2	21,21,22	3.08	7 (33%)	27,30,32	3.57	13 (48%)
2	V4F	B	114	2	21,21,22	2.78	6 (28%)	27,30,32	3.57	14 (51%)

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	V4F	A	102	2	-	5/10/10/12	0/2/2/2
2	V53	B	113	2	-	1/8/8/10	0/2/2/2
2	V53	A	105	2	-	1/8/8/10	0/2/2/2
2	V53	A	108	2	-	0/8/8/10	0/2/2/2
2	V53	B	115	2	-	4/8/8/10	0/2/2/2
2	V4F	B	117	2	-	6/10/10/12	0/2/2/2
2	V53	A	103	2	-	2/8/8/10	0/2/2/2
2	V53	A	110	2	-	0/10/10/10	0/2/2/2
2	V53	B	120	2	-	3/10/10/10	0/2/2/2
2	V4F	A	107	2	-	2/10/10/12	0/2/2/2
2	V4F	A	109	2	-	4/10/10/12	0/2/2/2
2	V4F	B	119	2	-	3/10/10/12	0/2/2/2
2	V53	B	118	2	-	3/8/8/10	0/2/2/2
2	V5F	A	106	2	-	1/4/6/8	0/1/1/1
2	V4F	A	104	2	-	1/10/10/12	0/2/2/2
2	V5F	B	116	2	-	1/4/6/8	0/1/1/1
2	V4F	B	112	2	-	8/10/10/12	0/2/2/2

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	V4F	B	114	2	-	6/10/10/12	0/2/2/2

All (97) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	107	V4F	CAE-C	-13.01	1.35	1.48
2	B	114	V4F	CAE-C	-10.05	1.38	1.48
2	A	108	V53	CAJ-C	-9.98	1.38	1.48
2	B	113	V53	CAJ-C	-9.86	1.38	1.48
2	B	115	V53	CAJ-C	-9.83	1.38	1.48
2	A	110	V53	P-C01	9.72	2.04	1.80
2	A	102	V4F	CAE-C	-9.51	1.38	1.48
2	A	105	V53	CAJ-C	-9.34	1.38	1.48
2	B	112	V4F	CAE-C	-8.72	1.39	1.48
2	A	109	V4F	CAE-C	-8.63	1.39	1.48
2	B	117	V4F	CAE-C	-8.62	1.39	1.48
2	B	119	V4F	CAE-C	-8.25	1.40	1.48
2	A	103	V53	CAJ-C	-8.07	1.40	1.48
2	A	110	V53	CAJ-C	-7.62	1.40	1.50
2	A	104	V4F	CAE-C	-7.47	1.40	1.48
2	B	118	V53	CAJ-C	-7.30	1.40	1.48
2	B	112	V4F	P-O3	-6.85	1.39	1.54
2	A	103	V53	P-C01	-6.00	1.65	1.80
2	B	120	V53	P-C01	5.44	1.94	1.80
2	A	102	V4F	P-C01	-4.74	1.68	1.80
2	A	110	V53	P-O3	-4.40	1.44	1.54
2	B	112	V4F	P-C01	-4.39	1.69	1.80
2	B	115	V53	P-O2	-4.17	1.45	1.54
2	B	114	V4F	P-O3	-4.13	1.45	1.54
2	B	117	V4F	P-O2	-4.11	1.45	1.54
2	B	113	V53	CAM-NAH	-3.98	1.29	1.37
2	A	105	V53	P-O2	-3.94	1.45	1.54
2	A	108	V53	P-C01	3.84	1.90	1.80
2	A	107	V4F	P-O3	-3.84	1.46	1.54
2	A	104	V4F	P-O2	-3.79	1.46	1.54
2	B	112	V4F	CAM-NAH	-3.72	1.29	1.37
2	A	110	V53	O01-C01	3.60	1.50	1.43
2	A	108	V53	P-O2	-3.56	1.46	1.54
2	B	112	V4F	CAE-NAH	-3.53	1.29	1.33
2	A	103	V53	P-O3	-3.52	1.46	1.54
2	B	120	V53	CAJ-C	-3.45	1.46	1.50
2	A	102	V4F	P-O3	-3.42	1.47	1.54

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	117	V4F	CA-CAJ	-3.36	1.39	1.51
2	A	108	V53	P-O3	-3.32	1.47	1.54
2	A	107	V4F	CA-CAJ	-3.32	1.39	1.51
2	B	115	V53	CAM-NAH	-3.27	1.30	1.37
2	B	119	V4F	CA-CAJ	-3.24	1.39	1.51
2	A	104	V4F	CA-CAJ	-3.20	1.39	1.51
2	A	108	V53	O01-CAF	3.17	1.46	1.36
2	A	106	V5F	O1-C6	-3.16	1.41	1.47
2	A	103	V53	CA-CAM	-3.12	1.37	1.42
2	B	119	V4F	P-C01	-3.07	1.72	1.80
2	B	114	V4F	CA-CAJ	-3.06	1.40	1.51
2	A	109	V4F	P-O2	-3.05	1.47	1.54
2	B	120	V53	P-O2	-3.04	1.48	1.54
2	A	105	V53	P-O3	-3.03	1.48	1.54
2	B	118	V53	P-O2	-3.02	1.48	1.54
2	B	112	V4F	P-O2	-2.99	1.48	1.54
2	A	109	V4F	P-O3	-2.99	1.48	1.54
2	B	113	V53	P-O2	-2.97	1.48	1.54
2	B	115	V53	O01-C01	2.91	1.48	1.43
2	A	110	V53	P-O2	-2.90	1.48	1.54
2	A	107	V4F	P-O2	-2.88	1.48	1.54
2	A	104	V4F	O01-C01	2.86	1.48	1.43
2	B	114	V4F	P-O2	-2.85	1.48	1.54
2	B	120	V53	P-O3	-2.84	1.48	1.54
2	B	114	V4F	O01-CAF	2.83	1.45	1.36
2	A	110	V53	O-C	2.72	1.30	1.22
2	B	117	V4F	CAJ-CAM	-2.68	1.37	1.43
2	B	113	V53	P-C01	2.67	1.87	1.80
2	A	102	V4F	P-O2	-2.66	1.48	1.54
2	B	119	V4F	CAE-NAH	2.63	1.35	1.33
2	A	110	V53	CAG-CAI	2.60	1.42	1.36
2	B	114	V4F	CAM-NAH	-2.58	1.32	1.37
2	B	113	V53	O01-CAF	2.57	1.44	1.36
2	B	113	V53	P-O3	-2.56	1.49	1.54
2	A	102	V4F	CA-CAJ	-2.53	1.42	1.51
2	B	118	V53	P-O3	-2.52	1.49	1.54
2	A	108	V53	CAM-NAH	-2.47	1.32	1.37
2	A	103	V53	CAM-NAH	-2.45	1.32	1.37
2	B	115	V53	P-O3	-2.42	1.49	1.54
2	B	115	V53	CA-N	-2.42	1.30	1.38
2	A	103	V53	P-O2	-2.38	1.49	1.54
2	B	119	V4F	P-O3	-2.37	1.49	1.54

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	103	V53	CAJ-NAH	-2.35	1.30	1.33
2	A	102	V4F	CAJ-CAM	-2.34	1.38	1.43
2	B	115	V53	CAG-CAI	2.32	1.42	1.36
2	A	107	V4F	CAE-NAH	2.28	1.35	1.33
2	B	117	V4F	P-C01	-2.25	1.74	1.80
2	B	117	V4F	CAM-NAH	-2.25	1.32	1.37
2	A	104	V4F	P-O3	-2.24	1.49	1.54
2	B	117	V4F	CAF-CAL	-2.18	1.36	1.42
2	B	120	V53	CAD-CAF	2.16	1.44	1.37
2	B	115	V53	CA-CAM	-2.10	1.38	1.42
2	B	112	V4F	O01-CAF	2.10	1.43	1.36
2	B	116	V5F	CA-N	-2.08	1.31	1.37
2	A	109	V4F	CA-CAJ	-2.06	1.43	1.51
2	B	117	V4F	P-O3	-2.06	1.50	1.54
2	A	107	V4F	CAM-NAH	-2.05	1.33	1.37
2	A	107	V4F	CAI-CAL	-2.05	1.38	1.42
2	A	103	V53	CAF-CAL	-2.05	1.37	1.42
2	B	118	V53	P-O1	-2.00	1.46	1.50

All (185) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	112	V4F	O-C-CAE	-10.86	113.93	124.22
2	B	116	V5F	O1-C6-CB	10.09	124.77	106.59
2	B	120	V53	O1-P-C01	-9.84	78.04	112.92
2	B	119	V4F	C-CAE-NAH	9.54	124.01	114.66
2	A	107	V4F	O-C-CAE	-9.05	115.64	124.22
2	B	113	V53	O-C-CAJ	-7.98	116.66	124.22
2	B	114	V4F	O-C-CAE	-7.97	116.67	124.22
2	B	114	V4F	CA-CAJ-CAM	7.83	131.34	118.84
2	B	118	V53	C-CAJ-NAH	7.71	122.21	114.66
2	B	114	V4F	O3-P-C01	-7.23	84.51	106.68
2	A	109	V4F	CAE-NAH-CAM	7.20	123.57	118.11
2	B	115	V53	C01-O01-CAF	-7.06	108.67	118.19
2	B	114	V4F	CA-CAJ-CAK	-6.97	106.35	120.11
2	B	115	V53	O2-P-C01	-6.97	85.31	106.68
2	B	112	V4F	CAJ-CAM-NAH	-6.87	110.98	118.52
2	B	118	V53	CAJ-NAH-CAM	6.75	123.23	118.11
2	B	112	V4F	CAJ-CAM-CAL	6.53	126.45	119.79
2	A	110	V53	O1-P-C01	-6.48	89.95	112.92
2	B	119	V4F	O1-P-C01	-6.34	90.42	112.92
2	B	116	V5F	C1-CA-N	-6.28	114.08	119.46

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	112	V4F	O3-P-C01	-6.19	87.68	106.68
2	B	119	V4F	CAE-NAH-CAM	5.91	122.59	118.11
2	A	109	V4F	C-CAE-NAH	5.84	120.38	114.66
2	A	108	V53	O-C-CAJ	-5.80	118.73	124.22
2	A	105	V53	O1-P-C01	-5.78	92.41	112.92
2	B	113	V53	CAD-CAJ-C	-5.76	116.25	121.23
2	A	104	V4F	O-C-CAE	-5.70	118.82	124.22
2	A	103	V53	C01-O01-CAF	-5.62	110.61	118.19
2	B	115	V53	C-CAJ-NAH	5.59	120.14	114.66
2	B	117	V4F	O2-P-C01	-5.58	89.55	106.68
2	A	109	V4F	C01-O01-CAF	-5.55	110.70	118.19
2	A	102	V4F	O1-P-C01	-5.55	93.24	112.92
2	B	119	V4F	CAD-CAE-C	-5.53	116.45	121.23
2	A	103	V53	O1-P-C01	-5.50	93.43	112.92
2	B	120	V53	CA-CAM-NAH	5.44	124.02	118.64
2	A	104	V4F	CAE-NAH-CAM	5.40	122.21	118.11
2	A	110	V53	CA-CAM-NAH	5.35	123.93	118.64
2	A	102	V4F	C01-O01-CAF	5.30	125.34	118.19
2	B	113	V53	O1-P-C01	-5.26	94.28	112.92
2	B	118	V53	O1-P-C01	-5.24	94.34	112.92
2	A	102	V4F	O-C-CAE	-5.20	119.30	124.22
2	B	113	V53	CA-CAM-NAH	-5.19	113.51	118.64
2	A	109	V4F	CA-CAJ-CAM	5.07	126.93	118.84
2	B	112	V4F	CAD-CAF-CAL	-4.93	108.90	120.01
2	B	118	V53	CAD-CAJ-C	-4.89	117.00	121.23
2	B	119	V4F	O01-CAF-CAL	4.88	128.65	115.01
2	B	117	V4F	O-C-CAE	-4.84	119.64	124.22
2	A	106	V5F	C1-O1-C6	-4.81	109.24	118.05
2	A	109	V4F	CAJ-CAM-NAH	4.80	123.79	118.52
2	B	120	V53	OXT-C-O	-4.74	112.82	123.35
2	B	115	V53	CAD-CAJ-C	-4.72	117.14	121.23
2	B	114	V4F	O01-CAF-CAL	4.65	128.00	115.01
2	A	109	V4F	CAD-CAE-C	-4.64	117.21	121.23
2	A	108	V53	CAD-CAJ-C	-4.64	117.22	121.23
2	A	102	V4F	C-CAE-NAH	4.56	119.13	114.66
2	B	116	V5F	C5-CA-C1	4.50	122.14	118.25
2	A	104	V4F	CA-CAJ-CAM	4.47	125.98	118.84
2	B	114	V4F	CAE-NAH-CAM	4.40	121.44	118.11
2	B	113	V53	C-CAJ-NAH	4.37	118.94	114.66
2	A	109	V4F	O-C-CAE	-4.31	120.14	124.22
2	B	120	V53	CAD-CAJ-NAH	-4.25	114.14	124.50
2	B	115	V53	CAJ-NAH-CAM	4.21	121.30	118.11

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	120	V53	OXT-C-CAJ	4.16	124.17	114.69
2	B	115	V53	O-C-CAJ	-4.16	120.28	124.22
2	B	119	V4F	O01-CAF-CAD	-4.11	111.26	124.69
2	B	117	V4F	CAE-NAH-CAM	4.03	121.17	118.11
2	A	103	V53	O-C-CAJ	-3.99	120.44	124.22
2	A	103	V53	CAG-CAI-CAL	-3.96	115.40	120.89
2	B	119	V4F	CAG-CAI-CAL	3.92	126.33	120.89
2	A	103	V53	CA-CAM-NAH	-3.91	114.78	118.64
2	A	105	V53	CAJ-NAH-CAM	3.90	121.06	118.11
2	A	106	V5F	C1-CA-N	-3.84	116.17	119.46
2	B	116	V5F	C1-O1-C6	3.69	124.82	118.05
2	B	112	V4F	O01-CAF-CAL	3.69	125.31	115.01
2	B	120	V53	O3-P-O2	3.67	118.79	108.08
2	A	105	V53	O-C-CAJ	-3.66	120.75	124.22
2	A	107	V4F	CA-CAJ-CAM	3.59	124.58	118.84
2	A	109	V4F	CA-CAJ-CAK	-3.55	113.12	120.11
2	B	118	V53	C01-O01-CAF	-3.46	113.52	118.19
2	B	117	V4F	CAD-CAE-C	3.45	124.21	121.23
2	B	113	V53	O2-P-C01	3.43	117.20	106.68
2	A	108	V53	O01-CAF-CAL	3.43	124.59	115.01
2	A	103	V53	CAK-CA-N	3.37	127.10	120.36
2	B	114	V4F	CAG-CAI-CAL	3.31	125.49	120.89
2	B	120	V53	CAJ-NAH-CAM	3.31	124.22	117.24
2	B	113	V53	CAD-CAF-CAL	-3.30	112.56	120.01
2	A	102	V4F	O2-P-O3	3.30	117.72	108.08
2	A	102	V4F	O01-CAF-CAL	3.29	124.20	115.01
2	A	108	V53	CAJ-NAH-CAM	3.28	120.59	118.11
2	A	106	V5F	C5-CA-N	3.27	126.46	120.13
2	A	104	V4F	CA-CAJ-CAK	-3.27	113.67	120.11
2	B	117	V4F	CA-CAJ-CAM	3.21	123.97	118.84
2	A	107	V4F	CAE-NAH-CAM	3.20	120.54	118.11
2	A	107	V4F	O3-P-C01	-3.17	96.94	106.68
2	A	107	V4F	O2-P-O3	3.14	117.25	108.08
2	A	105	V53	C-CAJ-NAH	3.14	117.74	114.66
2	A	110	V53	O3-P-O2	3.13	117.23	108.08
2	A	103	V53	CAJ-NAH-CAM	3.09	120.45	118.11
2	B	120	V53	CAM-CA-N	-3.06	112.23	118.07
2	A	107	V4F	CAJ-CAM-CAL	3.05	122.90	119.79
2	A	105	V53	O2-P-C01	3.04	116.02	106.68
2	B	114	V4F	CAJ-CAM-CAL	3.01	122.86	119.79
2	A	106	V5F	O1-C6-CB	3.00	112.00	106.59
2	B	112	V4F	CA-CAJ-CAM	2.97	123.59	118.84

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	103	V53	O3-P-O2	2.96	116.73	108.08
2	B	119	V4F	O2-P-O3	2.95	116.71	108.08
2	A	108	V53	CA-CAM-NAH	-2.95	115.73	118.64
2	B	112	V4F	C-CAE-NAH	2.93	117.53	114.66
2	A	109	V4F	CAL-CAM-NAH	-2.93	116.74	122.78
2	B	115	V53	CA-CAM-NAH	2.91	121.52	118.64
2	A	108	V53	O3-P-C01	-2.87	97.86	106.68
2	B	119	V4F	CAK-CAJ-CAM	2.82	122.61	119.08
2	B	120	V53	CAI-CAG-CAK	-2.82	116.50	120.99
2	A	106	V5F	CB-C6-C	-2.81	102.75	113.19
2	B	120	V53	C01-O01-CAF	-2.81	114.40	118.19
2	A	110	V53	CAL-CAM-NAH	-2.79	117.03	122.78
2	B	114	V4F	O2-P-O3	2.75	116.12	108.08
2	A	105	V53	O3-P-O2	2.73	116.06	108.08
2	B	117	V4F	O2-P-O1	2.72	119.58	112.39
2	B	114	V4F	CAI-CAL-CAM	-2.72	113.34	118.98
2	A	102	V4F	CAI-CAG-CAK	-2.72	116.66	120.99
2	A	110	V53	OXT-C-O	-2.71	117.34	123.35
2	B	112	V4F	C01-O01-CAF	-2.68	114.57	118.19
2	A	110	V53	CAJ-NAH-CAM	2.66	122.86	117.24
2	B	114	V4F	O1-P-C01	2.65	122.30	112.92
2	B	119	V4F	O-C-CAE	-2.64	121.72	124.22
2	B	112	V4F	CAI-CAL-CAM	-2.62	113.55	118.98
2	A	104	V4F	O1-P-C01	-2.61	103.66	112.92
2	B	118	V53	CA-CAM-NAH	2.60	121.21	118.64
2	A	102	V4F	CAJ-CAM-NAH	-2.60	115.67	118.52
2	B	115	V53	O3-P-C01	2.58	114.61	106.68
2	A	104	V4F	CAL-CAM-NAH	-2.58	117.46	122.78
2	B	117	V4F	CAG-CAI-CAL	-2.57	117.33	120.89
2	B	120	V53	O3-P-O1	2.55	119.12	112.39
2	A	104	V4F	C-CAE-NAH	2.54	117.16	114.66
2	B	114	V4F	CAD-CAF-CAL	-2.54	114.28	120.01
2	A	110	V53	O3-P-O1	2.53	119.08	112.39
2	B	120	V53	C-CAJ-NAH	2.53	120.31	116.28
2	A	105	V53	O3-P-C01	-2.50	99.02	106.68
2	A	109	V4F	O2-P-C01	-2.50	99.02	106.68
2	B	120	V53	CAD-CAJ-C	2.49	124.95	119.57
2	B	119	V4F	CAI-CAL-CAF	2.49	128.30	122.58
2	A	107	V4F	CAL-CAM-NAH	-2.48	117.67	122.78
2	B	119	V4F	CA-CAJ-CAK	-2.47	115.24	120.11
2	B	112	V4F	CAK-CAJ-CAM	-2.46	115.99	119.08

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	108	V53	CAI-CAG-CAK	2.46	124.92	120.99
2	B	112	V4F	O2-P-O3	2.46	115.27	108.08
2	B	118	V53	CAL-CAM-NAH	-2.44	117.74	122.78
2	B	113	V53	O3-P-C01	-2.44	99.20	106.68
2	A	102	V4F	CAE-NAH-CAM	2.43	119.95	118.11
2	A	105	V53	CAD-CAJ-C	-2.43	119.13	121.23
2	B	117	V4F	CAI-CAL-CAF	-2.40	117.05	122.58
2	A	105	V53	CAG-CAI-CAL	-2.38	117.59	120.89
2	B	117	V4F	O2-P-O3	2.37	115.01	108.08
2	B	116	V5F	C4-C5-CA	-2.37	117.72	121.04
2	A	102	V4F	O3-P-C01	-2.35	99.47	106.68
2	A	104	V4F	CAF-CAL-CAM	2.35	122.61	117.19
2	A	108	V53	C-CAJ-NAH	2.31	116.93	114.66
2	A	102	V4F	O3-P-O1	2.30	118.48	112.39
2	B	120	V53	CAK-CA-CAM	2.27	123.62	120.06
2	A	108	V53	CAL-CAM-NAH	-2.26	118.12	122.78
2	A	106	V5F	C2-C1-CA	2.25	122.62	120.88
2	B	119	V4F	O2-P-O1	2.24	118.31	112.39
2	A	103	V53	C-CAJ-NAH	2.21	116.83	114.66
2	A	110	V53	C-CAJ-NAH	2.21	119.81	116.28
2	A	108	V53	CAF-CAL-CAM	2.20	122.28	117.19
2	A	108	V53	CAG-CAK-CA	-2.18	116.99	121.19
2	A	108	V53	C01-O01-CAF	2.17	121.11	118.19
2	B	113	V53	CAG-CAI-CAL	-2.16	117.89	120.89
2	B	119	V4F	CAI-CAG-CAK	-2.15	117.56	120.99
2	A	105	V53	CAK-CA-CAM	-2.15	116.69	120.06
2	A	102	V4F	CA-CAJ-CAM	2.14	122.25	118.84
2	B	114	V4F	O01-CAF-CAD	-2.14	117.71	124.69
2	B	115	V53	O3-P-O2	2.12	114.28	108.08
2	A	108	V53	O3-P-O2	2.12	114.27	108.08
2	B	115	V53	CAK-CA-CAM	2.11	123.38	120.06
2	A	108	V53	CAM-CA-N	2.07	122.03	118.07
2	B	119	V4F	CA-CAJ-CAM	2.07	122.14	118.84
2	B	114	V4F	CAI-CAG-CAK	-2.06	117.70	120.99
2	B	115	V53	O2-P-O1	2.04	117.77	112.39
2	B	117	V4F	O01-CAF-CAL	-2.04	109.32	115.01
2	A	107	V4F	C01-O01-CAF	-2.03	115.45	118.19
2	A	108	V53	CAD-CAF-CAL	-2.02	115.46	120.01
2	B	112	V4F	CAG-CAI-CAL	2.01	123.69	120.89

There are no chirality outliers.

All (51) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	102	V4F	N-CA-CAJ-CAM
2	A	102	V4F	O01-C01-P-O1
2	B	112	V4F	O-C-CAE-CAD
2	B	112	V4F	O-C-CAE-NAH
2	B	112	V4F	CAL-CAF-O01-C01
2	B	112	V4F	N-CA-CAJ-CAM
2	B	112	V4F	O01-C01-P-O3
2	B	112	V4F	O01-C01-P-O2
2	B	112	V4F	O01-C01-P-O1
2	A	103	V53	O01-C01-P-O1
2	B	113	V53	O-C-CAJ-CAD
2	A	104	V4F	N-CA-CAJ-CAM
2	B	114	V4F	O-C-CAE-CAD
2	B	114	V4F	O-C-CAE-NAH
2	B	114	V4F	N-CA-CAJ-CAM
2	A	105	V53	O-C-CAJ-CAD
2	B	115	V53	O-C-CAJ-CAD
2	B	115	V53	O-C-CAJ-NAH
2	B	117	V4F	O-C-CAE-CAD
2	B	117	V4F	N-CA-CAJ-CAM
2	B	117	V4F	O01-C01-P-O3
2	B	117	V4F	O01-C01-P-O2
2	B	118	V53	O01-C01-P-O1
2	B	118	V53	O01-C01-P-O2
2	B	118	V53	O01-C01-P-O3
2	A	109	V4F	N-CA-CAJ-CAM
2	A	109	V4F	O01-C01-P-O3
2	A	109	V4F	O01-C01-P-O2
2	B	119	V4F	N-CA-CAJ-CAM
2	B	120	V53	O01-C01-P-O1
2	B	120	V53	O01-C01-P-O2
2	A	102	V4F	CAD-CAF-O01-C01
2	B	112	V4F	CAD-CAF-O01-C01
2	B	114	V4F	CAD-CAF-O01-C01
2	B	119	V4F	CAD-CAF-O01-C01
2	A	102	V4F	CAL-CAF-O01-C01
2	B	114	V4F	CAL-CAF-O01-C01
2	B	119	V4F	CAL-CAF-O01-C01
2	B	120	V53	O-C-CAJ-NAH
2	A	107	V4F	N-CA-CAJ-CAM
2	B	114	V4F	O01-C01-P-O1
2	B	115	V53	O01-C01-P-O1
2	B	117	V4F	O01-C01-P-O1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	A	109	V4F	O01-C01-P-O1
2	B	116	V5F	CB-C6-O1-C1
2	A	102	V4F	O01-C01-P-O3
2	A	103	V53	O01-C01-P-O3
2	B	115	V53	O01-C01-P-O2
2	A	107	V4F	N-CA-CAJ-CAK
2	A	106	V5F	CB-C6-O1-C1
2	B	117	V4F	O-C-CAE-NAH

There are no ring outliers.

9 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	102	V4F	3	0
2	A	108	V53	0	1
2	B	115	V53	1	0
2	B	117	V4F	1	0
2	A	103	V53	1	0
2	B	119	V4F	2	0
2	B	116	V5F	1	0
2	B	112	V4F	2	1
2	B	114	V4F	3	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	AA	63/66 (95%)	0.56	7 (11%)	5	3	109, 147, 171, 187	0
2	A	0/10	-	-			-	-
2	B	0/10	-	-			-	-
All	All	63/86 (73%)	0.56	7 (11%)	5	3	109, 147, 171, 187	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	AA	5	LYS	4.1
1	AA	42	ARG	3.8
1	AA	44	ALA	3.1
1	AA	30	VAL	2.9
1	AA	3	LYS	2.9
1	AA	14	GLU	2.4
1	AA	45	VAL	2.3

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
2	V4F	B	112	20/21	0.68	0.35	103,124,156,159	0
2	V53	B	120	20/20	0.70	0.26	100,107,149,153	0
2	V53	B	118	19/20	0.72	0.25	99,113,165,168	0
2	V4F	A	104	20/21	0.74	0.27	87,103,133,134	0
2	V4F	A	102	20/21	0.81	0.22	93,105,135,139	0
2	V4F	B	114	20/21	0.82	0.34	92,115,163,171	0
2	V4F	A	109	20/21	0.82	0.42	93,104,142,152	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	V53	A	110	20/20	0.82	0.22	80,89,137,144	0
2	V5F	B	116	12/13	0.82	0.44	89,102,107,109	0
2	V53	B	113	19/20	0.87	0.37	86,95,140,150	0
2	V4F	B	119	20/21	0.88	0.14	91,108,114,126	0
2	V53	A	103	19/20	0.91	0.25	71,76,108,113	0
2	V4F	A	107	20/21	0.91	0.17	79,91,116,123	0
2	V4F	B	117	20/21	0.91	0.20	98,102,133,136	0
2	V53	B	115	19/20	0.91	0.26	91,100,144,147	0
2	V53	A	108	19/20	0.92	0.22	68,81,122,135	0
2	V53	A	105	19/20	0.92	0.19	67,82,132,138	0
2	V5F	A	106	12/13	0.94	0.34	64,80,91,92	0

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.