



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:55 PM UTC

PDB ID : 4Z1L / pdb_00004z1l
Title : Yeast 20S proteasome in complex with belactosin C derivative 3
Authors : Huber, E.M.; Groll, M.
Deposited on : 2015-03-27
Resolution : 3.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

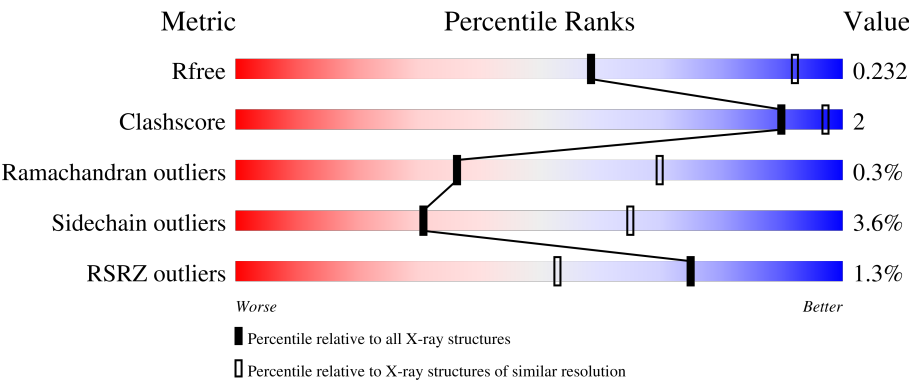
MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance i

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

The reported resolution of this entry is 3.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R _{free}	180053	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	250	0% 97% 2% 1% 0%
1	O	250	2% 97% 2% 1% 0%
2	B	258	2% 86% 8% 5% 0%
2	P	258	2% 86% 7% 5% 0%
3	C	254	2% 85% 7% 6% 0%

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Mol	Chain	Length	Quality of chain
3	Q	254	
4	D	260	
4	R	260	
5	E	234	
5	S	234	
6	F	288	
6	T	288	
7	G	252	
7	U	252	
8	H	232	
8	V	232	
9	I	205	
9	W	205	
10	J	198	
10	X	198	
11	K	212	
11	Y	212	
12	L	222	
12	Z	222	
13	M	246	
13	a	246	
14	N	196	
14	b	196	

2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 49749 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 Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	250	Total	C	N	O	S	0	0	0
			1915	1219	315	377	4			
1	O	250	Total	C	N	O	S	0	0	0
			1915	1219	315	377	4			

- Molecule 2 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	244	Total	C	N	O	S	0	0	0
			1904	1201	321	379	3			
2	P	244	Total	C	N	O	S	0	0	0
			1904	1201	321	379	3			

- Molecule 3 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	240	Total	C	N	O	S	0	0	0
			1881	1176	329	372	4			
3	Q	240	Total	C	N	O	S	0	0	0
			1881	1176	329	372	4			

- Molecule 4 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	235	Total	C	N	O	S	0	0	0
			1813	1136	304	366	7			
4	R	235	Total	C	N	O	S	0	0	0
			1813	1136	304	366	7			

- Molecule 5 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	231	Total	C	N	O	S	0	0	0
			1773	1114	307	348	4			
5	S	231	Total	C	N	O	S	0	0	0
			1773	1114	307	348	4			

- Molecule 6 is a protein called Probable proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	F	243	Total	C	N	O	S	0	0	0
			1892	1203	329	356	4			
6	T	243	Total	C	N	O	S	0	0	0
			1892	1203	329	356	4			

- Molecule 7 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	G	241	Total	C	N	O	S	0	0	0
			1907	1214	320	365	8			
7	U	241	Total	C	N	O	S	0	0	0
			1907	1214	320	365	8			

- Molecule 8 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	H	226	Total	C	N	O	S	0	0	0
			1719	1082	298	332	7			
8	V	226	Total	C	N	O	S	0	0	0
			1719	1082	298	332	7			

- Molecule 9 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
9	I	204	Total	C	N	O	S	0	0	0
			1581	1010	258	305	8			
9	W	204	Total	C	N	O	S	0	0	0
			1581	1010	258	305	8			

- Molecule 10 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
10	J	195	Total	C	N	O	S	0	0	0
			1561	992	264	299	6			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
10	X	195	Total	C	N	O	S	0	0	0
			1561	992	264	299	6			

- Molecule 11 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
11	K	212	Total	C	N	O	S	0	0	0
			1644	1045	280	312	7			
11	Y	212	Total	C	N	O	S	0	0	0
			1644	1045	280	312	7			

- Molecule 12 is a protein called Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
12	L	222	Total	C	N	O	S	0	0	0
			1757	1115	303	335	4			
12	Z	222	Total	C	N	O	S	0	0	0
			1757	1115	303	335	4			

- Molecule 13 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
13	M	229	Total	C	N	O	S	0	0	0
			1790	1133	306	344	7			
13	a	232	Total	C	N	O	S	0	0	0
			1815	1148	311	349	7			

- Molecule 14 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
14	N	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			
14	b	196	Total	C	N	O	S	0	0	0
			1512	955	250	300	7			

- Molecule 15 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	G	1	Total	Mg	0	0
			1	1		
15	I	2	Total	Mg	0	0
			2	2		

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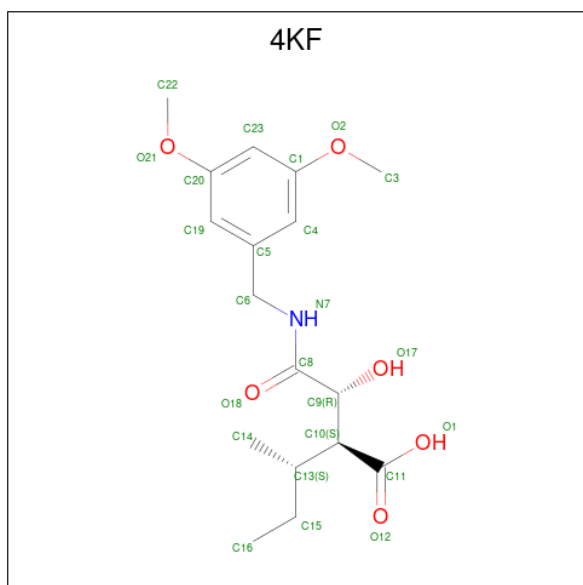
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
15	K	1	Total	Mg	0	0
			1	1		
15	L	1	Total	Mg	0	0
			1	1		
15	N	1	Total	Mg	0	0
			1	1		
15	W	1	Total	Mg	0	0
			1	1		
15	Z	1	Total	Mg	0	0
			1	1		

- Molecule 16 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
16	G	1	Total	Cl	0	0
			1	1		
16	N	1	Total	Cl	0	0
			1	1		
16	U	1	Total	Cl	0	0
			1	1		
16	b	1	Total	Cl	0	0
			1	1		

- Molecule 17 is (2S,3S)-2-[(1R)-2-[(3,5-dimethoxybenzyl)amino]-1-hydroxy-2-oxoethyl]-3-methylpentanoic acid (CCD ID: 4KF) (formula: C₁₇H₂₅NO₆).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
17	H	1	Total 23	C 17	N 1	O 5	0	0
17	K	1	Total 23	C 17	N 1	O 5	0	0
17	N	1	Total 23	C 17	N 1	O 5	0	0
17	V	1	Total 23	C 17	N 1	O 5	0	0
17	Y	1	Total 23	C 17	N 1	O 5	0	0
17	b	1	Total 23	C 17	N 1	O 5	0	0

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	A	5	Total 5	O 5	0	0
18	B	12	Total 12	O 12	0	0
18	C	8	Total 8	O 8	0	0
18	D	10	Total 10	O 10	0	0
18	E	6	Total 6	O 6	0	0
18	F	11	Total 11	O 11	0	0
18	G	9	Total 9	O 9	0	0
18	H	8	Total 8	O 8	0	0
18	I	7	Total 7	O 7	0	0
18	J	9	Total 9	O 9	0	0
18	K	13	Total 13	O 13	0	0
18	L	21	Total 21	O 21	0	0
18	M	15	Total 15	O 15	0	0
18	N	8	Total 8	O 8	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
18	P	15	Total 15	O 15	0	0
18	Q	16	Total 16	O 16	0	0
18	R	3	Total 3	O 3	0	0
18	S	4	Total 4	O 4	0	0
18	T	8	Total 8	O 8	0	0
18	U	13	Total 13	O 13	0	0
18	V	7	Total 7	O 7	0	0
18	W	9	Total 9	O 9	0	0
18	X	10	Total 10	O 10	0	0
18	Y	14	Total 14	O 14	0	0
18	Z	14	Total 14	O 14	0	0
18	a	8	Total 8	O 8	0	0
18	b	13	Total 13	O 13	0	0

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.

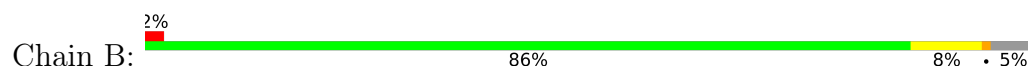
- Molecule 1: Proteasome subunit alpha type-2



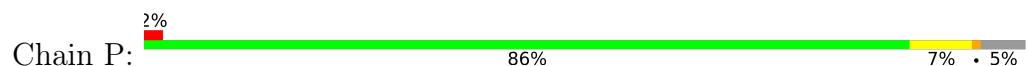
- Molecule 1: Proteasome subunit alpha type-2



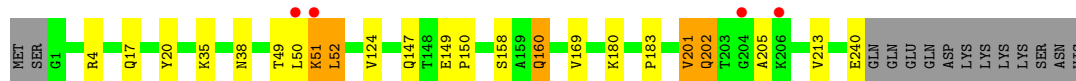
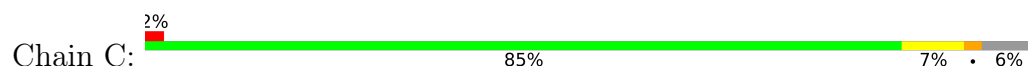
- Molecule 2: Proteasome subunit alpha type-3



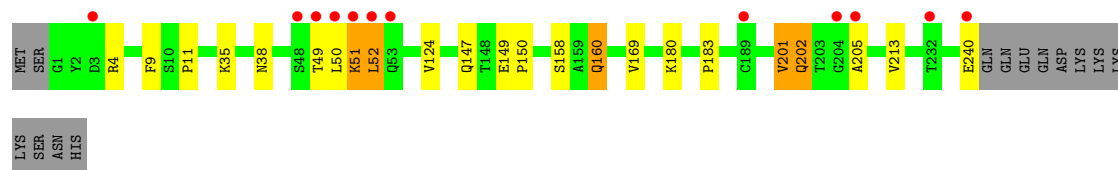
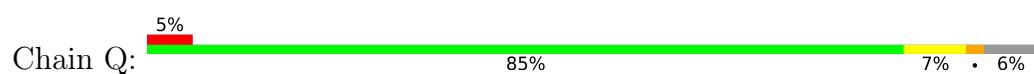
- Molecule 2: Proteasome subunit alpha type-3



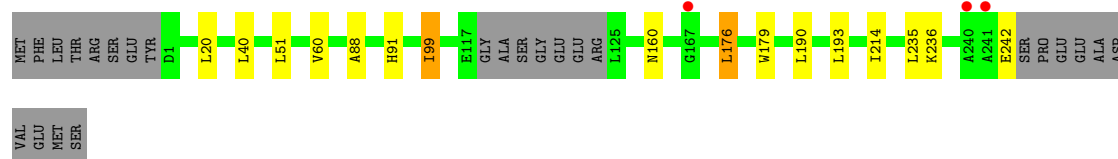
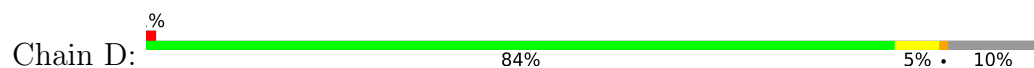
- Molecule 3: Proteasome subunit alpha type-4



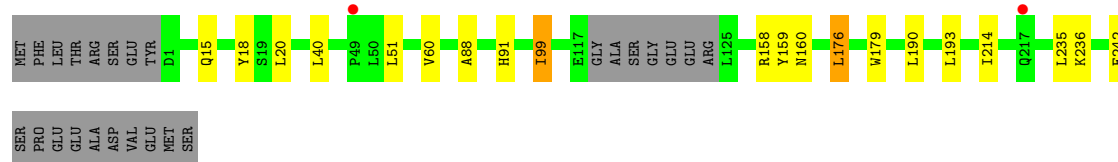
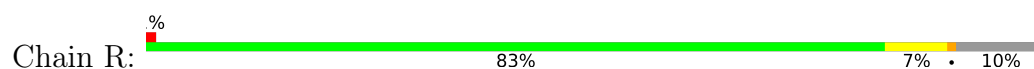
- Molecule 3: Proteasome subunit alpha type-4



- Molecule 4: Proteasome subunit alpha type-5



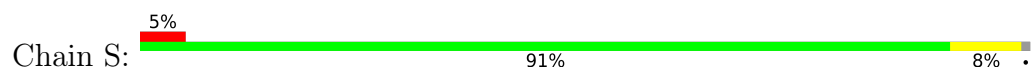
- Molecule 4: Proteasome subunit alpha type-5



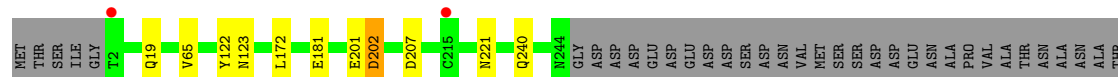
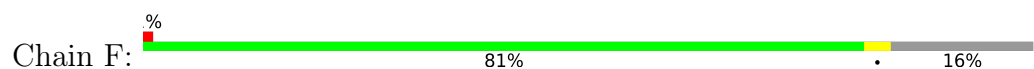
- Molecule 5: Proteasome subunit alpha type-6



- Molecule 5: Proteasome subunit alpha type-6



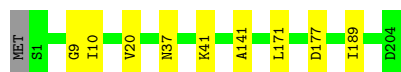
- Molecule 6: Probable proteasome subunit alpha type-7





- Molecule 9: Proteasome subunit beta type-3

Chain W: 95%



- Molecule 10: Proteasome subunit beta type-4

Chain J: 94%



- Molecule 10: Proteasome subunit beta type-4

Chain X: 94%



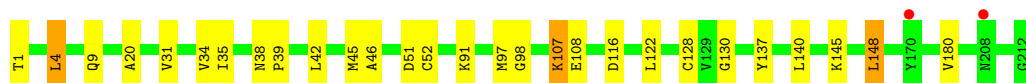
- Molecule 11: Proteasome subunit beta type-5

Chain K: 89%



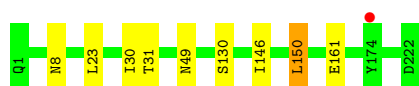
- Molecule 11: Proteasome subunit beta type-5

Chain Y: 87%

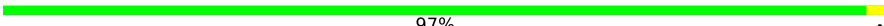


- Molecule 12: Proteasome subunit beta type-6

Chain L: 96%



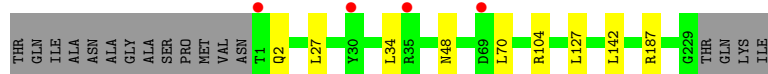
- Molecule 12: Proteasome subunit beta type-6

Chain Z:  97% .



- Molecule 13: Proteasome subunit beta type-7

Chain M:  89% . 7%



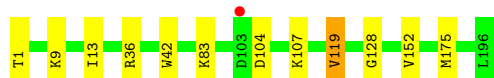
- Molecule 13: Proteasome subunit beta type-7

Chain a:  90% . 6%



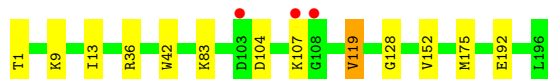
- Molecule 14: Proteasome subunit beta type-1

Chain N:  94% . 6%



- Molecule 14: Proteasome subunit beta type-1

Chain b:  93% . 6%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	136.09Å 301.30Å 144.58Å 90.00° 113.33° 90.00°	Depositor
Resolution (Å)	15.00 – 3.00 15.00 – 3.00	Depositor EDS
% Data completeness (in resolution range)	97.7 (15.00-3.00) 97.3 (15.00-3.00)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.38 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.204 , 0.229 0.208 , 0.232	Depositor DCC
R_{free} test set	10364 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	54.8	Xtriage
Anisotropy	0.186	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 50.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	49749	wwPDB-VP
Average B, all atoms (Å ²)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.37% 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: CL, MG, 4KF

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	0.39	0/1952	0.69	0/2642
1	O	0.40	0/1952	0.69	0/2642
2	B	0.40	0/1934	0.68	0/2618
2	P	0.40	0/1934	0.68	0/2618
3	C	0.39	0/1910	0.70	1/2586 (0.0%)
3	Q	0.39	0/1910	0.70	1/2586 (0.0%)
4	D	0.38	0/1837	0.68	0/2475
4	R	0.39	0/1837	0.68	0/2475
5	E	0.40	0/1800	0.66	0/2433
5	S	0.39	0/1800	0.66	0/2433
6	F	0.39	0/1932	0.69	0/2609
6	T	0.39	0/1932	0.69	0/2609
7	G	0.38	0/1945	0.68	0/2634
7	U	0.38	0/1945	0.69	0/2634
8	H	0.52	1/1750 (0.1%)	0.70	1/2373 (0.0%)
8	V	0.52	0/1750	0.69	0/2373
9	I	0.39	0/1611	0.67	0/2174
9	W	0.38	0/1611	0.67	0/2174
10	J	0.39	0/1589	0.66	0/2142
10	X	0.40	0/1589	0.66	0/2142
11	K	0.56	0/1681	0.70	0/2274
11	Y	0.48	0/1681	0.70	0/2274
12	L	0.38	0/1795	0.67	0/2420
12	Z	0.38	0/1795	0.67	0/2420
13	M	0.39	0/1821	0.68	0/2470
13	a	0.39	0/1846	0.68	0/2503
14	N	0.42	0/1541	0.66	0/2087
14	b	0.39	0/1541	0.66	0/2087
All	All	0.41	1/50221 (0.0%)	0.68	3/67907 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	H	3	ILE	C-O	-5.51	1.18	1.24

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	201	VAL	N-CA-C	6.32	116.47	110.53
3	Q	201	VAL	N-CA-C	6.28	116.43	110.53
8	H	80	LEU	N-CA-C	5.43	117.28	111.36

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	1915	0	1929	2	0
1	O	1915	0	1929	4	0
2	B	1904	0	1904	13	0
2	P	1904	0	1904	11	0
3	C	1881	0	1895	8	0
3	Q	1881	0	1895	9	0
4	D	1813	0	1797	6	0
4	R	1813	0	1797	10	0
5	E	1773	0	1775	6	0
5	S	1773	0	1775	7	0
6	F	1892	0	1883	4	0
6	T	1892	0	1883	4	0
7	G	1907	0	1901	5	0
7	U	1907	0	1901	6	0
8	H	1719	0	1718	14	0
8	V	1719	0	1718	7	0
9	I	1581	0	1574	7	0
9	W	1581	0	1574	4	0
10	J	1561	0	1569	4	0
10	X	1561	0	1569	4	0
11	K	1644	0	1594	20	0
11	Y	1644	0	1594	22	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
12	L	1757	0	1711	2	0
12	Z	1757	0	1711	1	0
13	M	1790	0	1793	2	0
13	a	1815	0	1821	2	0
14	N	1512	0	1480	7	0
14	b	1512	0	1480	7	0
15	G	1	0	0	0	0
15	I	2	0	0	0	0
15	K	1	0	0	0	0
15	L	1	0	0	0	0
15	N	1	0	0	0	0
15	W	1	0	0	0	0
15	Z	1	0	0	0	0
16	G	1	0	0	0	0
16	N	1	0	0	0	0
16	U	1	0	0	0	0
16	b	1	0	0	0	0
17	H	23	0	24	2	0
17	K	23	0	24	7	0
17	N	23	0	24	1	0
17	V	23	0	24	0	0
17	Y	23	0	24	5	0
17	b	23	0	24	1	0
18	A	5	0	0	0	0
18	B	12	0	0	1	0
18	C	8	0	0	0	0
18	D	10	0	0	0	0
18	E	6	0	0	0	0
18	F	11	0	0	1	0
18	G	9	0	0	0	0
18	H	8	0	0	0	0
18	I	7	0	0	0	0
18	J	9	0	0	0	0
18	K	13	0	0	0	0
18	L	21	0	0	0	0
18	M	15	0	0	0	0
18	N	8	0	0	0	0
18	P	15	0	0	1	0
18	Q	16	0	0	1	0
18	R	3	0	0	0	0
18	S	4	0	0	0	0
18	T	8	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	U	13	0	0	0	0
18	V	7	0	0	0	0
18	W	9	0	0	0	0
18	X	10	0	0	0	0
18	Y	14	0	0	0	0
18	Z	14	0	0	0	0
18	a	8	0	0	0	0
18	b	13	0	0	1	0
All	All	49749	0	49218	179	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 2.

All (179) 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)
11:Y:51:ASP:HB3	11:Y:97:MET:HE2	1.50	0.94
8:H:52:THR:O	8:H:56:THR:OG1	2.03	0.77
8:V:52:THR:O	8:V:56:THR:OG1	2.03	0.77
11:K:45:MET:HE3	17:K:301:4KF:H16	1.66	0.76
11:K:45:MET:HE3	17:K:301:4KF:C16	2.15	0.75
17:Y:301:4KF:O12	17:Y:301:4KF:H17	1.88	0.72
11:K:45:MET:CE	17:K:301:4KF:H16	2.20	0.71
11:Y:34:VAL:CG1	11:Y:42:LEU:HD22	2.26	0.64
2:P:93:HIS:HB3	18:P:301:HOH:O	1.98	0.63
11:K:28:SER:OG	11:K:31:VAL:HG23	2.03	0.59
4:R:159:TYR:CE2	5:S:56:SER:HB3	2.38	0.58
14:b:152:VAL:HA	14:b:175:MET:HE1	1.85	0.58
14:N:152:VAL:HA	14:N:175:MET:HE1	1.87	0.57
2:B:93:HIS:HB3	18:B:301:HOH:O	2.03	0.57
17:Y:301:4KF:H17	17:Y:301:4KF:C11	2.33	0.57
8:H:14:ILE:HD12	8:H:101:ALA:CB	2.35	0.56
8:H:14:ILE:HD11	8:H:99:ILE:HG22	1.87	0.55
14:b:1:THR:O	14:b:128:GLY:HA3	2.07	0.55
2:B:12:PHE:H	3:C:17:GLN:HE22	1.55	0.54
8:H:14:ILE:HD12	8:H:101:ALA:HB3	1.89	0.54
11:K:128:CYS:HB2	11:K:137:TYR:CZ	2.43	0.54
4:R:176:LEU:HD11	5:S:54:GLU:HB2	1.91	0.53
10:J:16:ALA:HB2	10:J:161:LEU:HD21	1.91	0.53
11:K:35:ILE:HD11	11:K:45:MET:CG	2.39	0.53
6:T:148:GLU:HG2	18:T:302:HOH:O	2.08	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:Y:128:CYS:HB2	11:Y:137:TYR:CZ	2.45	0.52
10:X:16:ALA:HB2	10:X:161:LEU:HD21	1.91	0.52
11:K:45:MET:HE3	17:K:301:4KF:H15	1.89	0.52
11:Y:1:THR:O	11:Y:130:GLY:HA3	2.09	0.52
7:U:23:PHE:O	7:U:26:THR:HB	2.10	0.52
7:G:23:PHE:O	7:G:26:THR:HB	2.10	0.52
11:K:45:MET:HB3	17:K:301:4KF:C16	2.40	0.52
8:H:113:ILE:HG23	8:H:119:THR:HG22	1.91	0.51
3:C:160:GLN:HE21	3:C:160:GLN:HA	1.75	0.51
3:C:201:VAL:O	3:C:202:GLN:CB	2.57	0.51
7:G:68:ARG:HH12	14:N:36:ARG:HH22	1.58	0.51
3:Q:201:VAL:O	3:Q:202:GLN:CB	2.58	0.51
14:N:1:THR:OG1	17:N:201:4KF:O17	2.26	0.51
11:Y:51:ASP:HB3	11:Y:97:MET:CE	2.32	0.50
8:H:92:GLY:HA3	8:H:116:HIS:CD2	2.47	0.50
14:N:83:LYS:HG3	14:N:119:VAL:CG2	2.42	0.50
3:Q:160:GLN:HE21	3:Q:160:GLN:HA	1.75	0.50
2:P:217:LYS:C	2:P:219:ALA:H	2.19	0.50
3:Q:51:LYS:O	3:Q:52:LEU:HB2	2.11	0.50
9:W:9:GLY:HA3	9:W:41:LYS:HE2	1.94	0.50
9:I:9:GLY:HA3	9:I:41:LYS:HE2	1.94	0.50
3:C:51:LYS:O	3:C:52:LEU:HB2	2.10	0.49
2:B:217:LYS:C	2:B:219:ALA:H	2.19	0.49
14:b:192:GLU:HB3	18:b:307:HOH:O	2.11	0.49
8:V:80:LEU:HD13	8:V:119:THR:HG21	1.94	0.49
8:H:49:ALA:HB2	17:H:301:4KF:H17	1.93	0.49
2:P:47:ALA:HB1	2:P:64:LYS:HD2	1.95	0.49
11:Y:42:LEU:HD12	11:Y:180:VAL:HG22	1.94	0.49
14:b:83:LYS:HG3	14:b:119:VAL:CG2	2.42	0.48
5:E:12:PHE:H	6:F:19:GLN:HE22	1.60	0.48
9:I:36:SER:HB2	10:J:126:VAL:HG11	1.94	0.48
17:Y:301:4KF:C11	17:Y:301:4KF:C16	2.90	0.48
4:R:158:ARG:HB3	5:S:57:SER:HB3	1.95	0.48
1:O:23:TYR:CD1	7:U:12:PRO:HA	2.49	0.48
2:B:47:ALA:HB1	2:B:64:LYS:HD2	1.96	0.48
11:Y:20:ALA:HB2	11:Y:31:VAL:HG21	1.96	0.48
5:S:87:LEU:HD21	5:S:107:ALA:HB1	1.95	0.47
3:C:35:LYS:HG2	3:C:158:SER:O	2.15	0.47
11:Y:97:MET:HE3	11:Y:97:MET:HB2	1.59	0.47
8:H:35:HIS:HB2	8:H:56:THR:HG21	1.97	0.47
11:K:128:CYS:HB2	11:K:137:TYR:CE2	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:65:VAL:HG12	18:F:301:HOH:O	2.15	0.47
11:Y:35:ILE:HD11	11:Y:45:MET:HG2	1.97	0.47
14:N:1:THR:O	14:N:128:GLY:HA3	2.14	0.46
8:V:35:HIS:HB2	8:V:56:THR:HG21	1.97	0.46
11:Y:1:THR:HG21	17:Y:301:4KF:O12	2.14	0.46
5:E:87:LEU:HD21	5:E:107:ALA:HB1	1.96	0.46
11:K:45:MET:HB3	17:K:301:4KF:H15	1.98	0.46
11:K:45:MET:HG2	11:K:52:CYS:HB3	1.97	0.46
8:H:126:SER:O	8:H:127:LEU:HD13	2.16	0.46
8:V:3:ILE:HD11	8:V:127:LEU:HB3	1.98	0.46
2:B:50:LYS:O	2:B:51:VAL:C	2.58	0.46
11:Y:1:THR:OG1	17:Y:301:4KF:O17	2.28	0.46
11:Y:52:CYS:SG	11:Y:97:MET:HG3	2.56	0.46
3:Q:52:LEU:N	18:Q:301:HOH:O	2.47	0.46
2:P:50:LYS:O	2:P:51:VAL:C	2.58	0.46
11:Y:128:CYS:HB2	11:Y:137:TYR:CE2	2.51	0.45
10:X:50:ALA:O	11:Y:91:LYS:NZ	2.48	0.45
11:Y:35:ILE:HD11	11:Y:45:MET:CG	2.47	0.45
4:D:176:LEU:HD22	5:E:55:LEU:CD2	2.47	0.45
3:Q:35:LYS:HG2	3:Q:158:SER:O	2.16	0.45
4:D:91:HIS:HB3	4:D:99:ILE:CG2	2.47	0.45
9:W:20:VAL:HG23	9:W:189:ILE:HB	1.99	0.45
3:Q:9:PHE:H	4:R:15:GLN:HE22	1.65	0.44
1:O:122:THR:HG22	2:P:128:ARG:HH21	1.83	0.44
4:D:88:ALA:HA	4:D:99:ILE:HG21	2.00	0.44
8:V:63:ILE:HG23	8:V:74:PRO:HB3	2.00	0.44
10:X:21:VAL:HG11	11:Y:122:LEU:HD11	2.00	0.44
9:I:141:ALA:HB2	9:I:177:ASP:HB2	2.00	0.44
8:H:104:ASP:HB2	8:H:105:PRO:HD2	1.99	0.44
4:R:91:HIS:HB3	4:R:99:ILE:CG2	2.48	0.44
8:V:104:ASP:HB2	8:V:105:PRO:HD2	2.00	0.44
5:S:68:HIS:HE1	5:S:102:LEU:O	2.00	0.44
5:E:68:HIS:HE1	5:E:102:LEU:O	2.01	0.43
4:R:160:ASN:HB3	4:R:179:TRP:CE2	2.53	0.43
6:F:202:ASP:N	6:F:202:ASP:OD1	2.51	0.43
11:K:1:THR:O	11:K:130:GLY:HA3	2.18	0.43
4:R:88:ALA:HA	4:R:99:ILE:HG21	2.00	0.43
9:I:10:ILE:HG21	9:I:141:ALA:HB3	2.00	0.43
11:K:107:LYS:HG3	11:K:108:GLU:HG3	2.00	0.43
2:P:151:ASN:HB2	2:P:152:PRO:HD2	2.01	0.43
8:V:84:LYS:HA	8:V:113:ILE:HD11	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:T:202:ASP:N	6:T:202:ASP:OD1	2.52	0.43
7:U:73:VAL:HG12	7:U:133:THR:HB	2.00	0.43
9:W:141:ALA:HB2	9:W:177:ASP:HB2	2.00	0.43
2:B:124:HIS:HB3	3:C:124:VAL:HG12	2.01	0.43
11:Y:107:LYS:HG3	11:Y:108:GLU:HG3	2.01	0.43
14:b:36:ARG:HG3	14:b:42:TRP:CE2	2.54	0.43
4:D:91:HIS:HB3	4:D:99:ILE:HG22	2.01	0.43
4:D:160:ASN:HB3	4:D:179:TRP:CE2	2.54	0.43
8:H:63:ILE:HG23	8:H:74:PRO:HB3	2.01	0.43
10:J:21:VAL:HG11	11:K:122:LEU:HD11	2.00	0.43
11:K:19:ARG:O	11:K:33:LYS:NZ	2.51	0.43
7:G:73:VAL:HG12	7:G:133:THR:HB	2.00	0.43
9:I:20:VAL:HG23	9:I:189:ILE:HB	1.99	0.43
2:B:50:LYS:HD3	2:B:50:LYS:HA	1.87	0.42
5:E:175:LEU:HA	5:E:178:PHE:CE2	2.54	0.42
3:Q:149:GLU:HB2	3:Q:150:PRO:HD2	2.01	0.42
12:Z:146:ILE:HG22	12:Z:150:LEU:HD22	2.01	0.42
9:W:10:ILE:HG21	9:W:141:ALA:HB3	2.01	0.42
1:A:1:MET:HG3	6:F:122:TYR:CZ	2.54	0.42
11:K:35:ILE:CD1	11:K:45:MET:CG	2.98	0.42
14:N:13:ILE:HG21	14:N:175:MET:HE2	2.01	0.42
5:S:175:LEU:HA	5:S:178:PHE:CE2	2.54	0.42
2:B:14:PRO:HA	3:C:20:TYR:CD1	2.54	0.42
4:R:91:HIS:HB3	4:R:99:ILE:HG22	2.02	0.42
2:B:151:ASN:HB2	2:B:152:PRO:CD	2.50	0.42
3:C:149:GLU:HB2	3:C:150:PRO:HD2	2.02	0.42
12:L:146:ILE:HG22	12:L:150:LEU:HD22	2.01	0.42
2:B:151:ASN:HB2	2:B:152:PRO:HD2	2.00	0.42
10:J:3:ILE:HG23	10:J:18:SER:HB3	2.01	0.42
14:N:36:ARG:HG3	14:N:42:TRP:CE2	2.54	0.42
8:H:80:LEU:HD13	8:H:111:PHE:CG	2.55	0.42
8:H:210:THR:HG21	9:I:167:SER:HB3	2.00	0.42
13:M:127:LEU:HG	13:M:142:LEU:HD12	2.02	0.42
7:U:78:ILE:N	7:U:79:PRO:CD	2.83	0.42
10:X:3:ILE:HG23	10:X:18:SER:HB3	2.01	0.42
1:A:122:THR:HG22	2:B:128:ARG:HH21	1.85	0.41
11:K:46:ALA:HB3	11:K:98:GLY:O	2.19	0.41
11:Y:38:ASN:HB2	11:Y:39:PRO:CD	2.50	0.41
11:Y:51:ASP:CB	11:Y:97:MET:HE2	2.36	0.41
11:K:1:THR:OG1	17:K:301:4KF:O17	2.37	0.41
2:P:151:ASN:HB2	2:P:152:PRO:CD	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
14:b:1:THR:OG1	17:b:201:4KF:O17	2.25	0.41
2:P:219:ALA:HB2	2:P:225:TYR:HB2	2.01	0.41
2:B:219:ALA:HB2	2:B:225:TYR:HB2	2.02	0.41
7:G:78:ILE:N	7:G:79:PRO:CD	2.83	0.41
11:K:38:ASN:HB2	11:K:39:PRO:CD	2.50	0.41
11:Y:46:ALA:HB3	11:Y:98:GLY:O	2.19	0.41
13:a:27:LEU:HD21	13:a:34:LEU:HD22	2.03	0.41
2:P:217:LYS:C	2:P:219:ALA:N	2.78	0.41
7:G:63:ILE:HD12	7:G:215:GLU:HG2	2.03	0.41
2:B:217:LYS:C	2:B:219:ALA:N	2.78	0.41
11:K:145:LYS:HB2	11:K:148:LEU:HD13	2.03	0.41
1:O:1:MET:HG3	6:T:122:TYR:CZ	2.56	0.41
3:Q:11:PRO:HA	4:R:18:TYR:CD1	2.56	0.41
5:S:77:ALA:N	5:S:78:PRO:CD	2.84	0.41
5:E:77:ALA:N	5:E:78:PRO:CD	2.84	0.40
17:H:301:4KF:H4	17:H:301:4KF:H16	1.87	0.40
11:Y:145:LYS:HB2	11:Y:148:LEU:HD13	2.03	0.40
4:D:91:HIS:CD2	4:D:99:ILE:HG22	2.57	0.40
7:U:63:ILE:HD12	7:U:215:GLU:HG2	2.03	0.40
9:I:20:VAL:HG13	9:I:118:PRO:HB3	2.03	0.40
12:L:8:ASN:HA	12:L:30:ILE:O	2.22	0.40
6:T:198:LEU:HD12	6:T:243:ILE:HG22	2.03	0.40
13:a:127:LEU:HG	13:a:142:LEU:HD12	2.03	0.40
14:b:13:ILE:HG21	14:b:175:MET:HE2	2.03	0.40
2:P:124:HIS:HB3	3:Q:124:VAL:HG12	2.04	0.40
7:U:165:LYS:HD2	7:U:205:LEU:HD22	2.03	0.40
11:Y:4:LEU:C	11:Y:4:LEU:HD22	2.47	0.40
8:H:104:ASP:HB2	8:H:105:PRO:CD	2.51	0.40
13:M:27:LEU:HD21	13:M:34:LEU:HD22	2.02	0.40
1:O:161:ALA:O	2:P:55:LEU:HD23	2.21	0.40
4:R:91:HIS:CD2	4:R:99:ILE:HG22	2.57	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	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	30	65
1	O	248/250 (99%)	238 (96%)	9 (4%)	1 (0%)	30	65
2	B	242/258 (94%)	235 (97%)	3 (1%)	4 (2%)	7	32
2	P	242/258 (94%)	235 (97%)	3 (1%)	4 (2%)	7	32
3	C	238/254 (94%)	233 (98%)	2 (1%)	3 (1%)	9	38
3	Q	238/254 (94%)	233 (98%)	2 (1%)	3 (1%)	9	38
4	D	231/260 (89%)	228 (99%)	3 (1%)	0	100	100
4	R	231/260 (89%)	228 (99%)	3 (1%)	0	100	100
5	E	229/234 (98%)	222 (97%)	7 (3%)	0	100	100
5	S	229/234 (98%)	222 (97%)	7 (3%)	0	100	100
6	F	241/288 (84%)	237 (98%)	4 (2%)	0	100	100
6	T	241/288 (84%)	236 (98%)	5 (2%)	0	100	100
7	G	239/252 (95%)	237 (99%)	2 (1%)	0	100	100
7	U	239/252 (95%)	237 (99%)	2 (1%)	0	100	100
8	H	224/232 (97%)	219 (98%)	5 (2%)	0	100	100
8	V	224/232 (97%)	219 (98%)	5 (2%)	0	100	100
9	I	202/205 (98%)	194 (96%)	8 (4%)	0	100	100
9	W	202/205 (98%)	194 (96%)	8 (4%)	0	100	100
10	J	193/198 (98%)	188 (97%)	5 (3%)	0	100	100
10	X	193/198 (98%)	188 (97%)	5 (3%)	0	100	100
11	K	210/212 (99%)	205 (98%)	5 (2%)	0	100	100
11	Y	210/212 (99%)	206 (98%)	4 (2%)	0	100	100
12	L	220/222 (99%)	215 (98%)	5 (2%)	0	100	100
12	Z	220/222 (99%)	214 (97%)	6 (3%)	0	100	100
13	M	227/246 (92%)	221 (97%)	6 (3%)	0	100	100
13	a	230/246 (94%)	223 (97%)	6 (3%)	1 (0%)	30	65
14	N	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
14	b	194/196 (99%)	190 (98%)	4 (2%)	0	100	100
All	All	6279/6614 (95%)	6125 (98%)	137 (2%)	17 (0%)	36	70

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	51	VAL
2	B	221	ASP
3	C	202	GLN
2	P	51	VAL
2	P	221	ASP
3	Q	202	GLN
1	A	2	THR
2	B	218	GLY
2	B	220	ASN
1	O	2	THR
2	P	218	GLY
2	P	220	ASN
3	C	205	ALA
3	Q	205	ALA
3	C	183	PRO
3	Q	183	PRO
13	a	229	GLY

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	209/209 (100%)	203 (97%)	6 (3%)	37	70
1	O	209/209 (100%)	204 (98%)	5 (2%)	43	73
2	B	203/216 (94%)	196 (97%)	7 (3%)	32	66
2	P	203/216 (94%)	196 (97%)	7 (3%)	32	66
3	C	212/226 (94%)	200 (94%)	12 (6%)	18	52
3	Q	212/226 (94%)	200 (94%)	12 (6%)	18	52
4	D	194/215 (90%)	182 (94%)	12 (6%)	16	49
4	R	194/215 (90%)	182 (94%)	12 (6%)	16	49
5	E	190/193 (98%)	182 (96%)	8 (4%)	26	61
5	S	190/193 (98%)	182 (96%)	8 (4%)	26	61
6	F	201/239 (84%)	193 (96%)	8 (4%)	28	62

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
6	T	201/239 (84%)	194 (96%)	7 (4%)	32	65
7	G	206/210 (98%)	197 (96%)	9 (4%)	25	60
7	U	206/210 (98%)	197 (96%)	9 (4%)	25	60
8	H	185/190 (97%)	177 (96%)	8 (4%)	26	60
8	V	185/190 (97%)	177 (96%)	8 (4%)	26	60
9	I	172/173 (99%)	170 (99%)	2 (1%)	63	82
9	W	172/173 (99%)	170 (99%)	2 (1%)	63	82
10	J	173/175 (99%)	169 (98%)	4 (2%)	44	74
10	X	173/175 (99%)	169 (98%)	4 (2%)	44	74
11	K	169/169 (100%)	163 (96%)	6 (4%)	31	65
11	Y	169/169 (100%)	163 (96%)	6 (4%)	31	65
12	L	185/185 (100%)	179 (97%)	6 (3%)	34	67
12	Z	185/185 (100%)	179 (97%)	6 (3%)	34	67
13	M	195/208 (94%)	190 (97%)	5 (3%)	40	72
13	a	198/208 (95%)	193 (98%)	5 (2%)	42	72
14	N	162/162 (100%)	158 (98%)	4 (2%)	42	72
14	b	162/162 (100%)	158 (98%)	4 (2%)	42	72
All	All	5315/5540 (96%)	5123 (96%)	192 (4%)	31	65

All (192) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	59	GLU
1	A	62	SER
1	A	122	THR
1	A	157	PHE
1	A	250	LEU
2	B	50	LYS
2	B	55	LEU
2	B	79	LEU
2	B	102	ASN
2	B	113	ARG
2	B	191	LEU
2	B	238	LEU
3	C	4	ARG

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Mol	Chain	Res	Type
3	C	38	ASN
3	C	49	THR
3	C	50	LEU
3	C	51	LYS
3	C	52	LEU
3	C	147	GLN
3	C	160	GLN
3	C	169	VAL
3	C	180	LYS
3	C	213	VAL
3	C	240	GLU
4	D	20	LEU
4	D	40	LEU
4	D	51	LEU
4	D	60	VAL
4	D	99	ILE
4	D	176	LEU
4	D	190	LEU
4	D	193	LEU
4	D	214	ILE
4	D	235	LEU
4	D	236	LYS
4	D	242	GLU
5	E	9	THR
5	E	29	LYS
5	E	55	LEU
5	E	71	LEU
5	E	188	LEU
5	E	207	VAL
5	E	208	ASP
5	E	231	LYS
6	F	123	ASN
6	F	172	LEU
6	F	181	GLU
6	F	201	GLU
6	F	202	ASP
6	F	207	ASP
6	F	221	ASN
6	F	240	GLN
7	G	13	GLU
7	G	26	THR
7	G	75	ASN

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Mol	Chain	Res	Type
7	G	83	ASN
7	G	115	LEU
7	G	122	ARG
7	G	125	MET
7	G	235	ARG
7	G	236	LEU
8	H	14	ILE
8	H	22	GLN
8	H	34	LEU
8	H	56	THR
8	H	68	LEU
8	H	127	LEU
8	H	144	GLN
8	H	196	ARG
9	I	37	ASN
9	I	171	LEU
10	J	3	ILE
10	J	35	THR
10	J	90	LYS
10	J	99	GLN
11	K	4	LEU
11	K	9	GLN
11	K	107	LYS
11	K	116	ASP
11	K	140	LEU
11	K	148	LEU
12	L	23	LEU
12	L	31	THR
12	L	49	ASN
12	L	130	SER
12	L	150	LEU
12	L	161	GLU
13	M	2	GLN
13	M	48	ASN
13	M	70	LEU
13	M	104	ARG
13	M	187	ARG
14	N	9	LYS
14	N	104	ASP
14	N	107	LYS
14	N	119	VAL
1	O	1	MET

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Mol	Chain	Res	Type
1	O	59	GLU
1	O	122	THR
1	O	157	PHE
1	O	250	LEU
2	P	50	LYS
2	P	55	LEU
2	P	79	LEU
2	P	102	ASN
2	P	113	ARG
2	P	191	LEU
2	P	238	LEU
3	Q	4	ARG
3	Q	38	ASN
3	Q	49	THR
3	Q	50	LEU
3	Q	51	LYS
3	Q	52	LEU
3	Q	147	GLN
3	Q	160	GLN
3	Q	169	VAL
3	Q	180	LYS
3	Q	213	VAL
3	Q	240	GLU
4	R	20	LEU
4	R	40	LEU
4	R	51	LEU
4	R	60	VAL
4	R	99	ILE
4	R	176	LEU
4	R	190	LEU
4	R	193	LEU
4	R	214	ILE
4	R	235	LEU
4	R	236	LYS
4	R	242	GLU
5	S	9	THR
5	S	29	LYS
5	S	55	LEU
5	S	71	LEU
5	S	188	LEU
5	S	207	VAL
5	S	208	ASP

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Mol	Chain	Res	Type
5	S	231	LYS
6	T	123	ASN
6	T	172	LEU
6	T	181	GLU
6	T	201	GLU
6	T	207	ASP
6	T	221	ASN
6	T	240	GLN
7	U	13	GLU
7	U	26	THR
7	U	75	ASN
7	U	83	ASN
7	U	115	LEU
7	U	122	ARG
7	U	125	MET
7	U	235	ARG
7	U	236	LEU
8	V	22	GLN
8	V	34	LEU
8	V	56	THR
8	V	68	LEU
8	V	80	LEU
8	V	127	LEU
8	V	144	GLN
8	V	196	ARG
9	W	37	ASN
9	W	171	LEU
10	X	3	ILE
10	X	35	THR
10	X	90	LYS
10	X	99	GLN
11	Y	4	LEU
11	Y	9	GLN
11	Y	107	LYS
11	Y	116	ASP
11	Y	140	LEU
11	Y	148	LEU
12	Z	23	LEU
12	Z	31	THR
12	Z	49	ASN
12	Z	130	SER
12	Z	150	LEU

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Mol	Chain	Res	Type
12	Z	161	GLU
13	a	2	GLN
13	a	48	ASN
13	a	70	LEU
13	a	104	ARG
13	a	187	ARG
14	b	9	LYS
14	b	104	ASP
14	b	107	LYS
14	b	119	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (118) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	95	GLN
2	B	119	GLN
2	B	123	GLN
2	B	155	ASN
2	B	176	GLN
2	B	232	GLN
3	C	17	GLN
3	C	115	GLN
3	C	147	GLN
3	C	160	GLN
3	C	233	GLN
4	D	15	GLN
4	D	100	ASN
4	D	225	ASN
5	E	68	HIS
5	E	92	ASN
5	E	99	ASN
5	E	116	GLN
5	E	118	ASN
5	E	120	GLN
5	E	151	ASN
5	E	184	ASN
6	F	19	GLN
6	F	86	ASN
6	F	117	GLN
6	F	123	ASN
7	G	30	ASN
7	G	83	ASN

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Mol	Chain	Res	Type
7	G	114	ASN
7	G	117	GLN
7	G	121	GLN
7	G	167	GLN
7	G	175	ASN
8	H	22	GLN
8	H	30	ASN
8	H	66	HIS
8	H	116	HIS
8	H	165	ASN
8	H	189	ASN
8	H	194	ASN
9	I	37	ASN
9	I	88	GLN
9	I	203	GLN
10	J	37	GLN
10	J	55	GLN
10	J	63	ASN
10	J	146	HIS
10	J	147	HIS
11	K	9	GLN
11	K	85	ASN
11	K	176	ASN
11	K	208	ASN
12	L	3	ASN
12	L	49	ASN
12	L	70	ASN
12	L	153	GLN
12	L	155	ASN
12	L	158	ASN
12	L	197	GLN
13	M	48	ASN
13	M	108	ASN
13	M	194	ASN
13	M	213	GLN
14	N	141	ASN
2	P	95	GLN
2	P	119	GLN
2	P	123	GLN
2	P	176	GLN
2	P	232	GLN
3	Q	17	GLN

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Mol	Chain	Res	Type
3	Q	147	GLN
3	Q	160	GLN
3	Q	233	GLN
4	R	15	GLN
4	R	91	HIS
4	R	100	ASN
4	R	106	GLN
4	R	225	ASN
5	S	68	HIS
5	S	92	ASN
5	S	99	ASN
5	S	118	ASN
5	S	120	GLN
5	S	151	ASN
5	S	184	ASN
6	T	19	GLN
6	T	86	ASN
6	T	117	GLN
6	T	123	ASN
7	U	30	ASN
7	U	83	ASN
7	U	114	ASN
7	U	117	GLN
7	U	121	GLN
7	U	175	ASN
8	V	22	GLN
8	V	66	HIS
8	V	194	ASN
9	W	37	ASN
9	W	203	GLN
10	X	55	GLN
10	X	63	ASN
10	X	146	HIS
10	X	147	HIS
11	Y	9	GLN
11	Y	85	ASN
11	Y	176	ASN
11	Y	208	ASN
11	Y	209	ASN
12	Z	49	ASN
12	Z	70	ASN
12	Z	197	GLN

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Mol	Chain	Res	Type
13	a	48	ASN
13	a	102	GLN
13	a	149	HIS
13	a	194	ASN
13	a	213	GLN
14	b	141	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 12 are monoatomic - leaving 6 for Mogul analysis.

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$
17	4KF	b	201	14	23,23,24	1.94	3 (13%)	26,30,32	1.43	6 (23%)
17	4KF	N	201	14	23,23,24	1.66	2 (8%)	26,30,32	1.60	6 (23%)
17	4KF	V	301	8	23,23,24	1.83	4 (17%)	26,30,32	1.37	7 (26%)
17	4KF	H	301	8	23,23,24	1.93	4 (17%)	26,30,32	1.60	5 (19%)
17	4KF	Y	301	11	23,23,24	1.91	3 (13%)	26,30,32	1.54	6 (23%)
17	4KF	K	301	11	23,23,24	1.85	2 (8%)	26,30,32	1.38	4 (15%)

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
17	4KF	b	201	14	-	2/25/25/27	0/1/1/1
17	4KF	N	201	14	-	7/25/25/27	0/1/1/1
17	4KF	V	301	8	-	2/25/25/27	0/1/1/1
17	4KF	H	301	8	-	2/25/25/27	0/1/1/1
17	4KF	Y	301	11	-	6/25/25/27	0/1/1/1
17	4KF	K	301	11	-	10/25/25/27	0/1/1/1

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	b	201	4KF	C6-C5	-7.20	1.35	1.51
17	Y	301	4KF	C6-C5	-7.12	1.35	1.51
17	K	301	4KF	C6-C5	-6.43	1.37	1.51
17	H	301	4KF	C6-C5	-6.28	1.37	1.51
17	N	201	4KF	C6-C5	-6.03	1.38	1.51
17	V	301	4KF	C6-C5	-5.75	1.38	1.51
17	H	301	4KF	C10-C13	-3.74	1.49	1.55
17	K	301	4KF	C10-C13	-3.44	1.50	1.55
17	V	301	4KF	C10-C13	-3.26	1.50	1.55
17	H	301	4KF	C10-C9	-3.22	1.51	1.54
17	b	201	4KF	C10-C13	-2.96	1.51	1.55
17	N	201	4KF	C10-C13	-2.82	1.51	1.55
17	b	201	4KF	C10-C9	-2.77	1.51	1.54
17	V	301	4KF	C10-C9	-2.62	1.52	1.54
17	Y	301	4KF	C10-C13	-2.28	1.52	1.55
17	H	301	4KF	O21-C20	-2.26	1.33	1.37
17	Y	301	4KF	O2-C1	-2.23	1.33	1.37
17	V	301	4KF	C23-C20	-2.00	1.35	1.39

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	H	301	4KF	C22-O21-C20	-5.85	104.96	117.50
17	N	201	4KF	O17-C9-C8	-3.96	102.36	110.63
17	Y	301	4KF	C3-O2-C1	-3.25	110.52	117.50
17	Y	301	4KF	C14-C13-C15	-3.20	103.73	111.81
17	N	201	4KF	C22-O21-C20	-3.06	110.93	117.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
17	K	301	4KF	C14-C13-C15	-2.91	104.46	111.81
17	V	301	4KF	C22-O21-C20	-2.72	111.66	117.50
17	N	201	4KF	C6-C5-C19	-2.64	114.99	120.63
17	Y	301	4KF	C6-C5-C4	-2.60	115.08	120.63
17	b	201	4KF	O12-C11-C10	-2.55	119.17	125.27
17	V	301	4KF	C3-O2-C1	2.51	122.87	117.50
17	Y	301	4KF	O12-C11-C10	-2.42	119.50	125.27
17	H	301	4KF	C6-C5-C19	-2.41	115.48	120.63
17	K	301	4KF	C6-C5-C4	-2.39	115.53	120.63
17	H	301	4KF	C6-C5-C4	2.37	125.70	120.63
17	Y	301	4KF	C5-C6-N7	2.34	118.02	113.07
17	K	301	4KF	O12-C11-C10	-2.34	119.68	125.27
17	b	201	4KF	C23-C20-C19	-2.33	117.44	120.98
17	b	201	4KF	C22-O21-C20	-2.32	112.51	117.50
17	K	301	4KF	O17-C9-C8	-2.28	105.87	110.63
17	H	301	4KF	O12-C11-C10	-2.26	119.88	125.27
17	N	201	4KF	C20-C19-C5	2.21	122.18	119.76
17	V	301	4KF	O12-C11-C10	-2.20	120.01	125.27
17	V	301	4KF	C6-C5-C4	2.19	125.30	120.63
17	N	201	4KF	O12-C11-C10	-2.16	120.10	125.27
17	b	201	4KF	O17-C9-C8	-2.16	106.11	110.63
17	N	201	4KF	C6-C5-C4	2.15	125.23	120.63
17	V	301	4KF	C5-C6-N7	2.14	117.58	113.07
17	V	301	4KF	C6-C5-C19	-2.13	116.08	120.63
17	H	301	4KF	C3-O2-C1	2.12	122.04	117.50
17	Y	301	4KF	C6-C5-C19	2.11	125.14	120.63
17	b	201	4KF	C1-C23-C20	2.04	121.42	118.48
17	V	301	4KF	C1-C23-C20	2.03	121.41	118.48
17	b	201	4KF	C6-C5-C19	-2.01	116.33	120.63

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	K	301	4KF	C11-C10-C13-C14
17	K	301	4KF	C9-C10-C13-C14
17	Y	301	4KF	C11-C10-C13-C14
17	Y	301	4KF	C9-C10-C13-C14
17	N	201	4KF	C19-C20-O21-C22
17	N	201	4KF	C23-C20-O21-C22
17	H	301	4KF	C19-C20-O21-C22
17	H	301	4KF	C23-C20-O21-C22

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Mol	Chain	Res	Type	Atoms
17	Y	301	4KF	C4-C1-O2-C3
17	Y	301	4KF	C23-C1-O2-C3
17	V	301	4KF	C19-C20-O21-C22
17	V	301	4KF	C23-C20-O21-C22
17	b	201	4KF	C19-C20-O21-C22
17	b	201	4KF	C23-C20-O21-C22
17	K	301	4KF	C4-C1-O2-C3
17	K	301	4KF	C23-C1-O2-C3
17	K	301	4KF	C10-C13-C15-C16
17	K	301	4KF	C14-C13-C15-C16
17	K	301	4KF	C23-C20-O21-C22
17	K	301	4KF	C11-C10-C13-C15
17	K	301	4KF	C19-C20-O21-C22
17	N	201	4KF	C14-C13-C15-C16
17	N	201	4KF	C23-C1-O2-C3
17	N	201	4KF	C10-C13-C15-C16
17	N	201	4KF	C4-C1-O2-C3
17	N	201	4KF	C13-C10-C9-O17
17	Y	301	4KF	C11-C10-C13-C15
17	K	301	4KF	C9-C10-C13-C15
17	Y	301	4KF	C9-C10-C13-C15

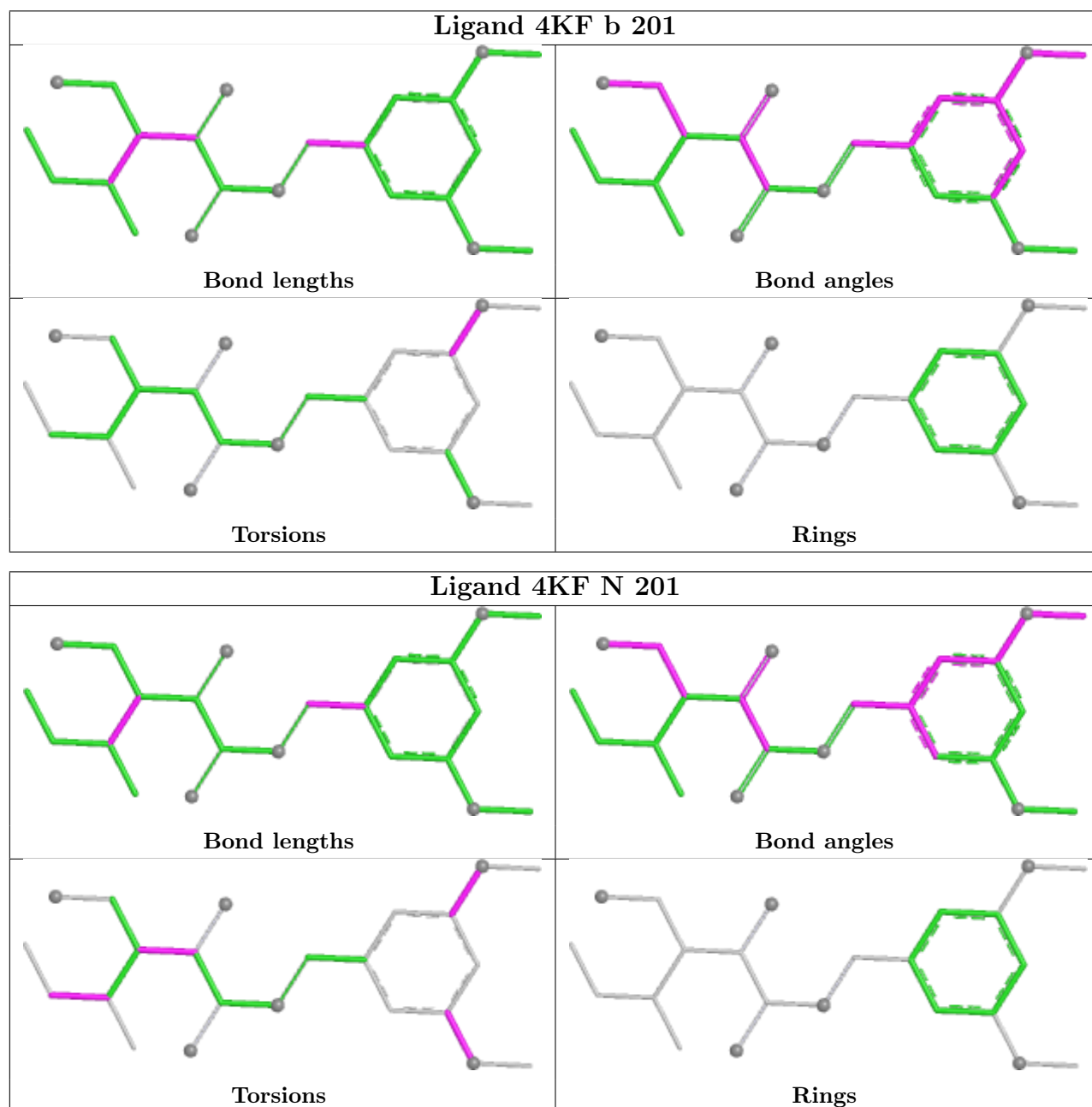
There are no ring outliers.

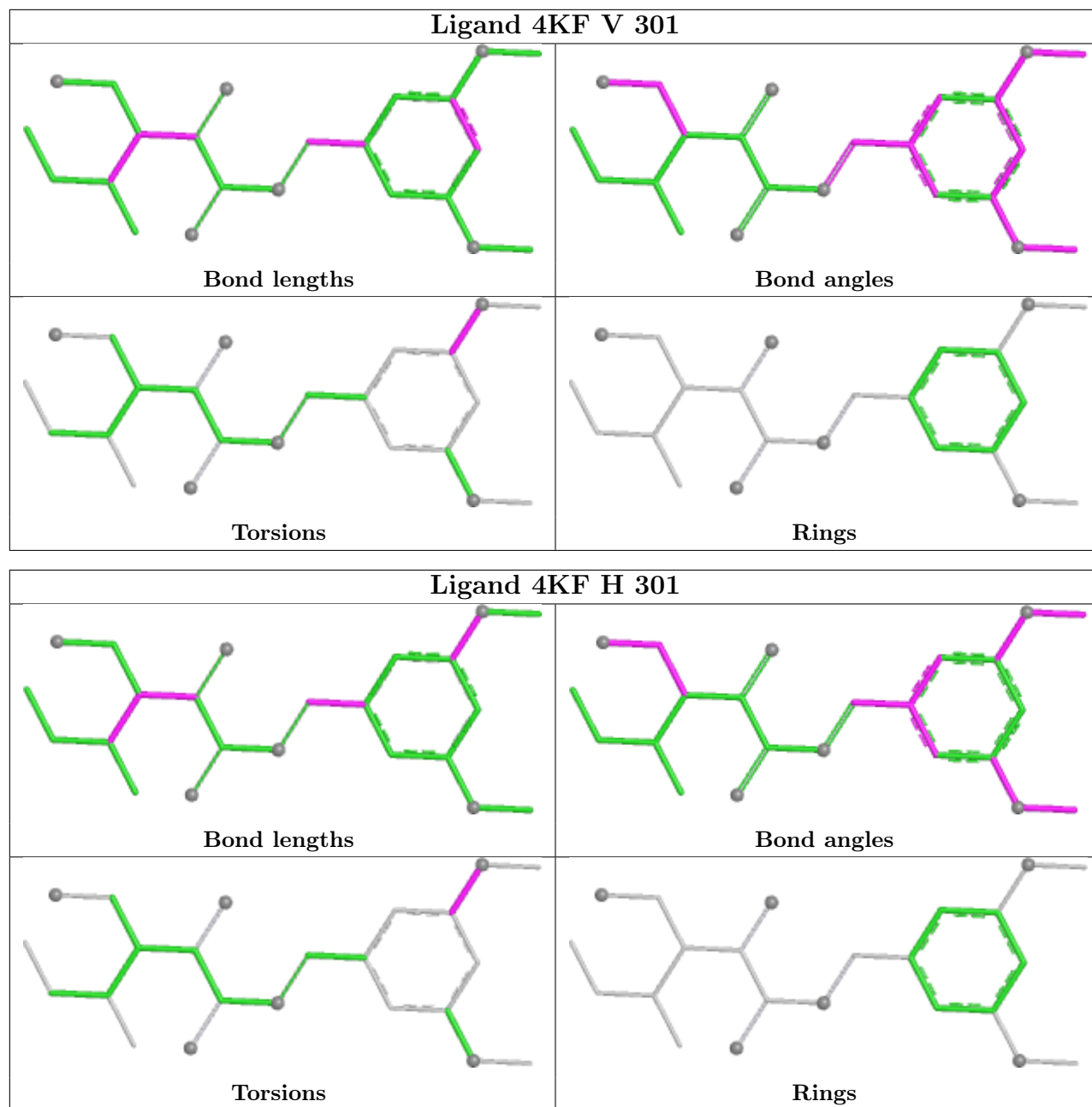
5 monomers are involved in 16 short contacts:

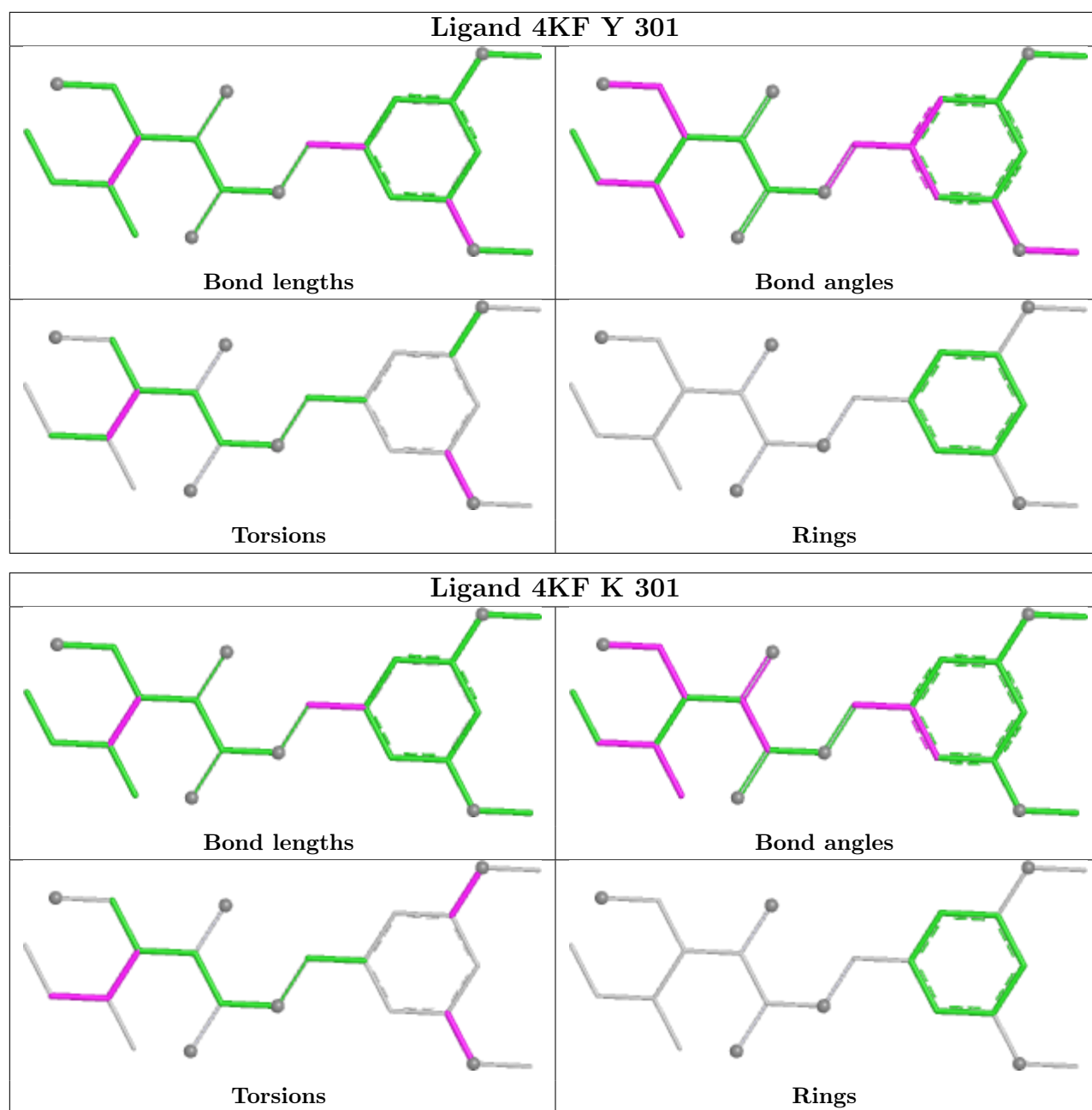
Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	b	201	4KF	1	0
17	N	201	4KF	1	0
17	H	301	4KF	2	0
17	Y	301	4KF	5	0
17	K	301	4KF	7	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	250/250 (100%)	-0.19	3 (1%) 76 55	36, 49, 89, 130	0
1	O	250/250 (100%)	-0.15	4 (1%) 70 47	40, 56, 100, 131	0
2	B	244/258 (94%)	-0.10	4 (1%) 70 47	34, 55, 98, 155	0
2	P	244/258 (94%)	-0.05	4 (1%) 70 47	42, 60, 100, 146	0
3	C	240/254 (94%)	-0.06	4 (1%) 69 45	35, 61, 122, 149	0
3	Q	240/254 (94%)	0.18	12 (5%) 34 18	47, 74, 157, 183	0
4	D	235/260 (90%)	-0.18	3 (1%) 75 53	39, 60, 95, 138	0
4	R	235/260 (90%)	0.02	2 (0%) 81 61	48, 70, 108, 143	0
5	E	231/234 (98%)	0.06	0 100 100	44, 69, 111, 153	0
5	S	231/234 (98%)	0.36	12 (5%) 33 17	45, 77, 134, 176	0
6	F	243/288 (84%)	-0.11	2 (0%) 82 64	45, 64, 116, 140	0
6	T	243/288 (84%)	0.15	7 (2%) 53 31	46, 72, 133, 170	0
7	G	241/252 (95%)	-0.20	1 (0%) 88 76	35, 55, 89, 138	0
7	U	241/252 (95%)	-0.14	2 (0%) 82 64	39, 56, 89, 136	0
8	H	226/232 (97%)	-0.09	2 (0%) 81 61	32, 51, 82, 150	0
8	V	226/232 (97%)	-0.18	2 (0%) 81 61	34, 50, 78, 150	0
9	I	204/205 (99%)	-0.37	0 100 100	31, 46, 73, 104	0
9	W	204/205 (99%)	-0.38	0 100 100	31, 46, 75, 104	0
10	J	195/198 (98%)	-0.28	1 (0%) 87 72	33, 49, 73, 124	0
10	X	195/198 (98%)	-0.26	1 (0%) 87 72	35, 52, 76, 140	0
11	K	212/212 (100%)	-0.25	1 (0%) 87 72	28, 48, 70, 90	0
11	Y	212/212 (100%)	-0.25	2 (0%) 81 61	35, 51, 76, 98	0
12	L	222/222 (100%)	-0.26	1 (0%) 87 72	33, 51, 87, 120	0
12	Z	222/222 (100%)	-0.28	1 (0%) 87 72	33, 49, 84, 119	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
13	M	229/246 (93%)	-0.18	4 (1%) 69 45	33, 56, 85, 100	0
13	a	232/246 (94%)	-0.15	4 (1%) 69 45	29, 56, 84, 102	0
14	N	196/196 (100%)	-0.23	1 (0%) 87 72	36, 51, 81, 106	0
14	b	196/196 (100%)	-0.22	3 (1%) 72 49	37, 51, 83, 115	0
All	All	6339/6614 (95%)	-0.13	83 (1%) 75 53	28, 56, 106, 183	0

All (83) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	Q	50	LEU	5.9
10	X	1	MET	5.2
8	H	223	ILE	5.1
10	J	1	MET	4.9
5	S	57	SER	4.7
8	V	223	ILE	4.7
2	P	219	ALA	4.7
3	Q	49	THR	4.3
13	a	1	THR	4.0
14	b	103	ASP	3.8
2	B	219	ALA	3.8
1	O	53	SER	3.8
13	a	69	ASP	3.5
4	D	240	ALA	3.4
2	P	1	GLY	3.4
13	M	1	THR	3.3
2	B	51	VAL	3.3
3	Q	205	ALA	3.3
5	S	55	LEU	3.1
3	Q	3	ASP	3.1
6	T	178	HIS	3.0
5	S	56	SER	3.0
5	S	51	ASN	3.0
1	A	62	SER	2.9
13	M	69	ASP	2.9
11	K	97	MET	2.8
2	P	51	VAL	2.7
2	B	1	GLY	2.7
3	Q	53	GLN	2.7
3	C	50	LEU	2.7
5	S	209	ASN	2.7
6	T	243	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
2	P	218	GLY	2.6
7	U	168	GLU	2.6
13	a	30	TYR	2.6
1	O	51	SER	2.6
8	V	224	GLN	2.6
3	C	204	GLY	2.6
3	Q	204	GLY	2.6
6	T	14	ASP	2.6
3	Q	189	CYS	2.5
8	H	224	GLN	2.5
13	M	35	ARG	2.5
12	L	174	TYR	2.5
5	S	52	ALA	2.4
3	C	51	LYS	2.4
14	N	103	ASP	2.4
3	Q	52	LEU	2.4
6	T	241	LYS	2.3
13	a	35	ARG	2.3
5	S	227	GLU	2.3
1	O	62	SER	2.3
4	D	167	GLY	2.3
11	Y	208	ASN	2.3
5	S	180	LYS	2.3
5	S	58	TYR	2.3
3	Q	51	LYS	2.3
13	M	30	TYR	2.3
14	b	108	GLY	2.2
6	T	198	LEU	2.2
1	A	201	GLU	2.2
3	Q	240	GLU	2.2
6	F	215	CYS	2.2
14	b	107	LYS	2.2
12	Z	174	TYR	2.1
7	U	242	GLN	2.1
1	O	58	SER	2.1
6	T	215	CYS	2.1
6	F	2	THR	2.1
5	S	48	LEU	2.1
4	R	49	PRO	2.1
3	C	206	LYS	2.1
5	S	49	LYS	2.1
3	Q	232	THR	2.1

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Mol	Chain	Res	Type	RSRZ
6	T	201	GLU	2.1
1	A	2	THR	2.1
2	B	218	GLY	2.1
4	R	217	GLN	2.1
5	S	228	ALA	2.0
7	G	242	GLN	2.0
3	Q	48	SER	2.0
4	D	241	ALA	2.0
11	Y	170	TYR	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
17	4KF	N	201	23/24	0.87	0.12	33,47,55,56	0
17	4KF	Y	301	23/24	0.89	0.11	39,44,50,50	0
17	4KF	b	201	23/24	0.90	0.10	37,46,54,55	0
17	4KF	K	301	23/24	0.91	0.10	37,44,50,54	0
17	4KF	H	301	23/24	0.92	0.10	32,37,40,46	0
17	4KF	V	301	23/24	0.93	0.09	35,38,43,48	0
15	MG	W	301	1/1	0.94	0.08	49,49,49,49	0
15	MG	I	301	1/1	0.95	0.06	52,52,52,52	0
15	MG	Z	301	1/1	0.95	0.04	45,45,45,45	0
16	CL	N	203	1/1	0.95	0.12	52,52,52,52	0
15	MG	K	302	1/1	0.96	0.06	41,41,41,41	0
15	MG	G	301	1/1	0.97	0.11	59,59,59,59	0
16	CL	b	202	1/1	0.97	0.12	52,52,52,52	0
16	CL	U	301	1/1	0.98	0.10	47,47,47,47	0

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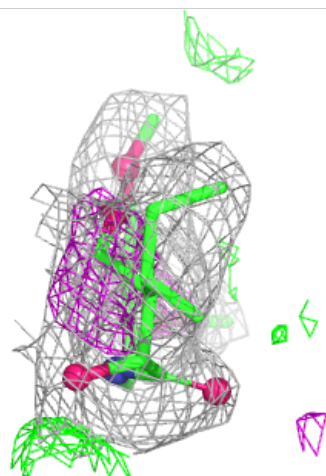
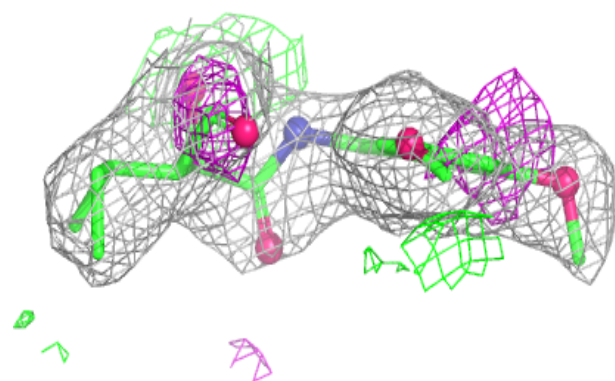
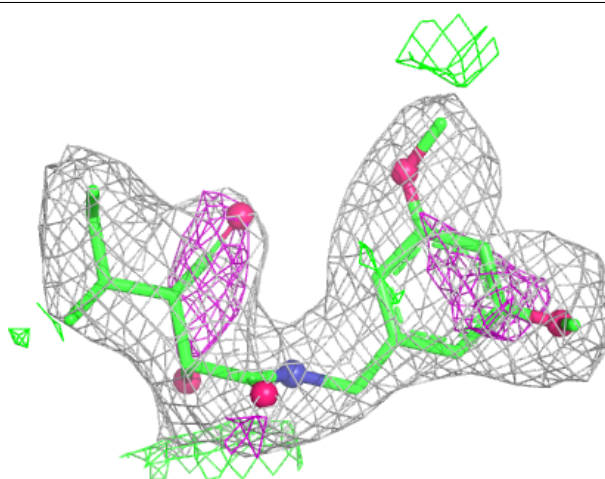
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
15	MG	L	301	1/1	0.98	0.05	50,50,50,50	0
15	MG	I	302	1/1	0.99	0.10	45,45,45,45	0
15	MG	N	202	1/1	0.99	0.03	35,35,35,35	0
16	CL	G	302	1/1	0.99	0.11	44,44,44,44	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

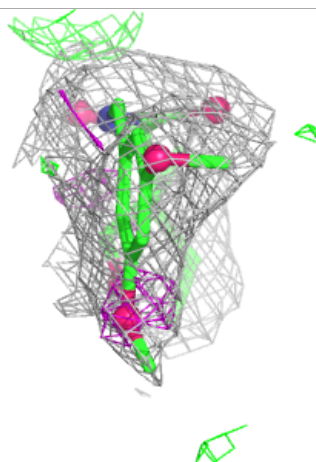
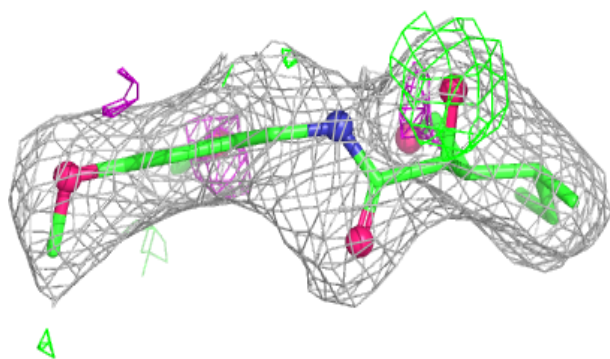
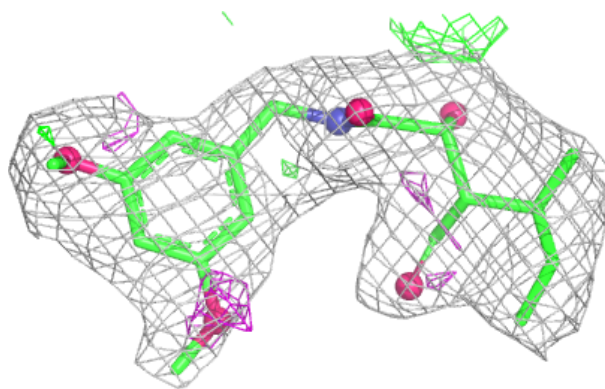
Electron density around 4KF N 201:

2mF_o-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



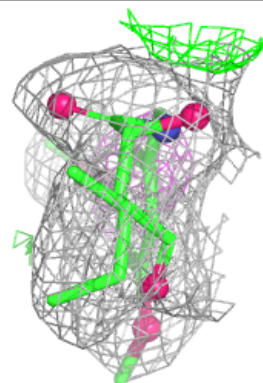
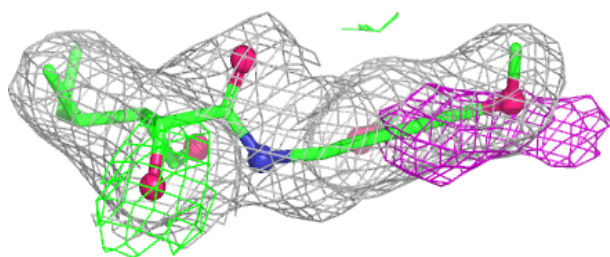
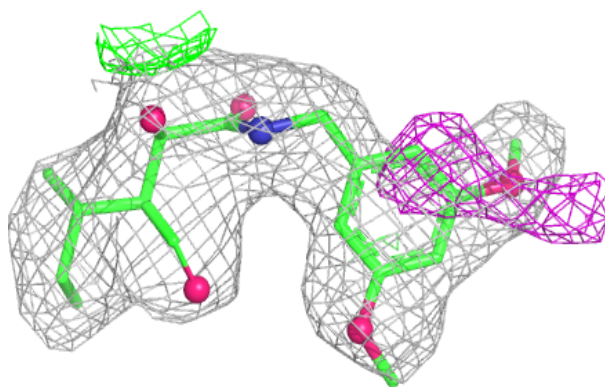
Electron density around 4KF Y 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



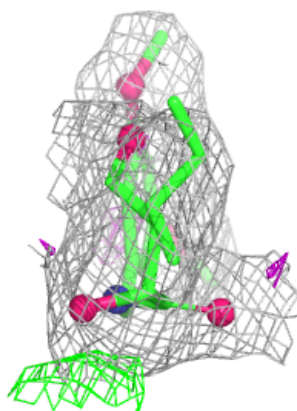
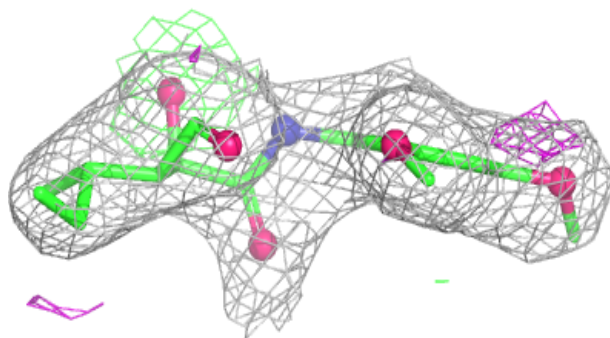
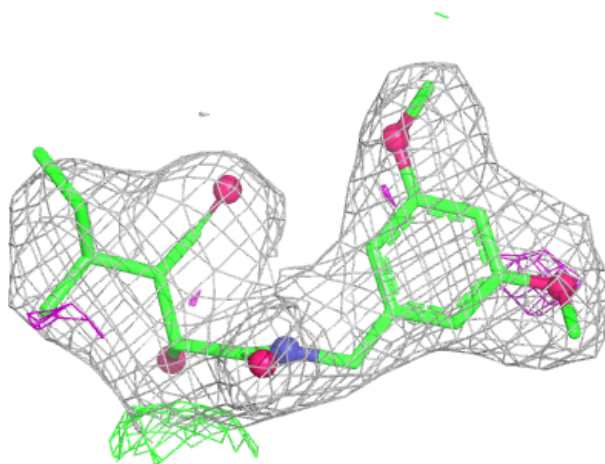
Electron density around 4KF b 201:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



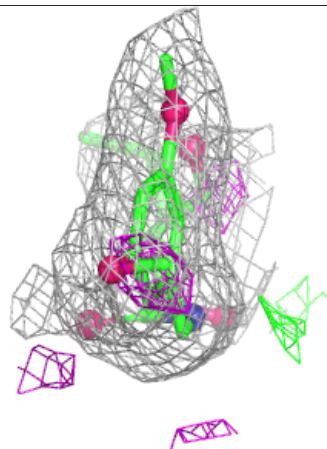
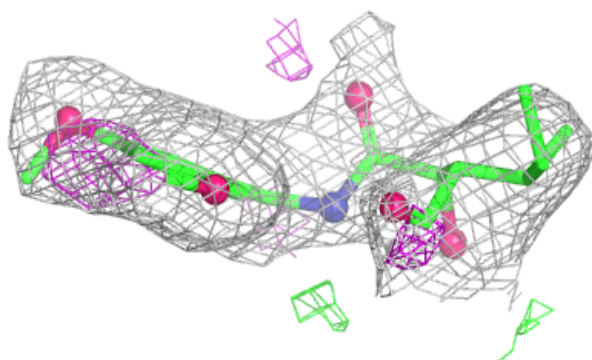
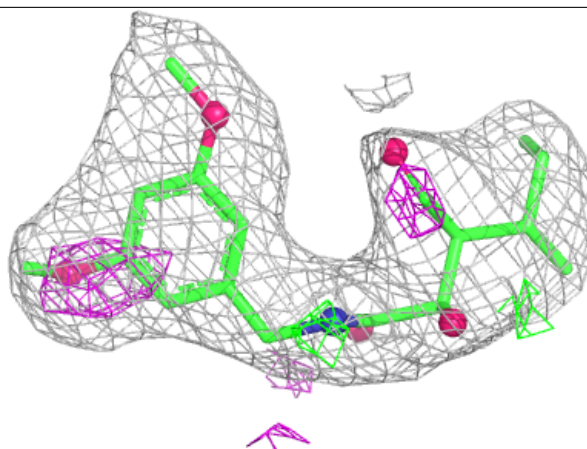
Electron density around 4KF K 301:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

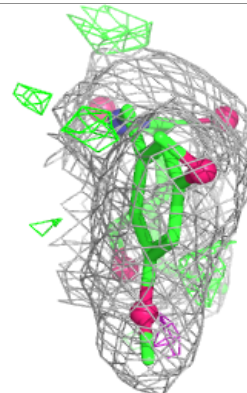
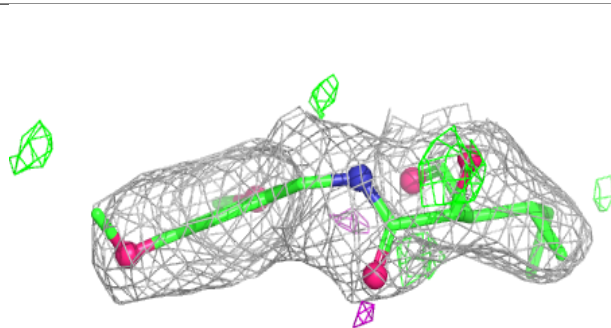
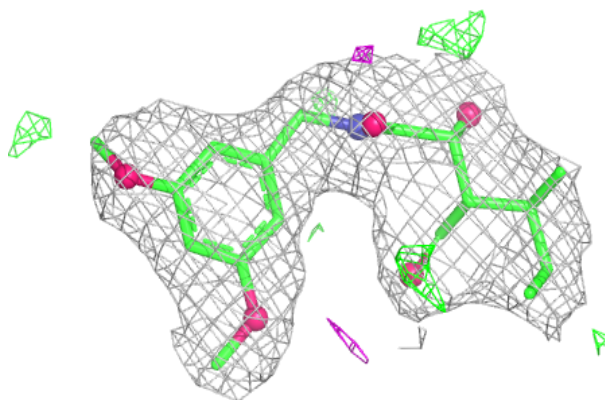


Electron density around 4KF H 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around 4KF V 301:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.