Full wwPDB X-ray Structure Validation Report ⓘ

Feb 4, 2024 – 08:12 PM EST

PDB ID	:	1U1D
Title	:	Structure of e. coli uridine phosphorylase complexed to 5-(phenylthio)acyclo uridine (ptau)
Authors	:	Bu, W.; Settembre, E.C.; Ealick, S.E.
Deposited on	:	2004-07-15
Resolution	:	2.00 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:

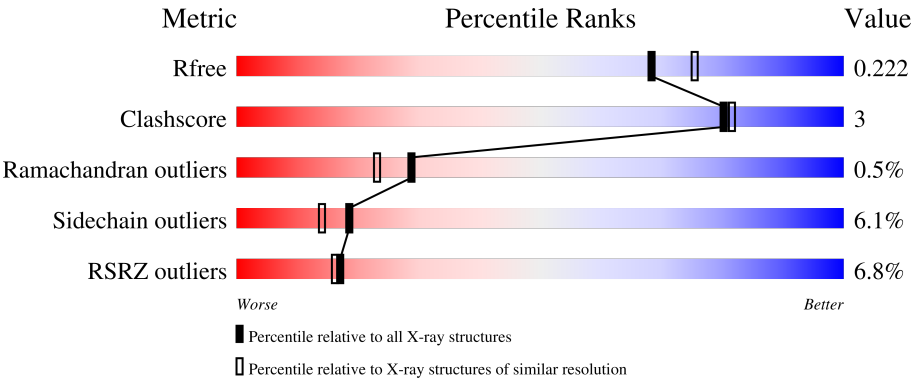
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.00 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}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 <=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	256	4% 85% 13%
1	B	256	2% 86% 11%
1	C	256	4% 85% 11%
1	D	256	5% 86% 11%
1	E	256	9% 85% 12%

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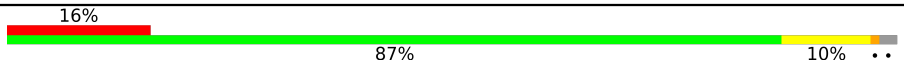
Mol	Chain	Length	Quality of chain
1	F	256	

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 11932 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 Uridine phosphorylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	253	Total	C	N	O	S	0	0	0
			1895	1186	330	367	12			
1	B	251	Total	C	N	O	S	0	0	0
			1881	1178	328	364	11			
1	C	250	Total	C	N	O	S	0	0	0
			1872	1172	326	363	11			
1	D	250	Total	C	N	O	S	0	0	0
			1872	1172	326	363	11			
1	E	251	Total	C	N	O	S	0	0	0
			1881	1178	328	364	11			
1	F	250	Total	C	N	O	S	0	0	0
			1872	1172	326	363	11			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	cloning artifact	UNP P12758
A	-1	SER	-	cloning artifact	UNP P12758
A	0	HIS	-	cloning artifact	UNP P12758
A	1	MET	-	cloning artifact	UNP P12758
B	-2	GLY	-	cloning artifact	UNP P12758
B	-1	SER	-	cloning artifact	UNP P12758
B	0	HIS	-	cloning artifact	UNP P12758
B	1	MET	-	cloning artifact	UNP P12758
C	-2	GLY	-	cloning artifact	UNP P12758
C	-1	SER	-	cloning artifact	UNP P12758
C	0	HIS	-	cloning artifact	UNP P12758
C	1	MET	-	cloning artifact	UNP P12758
D	-2	GLY	-	cloning artifact	UNP P12758
D	-1	SER	-	cloning artifact	UNP P12758
D	0	HIS	-	cloning artifact	UNP P12758
D	1	MET	-	cloning artifact	UNP P12758
E	-2	GLY	-	cloning artifact	UNP P12758

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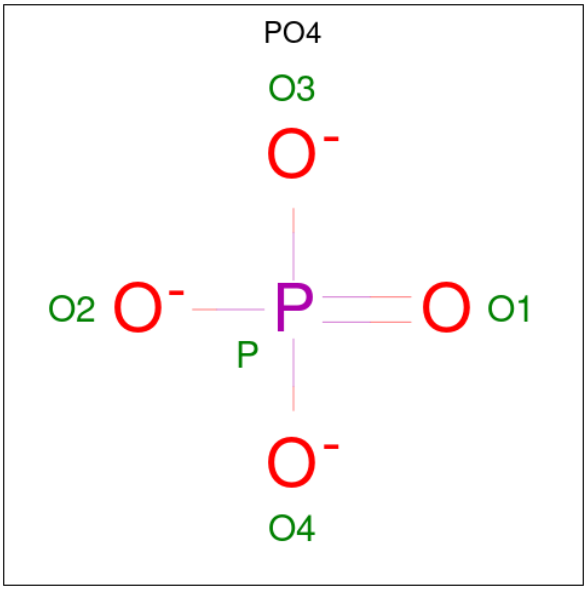
Chain	Residue	Modelled	Actual	Comment	Reference
E	-1	SER	-	cloning artifact	UNP P12758
E	0	HIS	-	cloning artifact	UNP P12758
E	1	MET	-	cloning artifact	UNP P12758
F	-2	GLY	-	cloning artifact	UNP P12758
F	-1	SER	-	cloning artifact	UNP P12758
F	0	HIS	-	cloning artifact	UNP P12758
F	1	MET	-	cloning artifact	UNP P12758

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

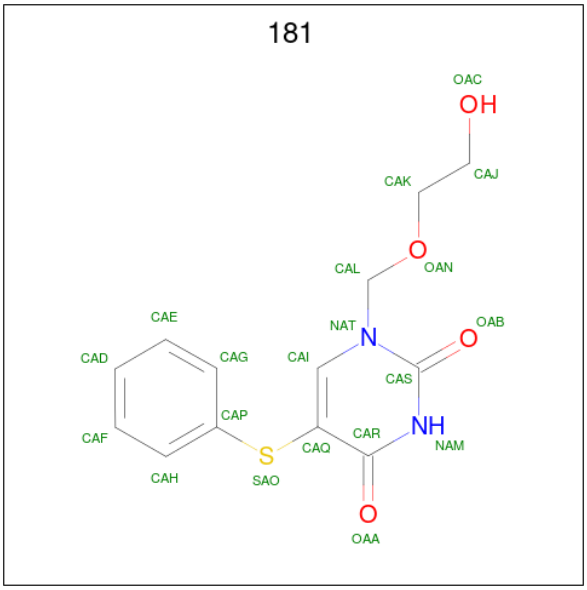


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0
2	D	1	Total O P 5 4 1	0	0
2	E	1	Total O P 5 4 1	0	0
2	F	1	Total O P 5 4 1	0	0

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

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

- Molecule 4 is 1-((2-HYDROXYETHOXY)METHYL)-5-(PHENYLTHIO)PYRIMIDINE-2, 4(1H,3H)-DIONE (three-letter code: 181) (formula: $C_{13}H_{14}N_2O_4S$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O S 20 13 2 4 1	0	0
4	B	1	Total C N O S 20 13 2 4 1	0	0
4	C	1	Total C N O S 20 13 2 4 1	0	0
4	D	1	Total C N O S 20 13 2 4 1	0	0
4	E	1	Total C N O S 20 13 2 4 1	0	0
4	F	1	Total C N O S 20 13 2 4 1	0	0

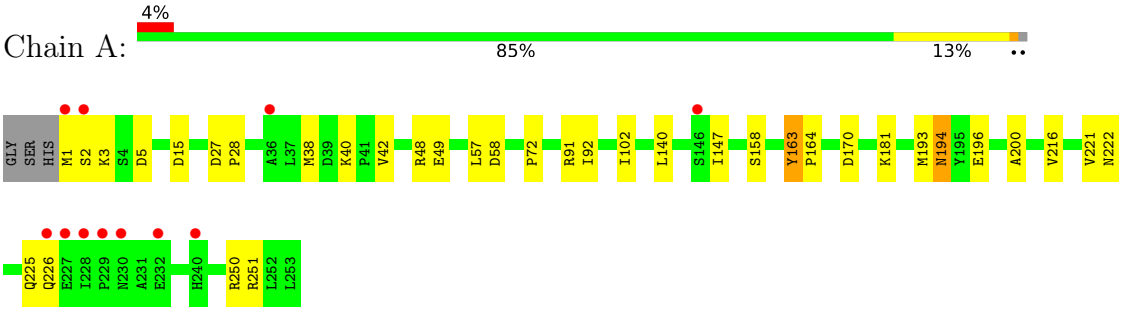
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	91	Total O 91 91	0	0
5	B	84	Total O 84 84	0	0
5	C	120	Total O 120 120	0	0
5	D	91	Total O 91 91	0	0
5	E	67	Total O 67 67	0	0
5	F	53	Total O 53 53	0	0

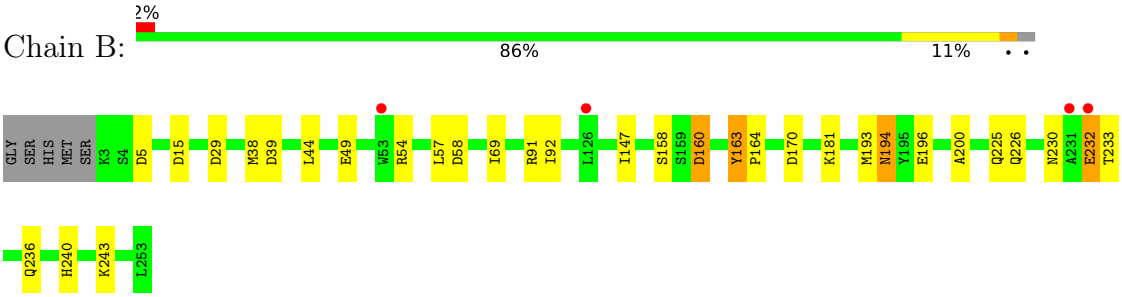
3 Residue-property plots (i)

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.

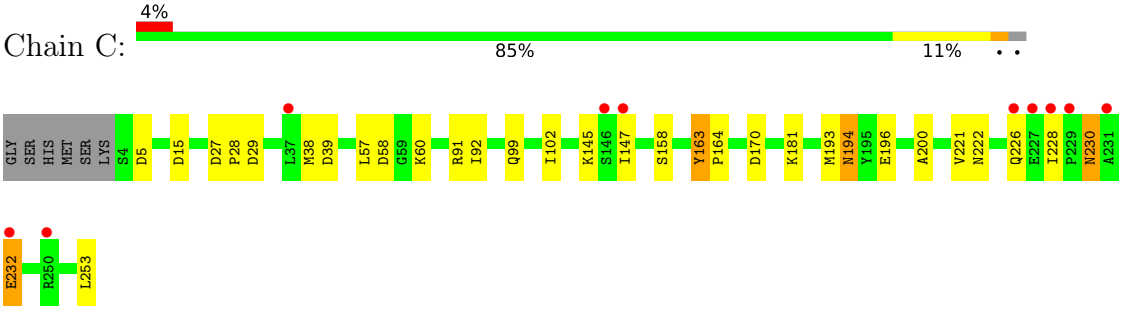
• Molecule 1: Uridine phosphorylase



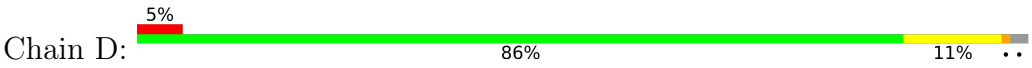
• Molecule 1: Uridine phosphorylase

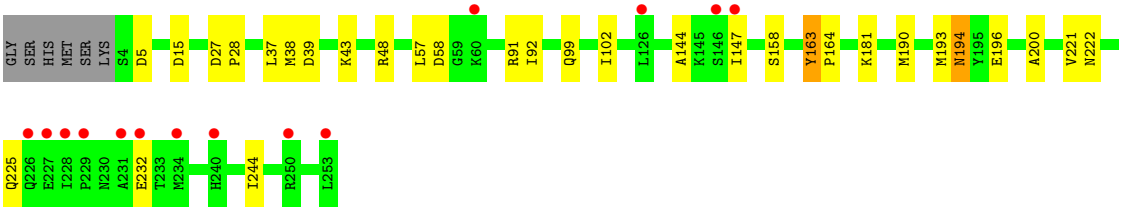


• Molecule 1: Uridine phosphorylase

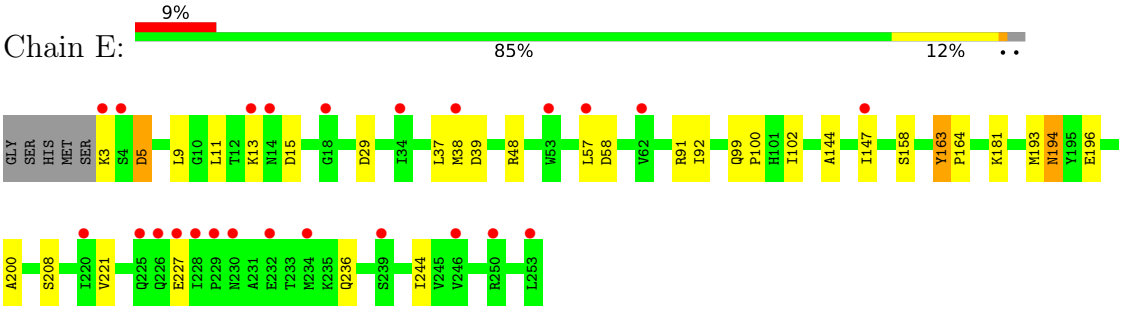


• Molecule 1: Uridine phosphorylase

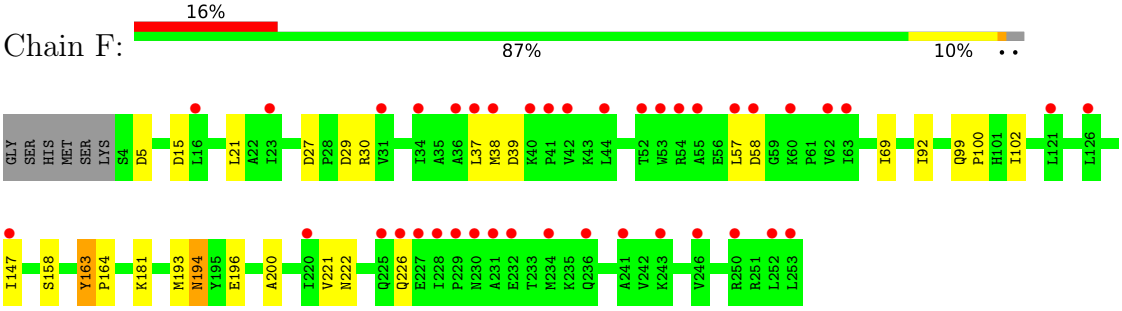




• Molecule 1: Uridine phosphorylase



• Molecule 1: Uridine phosphorylase



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	91.15Å 125.75Å 140.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.14 – 2.00 46.91 – 2.00	Depositor EDS
% Data completeness (in resolution range)	96.7 (47.14-2.00) 96.7 (46.91-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.26 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.1.24, CNS	Depositor
R, R_{free}	0.209 , 0.226 0.206 , 0.222	Depositor DCC
R_{free} test set	11027 reflections (10.07%)	wwPDB-VP
Wilson B-factor (Å^2)	30.9	Xtriage
Anisotropy	0.318	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 40.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	11932	wwPDB-VP
Average B, all atoms (Å^2)	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% 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: K, PO4, 181

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	0.30	0/1927	0.66	4/2616 (0.2%)
1	B	0.30	0/1913	0.67	7/2598 (0.3%)
1	C	0.30	0/1904	0.67	6/2587 (0.2%)
1	D	0.30	0/1904	0.66	4/2587 (0.2%)
1	E	0.31	0/1913	0.65	5/2598 (0.2%)
1	F	0.29	0/1904	0.65	5/2587 (0.2%)
All	All	0.30	0/11465	0.66	31/15573 (0.2%)

There are no bond length outliers.

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	5	ASP	CB-CG-OD2	6.21	123.88	118.30
1	D	15	ASP	CB-CG-OD2	6.17	123.86	118.30
1	B	15	ASP	CB-CG-OD2	6.17	123.85	118.30
1	C	15	ASP	CB-CG-OD2	6.12	123.81	118.30
1	A	58	ASP	CB-CG-OD2	6.11	123.80	118.30
1	B	58	ASP	CB-CG-OD2	6.05	123.75	118.30
1	E	58	ASP	CB-CG-OD2	6.01	123.71	118.30
1	F	15	ASP	CB-CG-OD2	6.01	123.71	118.30
1	A	15	ASP	CB-CG-OD2	6.01	123.71	118.30
1	A	5	ASP	CB-CG-OD2	5.94	123.64	118.30
1	E	15	ASP	CB-CG-OD2	5.92	123.63	118.30
1	D	5	ASP	CB-CG-OD2	5.84	123.56	118.30
1	F	5	ASP	CB-CG-OD2	5.74	123.46	118.30
1	D	58	ASP	CB-CG-OD2	5.71	123.44	118.30
1	C	58	ASP	CB-CG-OD2	5.63	123.37	118.30
1	B	5	ASP	CB-CG-OD2	5.59	123.33	118.30
1	F	58	ASP	CB-CG-OD2	5.47	123.23	118.30
1	E	5	ASP	CB-CG-OD2	5.42	123.18	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	29	ASP	CB-CG-OD2	5.33	123.10	118.30
1	E	29	ASP	CB-CG-OD2	5.33	123.09	118.30
1	B	170	ASP	CB-CG-OD2	5.19	122.97	118.30
1	F	29	ASP	CB-CG-OD2	5.19	122.97	118.30
1	A	170	ASP	CB-CG-OD2	5.18	122.96	118.30
1	F	39	ASP	CB-CG-OD2	5.18	122.96	118.30
1	B	29	ASP	CB-CG-OD2	5.17	122.96	118.30
1	E	39	ASP	CB-CG-OD2	5.17	122.95	118.30
1	B	160	ASP	CB-CG-OD2	5.11	122.90	118.30
1	C	39	ASP	CB-CG-OD2	5.08	122.87	118.30
1	B	39	ASP	CB-CG-OD2	5.04	122.84	118.30
1	C	170	ASP	CB-CG-OD2	5.03	122.83	118.30
1	D	39	ASP	CB-CG-OD2	5.01	122.81	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1895	0	1892	12	0
1	B	1881	0	1875	10	0
1	C	1872	0	1862	10	0
1	D	1872	0	1862	13	0
1	E	1881	0	1875	11	0
1	F	1872	0	1862	10	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	1	0
2	D	5	0	0	0	0
2	E	5	0	0	0	0
2	F	5	0	0	0	0
3	A	1	0	0	0	0
3	C	1	0	0	0	0
3	E	1	0	0	0	0
4	A	20	0	14	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	20	0	14	0	0
4	C	20	0	14	0	0
4	D	20	0	14	0	0
4	E	20	0	14	0	0
4	F	20	0	14	0	0
5	A	91	0	0	0	0
5	B	84	0	0	0	0
5	C	120	0	0	0	0
5	D	91	0	0	0	0
5	E	67	0	0	0	0
5	F	53	0	0	0	0
All	All	11932	0	11312	61	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (61) 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:F:158:SER:HB3	1:F:200:ALA:HB2	1.84	0.59
1:D:158:SER:HB3	1:D:200:ALA:HB2	1.86	0.58
1:E:48:ARG:HD3	1:F:69:ILE:HD11	1.85	0.57
1:E:158:SER:HB3	1:E:200:ALA:HB2	1.87	0.56
1:C:158:SER:HB3	1:C:200:ALA:HB2	1.88	0.55
1:E:38:MET:HG2	1:E:57:LEU:HD13	1.88	0.54
1:E:193:MET:HB2	1:E:194:ASN:HD22	1.73	0.54
1:B:158:SER:HB3	1:B:200:ALA:HB2	1.90	0.53
1:D:38:MET:HG2	1:D:57:LEU:HD13	1.90	0.53
1:A:158:SER:HB3	1:A:200:ALA:HB2	1.90	0.53
1:A:163:TYR:HB2	1:A:164:PRO:HD3	1.92	0.52
1:F:193:MET:HB2	1:F:194:ASN:HD22	1.75	0.52
1:E:99:GLN:HB2	1:E:102:ILE:HD12	1.92	0.51
1:E:163:TYR:HB2	1:E:164:PRO:CD	2.41	0.51
1:D:194:ASN:HD22	1:D:194:ASN:N	2.09	0.51
1:B:193:MET:HB2	1:B:194:ASN:HD22	1.77	0.50
1:D:102:ILE:O	1:D:222:ASN:ND2	2.44	0.50
1:A:38:MET:HG2	1:A:57:LEU:HD13	1.93	0.50
1:F:27:ASP:HB3	1:F:30:ARG:HB2	1.94	0.49
1:F:163:TYR:HB2	1:F:164:PRO:HD3	1.93	0.49
1:D:163:TYR:HB2	1:D:164:PRO:CD	2.42	0.49
1:A:102:ILE:O	1:A:222:ASN:ND2	2.44	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:TYR:HB2	1:A:164:PRO:CD	2.43	0.49
1:F:163:TYR:HB2	1:F:164:PRO:CD	2.43	0.48
1:B:163:TYR:HB2	1:B:164:PRO:HD3	1.95	0.48
1:C:230:ASN:HD21	1:C:232:GLU:HB3	1.79	0.48
1:F:102:ILE:O	1:F:222:ASN:ND2	2.47	0.48
1:B:163:TYR:HB2	1:B:164:PRO:CD	2.44	0.48
1:E:163:TYR:HB2	1:E:164:PRO:HD3	1.95	0.47
1:B:38:MET:HG2	1:B:57:LEU:HD13	1.96	0.47
1:D:163:TYR:HB2	1:D:164:PRO:HD3	1.97	0.47
1:A:193:MET:HB2	1:A:194:ASN:HD22	1.80	0.47
1:C:193:MET:HB2	1:C:194:ASN:HD22	1.81	0.46
1:C:163:TYR:HB2	1:C:164:PRO:CD	2.45	0.46
1:A:49:GLU:HB3	1:B:49:GLU:HB3	1.97	0.46
1:C:102:ILE:O	1:C:222:ASN:ND2	2.47	0.46
1:C:163:TYR:HB2	1:C:164:PRO:HD3	1.98	0.46
1:C:27:ASP:HA	1:C:28:PRO:HD2	1.88	0.45
2:C:5401:PO4:O1	1:D:48:ARG:NH2	2.47	0.45
1:B:230:ASN:HD22	1:B:233:THR:H	1.63	0.45
1:D:190:MET:HG2	1:E:208:SER:HB2	1.99	0.45
1:D:27:ASP:HA	1:D:28:PRO:HD2	1.88	0.44
1:F:38:MET:HG2	1:F:57:LEU:HD13	2.00	0.43
1:A:194:ASN:HD22	1:A:194:ASN:N	2.16	0.43
1:A:27:ASP:HA	1:A:28:PRO:HD2	1.89	0.43
1:A:48:ARG:HD3	1:B:69:ILE:HD11	2.00	0.43
1:D:144:ALA:HA	1:D:244:ILE:HG12	2.01	0.42
1:E:9:LEU:HB3	1:E:11:LEU:HD12	2.00	0.42
1:D:99:GLN:HB2	1:D:102:ILE:HD12	2.02	0.42
1:A:140:LEU:HD22	1:A:216:VAL:HB	2.02	0.41
1:C:99:GLN:HB2	1:C:102:ILE:HD12	2.02	0.41
1:C:38:MET:HG2	1:C:57:LEU:HD13	2.02	0.41
1:A:72:PRO:HA	1:B:160:ASP:O	2.20	0.41
1:B:44:LEU:HD11	1:B:54:ARG:HB2	2.03	0.41
1:D:163:TYR:CB	1:D:164:PRO:CD	2.99	0.41
1:F:99:GLN:HB2	1:F:102:ILE:HD12	2.02	0.41
1:D:193:MET:HB2	1:D:194:ASN:HD22	1.86	0.40
1:E:144:ALA:HA	1:E:244:ILE:HG12	2.04	0.40
1:C:60:LYS:HE3	1:C:253:LEU:HB3	2.04	0.40
1:E:99:GLN:HA	1:E:100:PRO:HD3	1.92	0.40
1:F:99:GLN:HA	1:F:100:PRO:HD3	1.92	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	251/256 (98%)	246 (98%)	4 (2%)	1 (0%)	34	30
1	B	249/256 (97%)	244 (98%)	3 (1%)	2 (1%)	19	13
1	C	248/256 (97%)	242 (98%)	5 (2%)	1 (0%)	34	30
1	D	248/256 (97%)	242 (98%)	5 (2%)	1 (0%)	34	30
1	E	249/256 (97%)	243 (98%)	5 (2%)	1 (0%)	34	30
1	F	248/256 (97%)	241 (97%)	6 (2%)	1 (0%)	34	30
All	All	1493/1536 (97%)	1458 (98%)	28 (2%)	7 (0%)	29	23

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	163	TYR
1	B	163	TYR
1	C	163	TYR
1	D	163	TYR
1	E	163	TYR
1	F	163	TYR
1	B	232	GLU

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	202/206 (98%)	186 (92%)	16 (8%)	12	8

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	B	200/206 (97%)	188 (94%)	12 (6%)	19 14
1	C	199/206 (97%)	187 (94%)	12 (6%)	19 14
1	D	199/206 (97%)	188 (94%)	11 (6%)	21 17
1	E	200/206 (97%)	187 (94%)	13 (6%)	17 12
1	F	199/206 (97%)	190 (96%)	9 (4%)	27 24
All	All	1199/1236 (97%)	1126 (94%)	73 (6%)	18 14

All (73) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	2	SER
1	A	3	LYS
1	A	40	LYS
1	A	42	VAL
1	A	91	ARG
1	A	92	ILE
1	A	147	ILE
1	A	181	LYS
1	A	194	ASN
1	A	196	GLU
1	A	221	VAL
1	A	225	GLN
1	A	226	GLN
1	A	250	ARG
1	A	251	ARG
1	B	91	ARG
1	B	92	ILE
1	B	147	ILE
1	B	181	LYS
1	B	194	ASN
1	B	196	GLU
1	B	225	GLN
1	B	226	GLN
1	B	232	GLU
1	B	236	GLN
1	B	240	HIS
1	B	243	LYS
1	C	91	ARG
1	C	92	ILE

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Mol	Chain	Res	Type
1	C	145	LYS
1	C	147	ILE
1	C	181	LYS
1	C	194	ASN
1	C	196	GLU
1	C	221	VAL
1	C	226	GLN
1	C	228	ILE
1	C	230	ASN
1	C	232	GLU
1	D	37	LEU
1	D	43	LYS
1	D	91	ARG
1	D	92	ILE
1	D	147	ILE
1	D	181	LYS
1	D	194	ASN
1	D	196	GLU
1	D	221	VAL
1	D	225	GLN
1	D	232	GLU
1	E	3	LYS
1	E	5	ASP
1	E	13	LYS
1	E	37	LEU
1	E	91	ARG
1	E	92	ILE
1	E	147	ILE
1	E	181	LYS
1	E	194	ASN
1	E	196	GLU
1	E	221	VAL
1	E	227	GLU
1	E	236	GLN
1	F	21	LEU
1	F	37	LEU
1	F	92	ILE
1	F	147	ILE
1	F	181	LYS
1	F	194	ASN
1	F	196	GLU
1	F	221	VAL

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Mol	Chain	Res	Type
1	F	226	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	GLN
1	A	194	ASN
1	B	17	GLN
1	B	99	GLN
1	B	194	ASN
1	B	230	ASN
1	C	17	GLN
1	C	47	HIS
1	C	99	GLN
1	C	194	ASN
1	C	230	ASN
1	D	47	HIS
1	D	99	GLN
1	D	194	ASN
1	D	226	GLN
1	D	230	ASN
1	E	99	GLN
1	E	194	ASN
1	E	230	ASN
1	F	99	GLN
1	F	179	HIS
1	F	194	ASN
1	F	226	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 15 ligands modelled in this entry, 3 are monoatomic - leaving 12 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	$\#\|Z\| > 2$
4	181	C	5400	-	15,21,21	2.44	9 (60%)	16,27,27	1.81	2 (12%)
4	181	A	3400	-	15,21,21	2.47	9 (60%)	16,27,27	1.83	2 (12%)
2	PO4	B	4401	-	4,4,4	0.91	0	6,6,6	0.41	0
4	181	E	7400	-	15,21,21	2.46	9 (60%)	16,27,27	1.75	2 (12%)
4	181	B	4400	-	15,21,21	2.44	9 (60%)	16,27,27	1.81	2 (12%)
2	PO4	A	3401	-	4,4,4	0.89	0	6,6,6	0.42	0
2	PO4	C	5401	-	4,4,4	0.90	0	6,6,6	0.50	0
2	PO4	F	8401	-	4,4,4	0.91	0	6,6,6	0.42	0
2	PO4	E	7401	-	4,4,4	0.91	0	6,6,6	0.42	0
4	181	F	8400	-	15,21,21	2.46	9 (60%)	16,27,27	1.84	2 (12%)
4	181	D	6400	-	15,21,21	2.46	9 (60%)	16,27,27	1.87	2 (12%)
2	PO4	D	6401	-	4,4,4	0.88	0	6,6,6	0.41	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
4	181	C	5400	-	-	1/8/9/9	0/2/2/2
4	181	A	3400	-	-	1/8/9/9	0/2/2/2
4	181	E	7400	-	-	1/8/9/9	0/2/2/2
4	181	B	4400	-	-	1/8/9/9	0/2/2/2
4	181	F	8400	-	-	1/8/9/9	0/2/2/2
4	181	D	6400	-	-	1/8/9/9	0/2/2/2

All (54) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	6400	181	CAR-NAM	5.29	1.42	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	4400	181	CAR-NAM	5.26	1.42	1.33
4	F	8400	181	CAR-NAM	5.26	1.42	1.33
4	E	7400	181	CAR-NAM	5.23	1.42	1.33
4	A	3400	181	CAR-NAM	5.20	1.42	1.33
4	C	5400	181	CAR-NAM	5.12	1.42	1.33
4	E	7400	181	CAE-CAG	3.24	1.45	1.38
4	A	3400	181	CAE-CAG	3.22	1.45	1.38
4	A	3400	181	CAG-CAP	3.21	1.45	1.39
4	D	6400	181	CAE-CAG	3.21	1.45	1.38
4	C	5400	181	CAE-CAG	3.17	1.45	1.38
4	F	8400	181	CAE-CAG	3.17	1.45	1.38
4	E	7400	181	CAG-CAP	3.14	1.45	1.39
4	C	5400	181	CAG-CAP	3.13	1.45	1.39
4	B	4400	181	CAE-CAG	3.10	1.45	1.38
4	D	6400	181	CAG-CAP	3.09	1.45	1.39
4	F	8400	181	CAG-CAP	3.08	1.45	1.39
4	C	5400	181	CAF-CAH	3.04	1.45	1.38
4	D	6400	181	CAF-CAH	3.04	1.45	1.38
4	E	7400	181	CAF-CAH	3.04	1.45	1.38
4	F	8400	181	CAF-CAH	3.04	1.45	1.38
4	A	3400	181	CAF-CAH	3.03	1.45	1.38
4	B	4400	181	CAG-CAP	3.00	1.45	1.39
4	B	4400	181	CAF-CAH	2.93	1.45	1.38
4	B	4400	181	CAI-NAT	2.80	1.43	1.36
4	A	3400	181	CAI-NAT	2.77	1.42	1.36
4	F	8400	181	CAH-CAP	2.76	1.44	1.39
4	F	8400	181	CAI-NAT	2.75	1.42	1.36
4	E	7400	181	CAH-CAP	2.75	1.44	1.39
4	A	3400	181	CAH-CAP	2.74	1.44	1.39
4	C	5400	181	CAH-CAP	2.74	1.44	1.39
4	C	5400	181	CAI-NAT	2.74	1.42	1.36
4	B	4400	181	CAH-CAP	2.72	1.44	1.39
4	D	6400	181	CAH-CAP	2.71	1.44	1.39
4	E	7400	181	CAI-NAT	2.69	1.42	1.36
4	D	6400	181	CAI-NAT	2.66	1.42	1.36
4	A	3400	181	CAD-CAF	2.65	1.45	1.38
4	D	6400	181	CAD-CAF	2.62	1.45	1.38
4	E	7400	181	CAD-CAF	2.61	1.44	1.38
4	F	8400	181	CAD-CAF	2.59	1.44	1.38
4	C	5400	181	CAD-CAF	2.59	1.44	1.38
4	B	4400	181	CAD-CAF	2.56	1.44	1.38
4	E	7400	181	CAE-CAD	2.32	1.44	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	4400	181	CAE-CAD	2.31	1.44	1.38
4	C	5400	181	CAE-CAD	2.31	1.44	1.38
4	A	3400	181	CAE-CAD	2.31	1.44	1.38
4	F	8400	181	CAE-CAD	2.30	1.44	1.38
4	D	6400	181	CAE-CAD	2.28	1.44	1.38
4	B	4400	181	CAS-NAM	2.21	1.42	1.38
4	D	6400	181	CAS-NAM	2.17	1.42	1.38
4	F	8400	181	CAS-NAM	2.16	1.42	1.38
4	E	7400	181	CAS-NAM	2.13	1.42	1.38
4	A	3400	181	CAS-NAM	2.11	1.42	1.38
4	C	5400	181	CAS-NAM	2.11	1.42	1.38

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	F	8400	181	CAS-NAM-CAR	6.21	120.38	115.14
4	A	3400	181	CAS-NAM-CAR	6.16	120.34	115.14
4	C	5400	181	CAS-NAM-CAR	6.11	120.30	115.14
4	D	6400	181	CAS-NAM-CAR	6.09	120.29	115.14
4	B	4400	181	CAS-NAM-CAR	6.04	120.24	115.14
4	E	7400	181	CAS-NAM-CAR	5.93	120.15	115.14
4	D	6400	181	CAR-CAQ-SAO	2.99	123.99	119.89
4	F	8400	181	CAR-CAQ-SAO	2.61	123.47	119.89
4	A	3400	181	CAR-CAQ-SAO	2.53	123.35	119.89
4	B	4400	181	CAR-CAQ-SAO	2.42	123.20	119.89
4	C	5400	181	CAR-CAQ-SAO	2.42	123.20	119.89
4	E	7400	181	CAR-CAQ-SAO	2.40	123.17	119.89

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	3400	181	OAN-CAL-NAT-CAI
4	B	4400	181	OAN-CAL-NAT-CAI
4	C	5400	181	OAN-CAL-NAT-CAI
4	D	6400	181	OAN-CAL-NAT-CAI
4	E	7400	181	OAN-CAL-NAT-CAI
4	F	8400	181	OAN-CAL-NAT-CAI

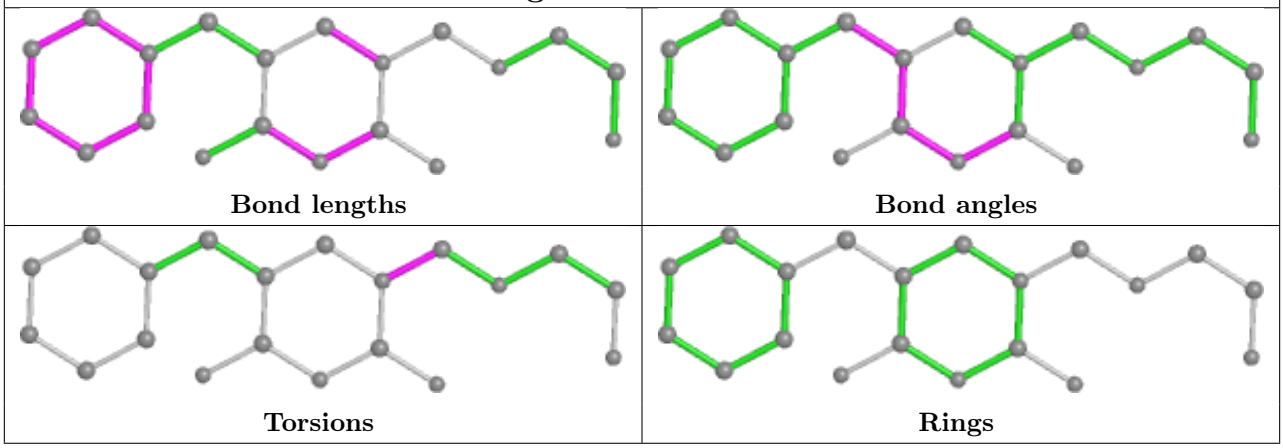
There are no ring outliers.

1 monomer is involved in 1 short contact:

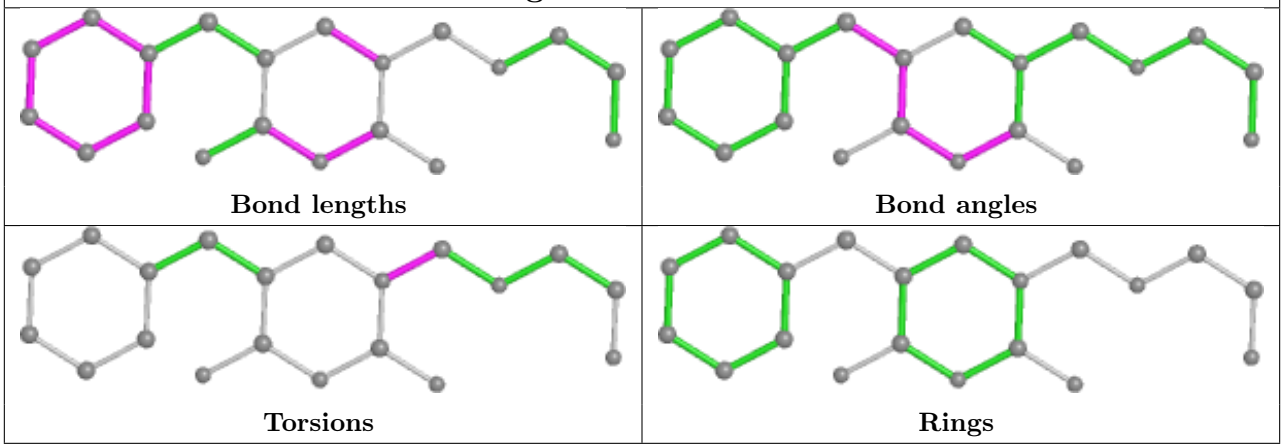
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	5401	PO4	1	0

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 then 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.

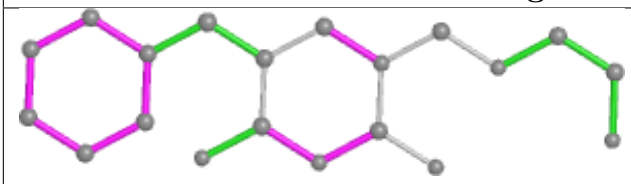
Ligand 181 C 5400



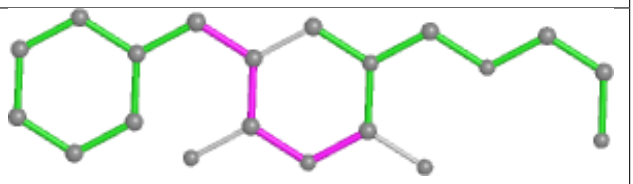
Ligand 181 A 3400



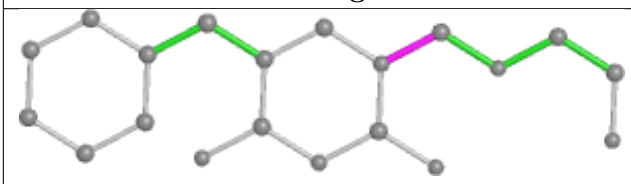
Ligand 181 E 7400



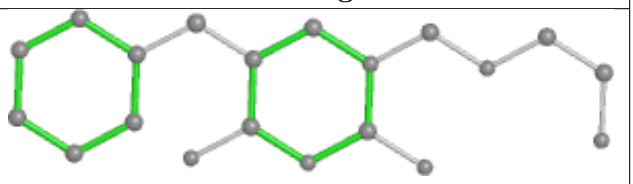
Bond lengths



Bond angles

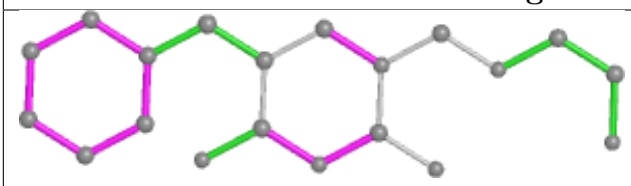


Torsions

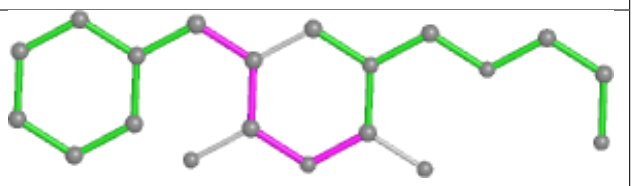


Rings

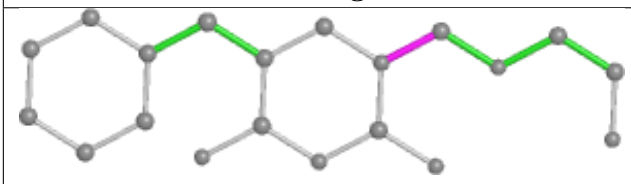
Ligand 181 B 4400



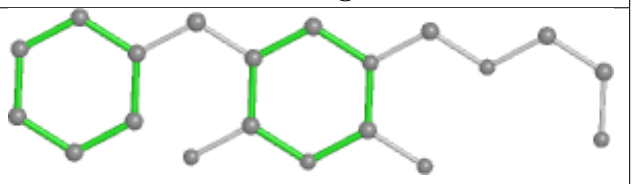
Bond lengths



Bond angles

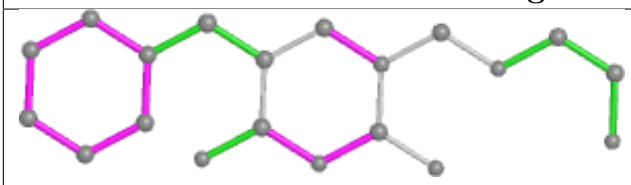


Torsions

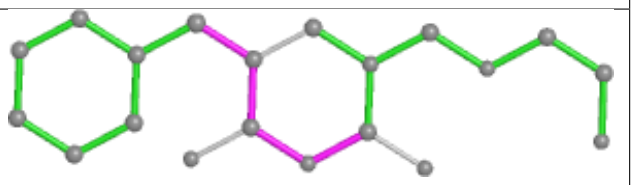


Rings

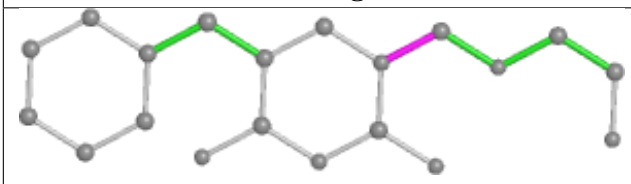
Ligand 181 F 8400



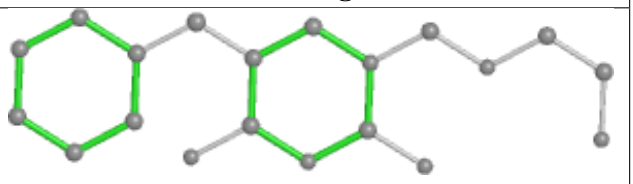
Bond lengths



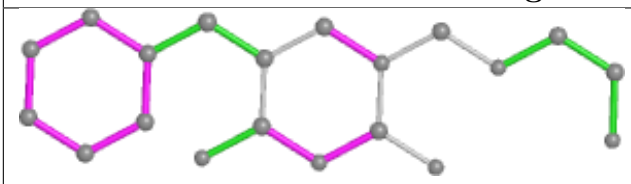
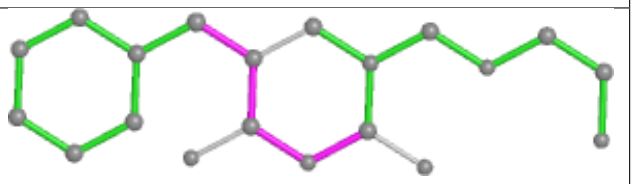
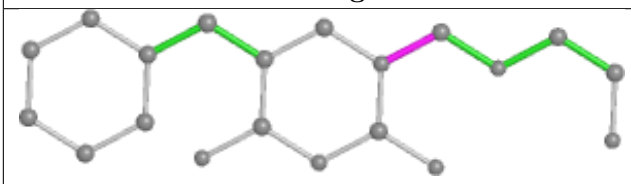
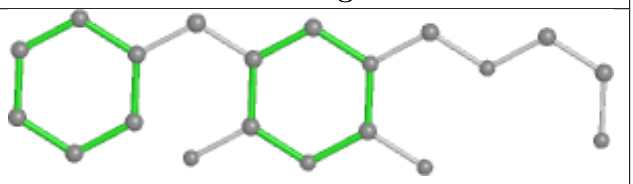
Bond angles



Torsions



Rings

Ligand 181 D 6400	
 Bond lengths	 Bond angles
 Torsions	 Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95^{th} 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	253/256 (98%)	0.28	11 (4%) 35 34	14, 16, 22, 26	0
1	B	251/256 (98%)	0.27	4 (1%) 72 70	14, 16, 19, 23	0
1	C	250/256 (97%)	0.10	10 (4%) 38 37	14, 16, 21, 25	0
1	D	250/256 (97%)	0.33	14 (5%) 24 23	14, 16, 22, 26	0
1	E	251/256 (98%)	0.58	24 (9%) 8 7	15, 16, 19, 22	0
1	F	250/256 (97%)	0.99	40 (16%) 1 1	15, 16, 19, 20	0
All	All	1505/1536 (97%)	0.42	103 (6%) 17 16	14, 16, 20, 26	0

All (103) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	2	SER	12.8
1	D	228	ILE	10.6
1	D	231	ALA	9.6
1	A	1	MET	8.1
1	F	228	ILE	7.5
1	D	226	GLN	7.3
1	D	227	GLU	7.2
1	C	228	ILE	7.0
1	E	232	GLU	6.7
1	E	229	PRO	6.6
1	A	227	GLU	6.2
1	B	231	ALA	6.0
1	F	34	ILE	5.9
1	C	226	GLN	5.9
1	F	227	GLU	5.8
1	A	226	GLN	5.5
1	E	228	ILE	5.5
1	E	227	GLU	5.5
1	F	41	PRO	5.4

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Mol	Chain	Res	Type	RSRZ
1	F	42	VAL	5.2
1	F	57	LEU	5.0
1	C	227	GLU	4.9
1	E	226	GLN	4.9
1	F	53	TRP	4.9
1	F	38	MET	4.7
1	F	253	LEU	4.6
1	E	57	LEU	4.6
1	D	229	PRO	4.3
1	A	229	PRO	4.1
1	F	54	ARG	4.0
1	F	230	ASN	4.0
1	D	232	GLU	4.0
1	F	36	ALA	4.0
1	C	231	ALA	3.9
1	F	37	LEU	3.9
1	D	147	ILE	3.9
1	A	228	ILE	3.8
1	E	239	SER	3.7
1	F	232	GLU	3.7
1	F	58	ASP	3.6
1	E	147	ILE	3.6
1	F	23	ILE	3.5
1	F	231	ALA	3.5
1	F	16	LEU	3.5
1	F	220	ILE	3.4
1	F	236	GLN	3.4
1	D	253	LEU	3.4
1	F	252	LEU	3.4
1	F	250	ARG	3.3
1	F	243	LYS	3.2
1	E	34	ILE	3.2
1	C	147	ILE	3.1
1	F	234	MET	3.1
1	F	40	LYS	3.0
1	B	126	LEU	3.0
1	A	232	GLU	2.9
1	F	229	PRO	2.9
1	D	234	MET	2.9
1	A	230	ASN	2.8
1	F	55	ALA	2.8
1	F	63	ILE	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	240	HIS	2.8
1	F	226	GLN	2.8
1	C	232	GLU	2.7
1	E	234	MET	2.7
1	F	62	VAL	2.7
1	E	225	GLN	2.6
1	E	13	LYS	2.6
1	E	3	LYS	2.6
1	F	126	LEU	2.5
1	E	250	ARG	2.5
1	D	146	SER	2.5
1	E	18	GLY	2.5
1	E	38	MET	2.4
1	E	253	LEU	2.4
1	C	250	ARG	2.4
1	F	31	VAL	2.4
1	D	60	LYS	2.4
1	A	36	ALA	2.4
1	A	240	HIS	2.4
1	E	53	TRP	2.4
1	E	230	ASN	2.3
1	D	250	ARG	2.3
1	F	52	THR	2.3
1	F	225	GLN	2.3
1	D	126	LEU	2.2
1	F	60	LYS	2.2
1	F	147	ILE	2.2
1	F	44	LEU	2.2
1	E	246	VAL	2.2
1	F	241	ALA	2.2
1	A	146	SER	2.2
1	E	4	SER	2.2
1	E	62	VAL	2.2
1	C	229	PRO	2.1
1	B	232	GLU	2.1
1	C	146	SER	2.1
1	F	121	LEU	2.1
1	B	53	TRP	2.1
1	F	246	VAL	2.0
1	E	14	ASN	2.0
1	C	37	LEU	2.0
1	E	220	ILE	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

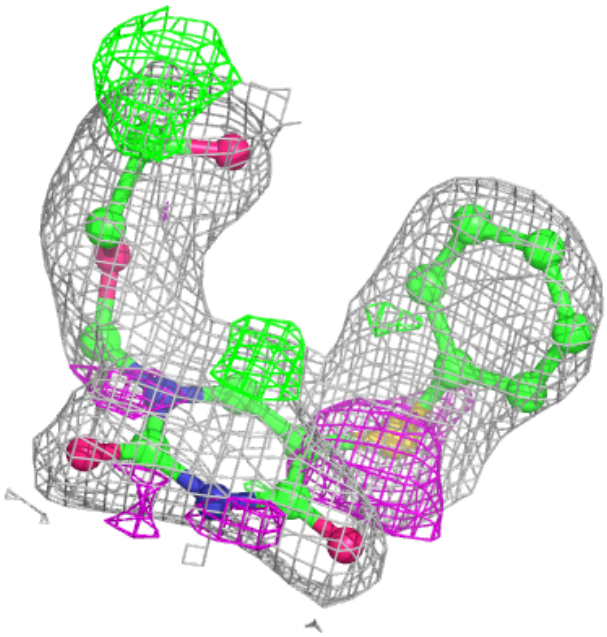
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

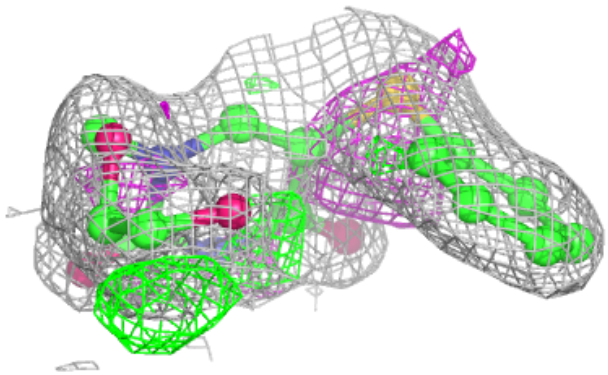
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	K	E	1003	1/1	0.76	0.38	74,74,74,74	0
3	K	A	1001	1/1	0.80	0.30	64,64,64,64	0
4	181	F	8400	20/20	0.84	0.21	44,45,46,46	0
4	181	B	4400	20/20	0.87	0.16	35,37,38,38	0
3	K	C	1002	1/1	0.90	0.16	56,56,56,56	0
4	181	E	7400	20/20	0.93	0.15	41,42,43,43	0
4	181	A	3400	20/20	0.93	0.12	35,37,39,39	0
2	PO4	D	6401	5/5	0.94	0.10	40,40,41,41	0
2	PO4	F	8401	5/5	0.95	0.17	47,47,47,47	0
2	PO4	B	4401	5/5	0.95	0.11	40,40,40,41	0
4	181	D	6400	20/20	0.96	0.12	30,31,32,32	0
2	PO4	A	3401	5/5	0.96	0.10	41,41,41,42	0
4	181	C	5400	20/20	0.96	0.12	30,32,33,33	0
2	PO4	C	5401	5/5	0.97	0.09	35,36,36,37	0
2	PO4	E	7401	5/5	0.97	0.09	48,49,49,49	0

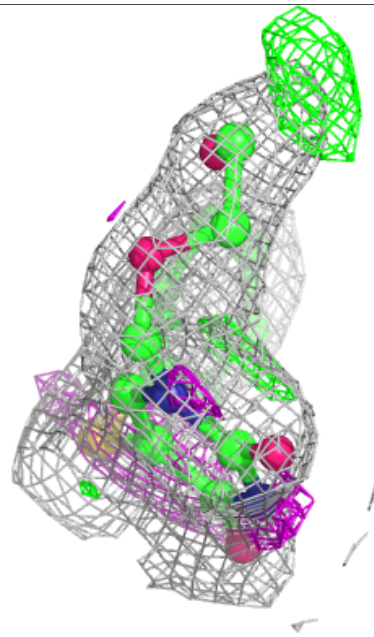
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 181 F 8400:

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

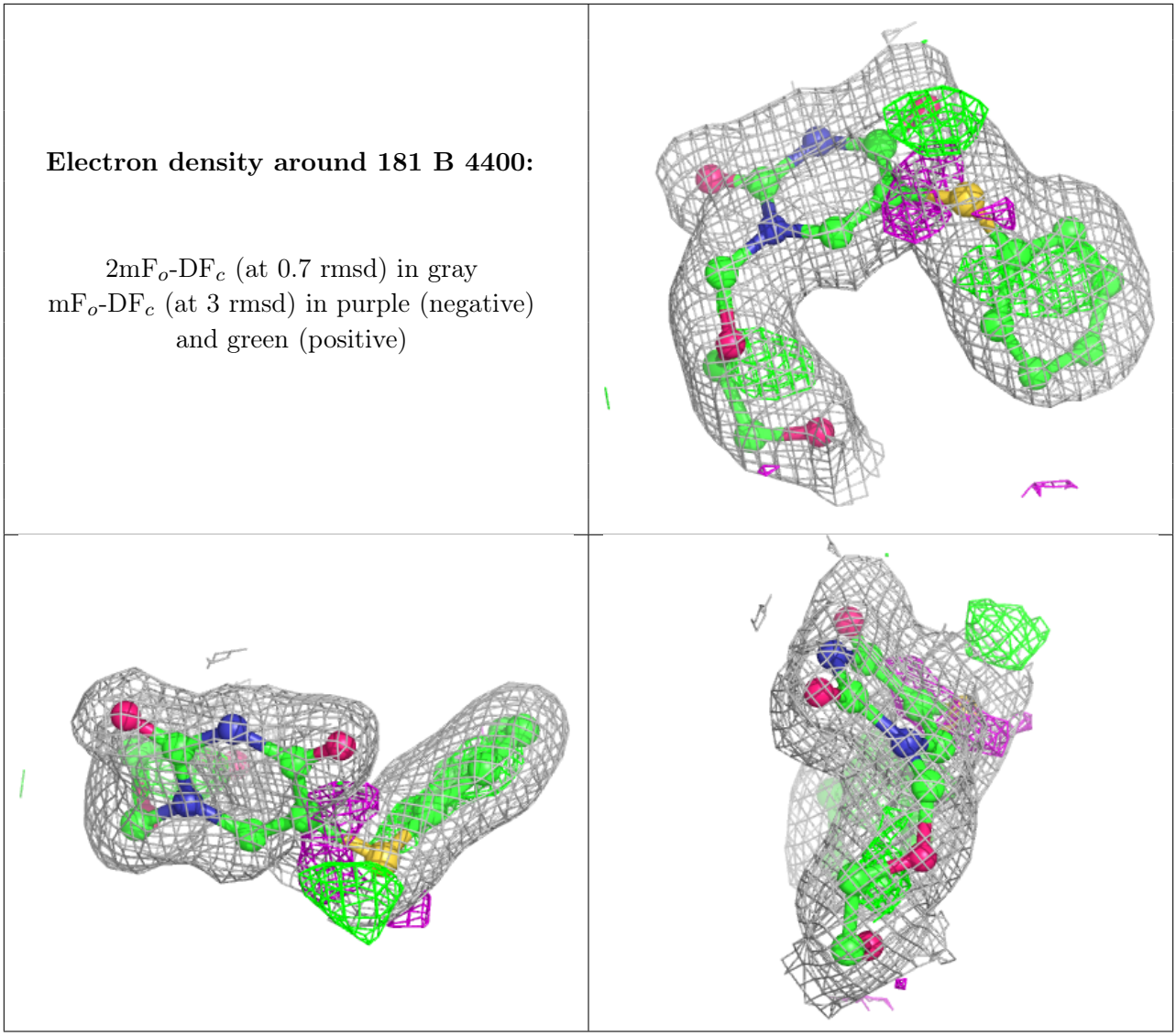






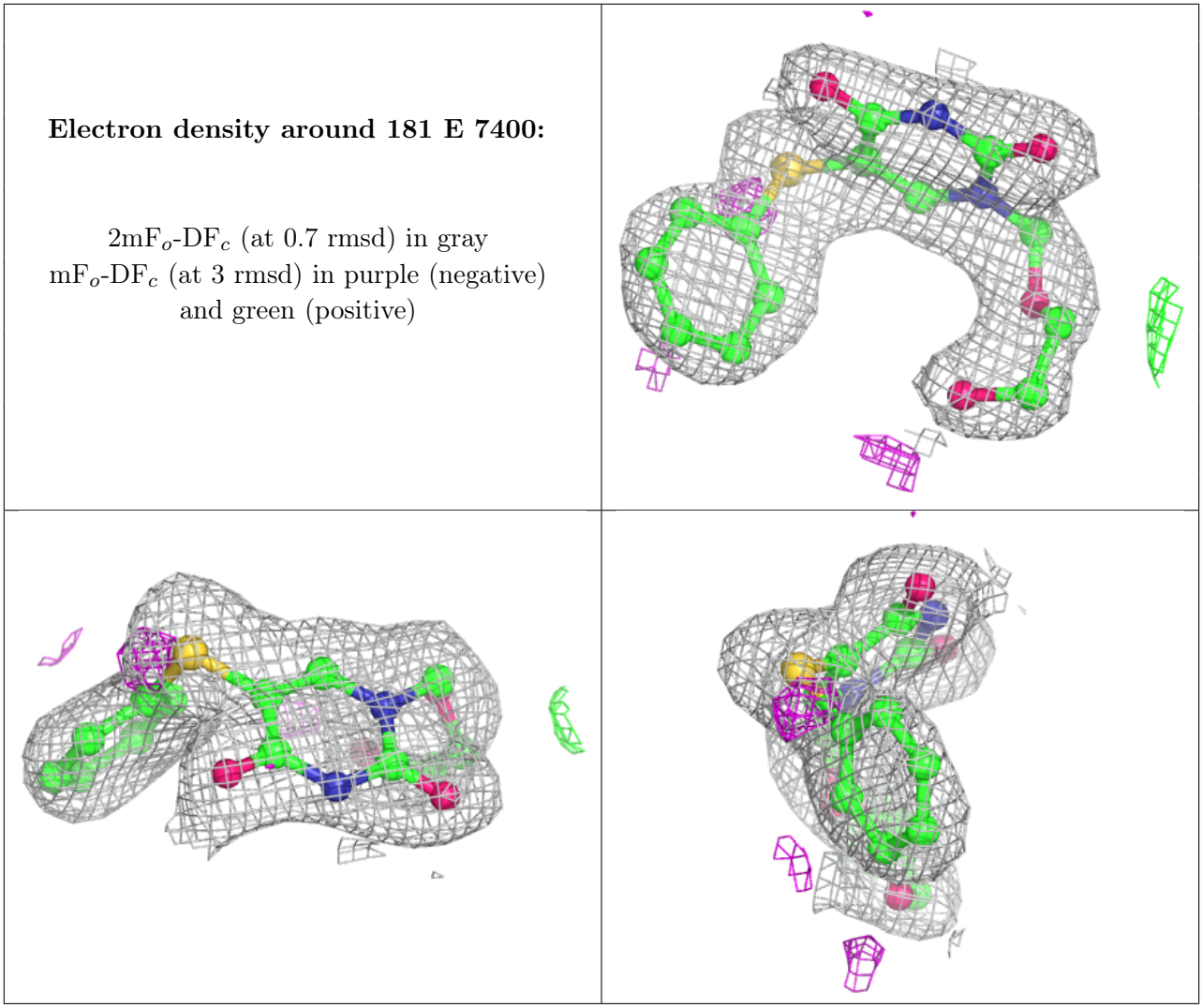
Electron density around 181 B 4400:

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



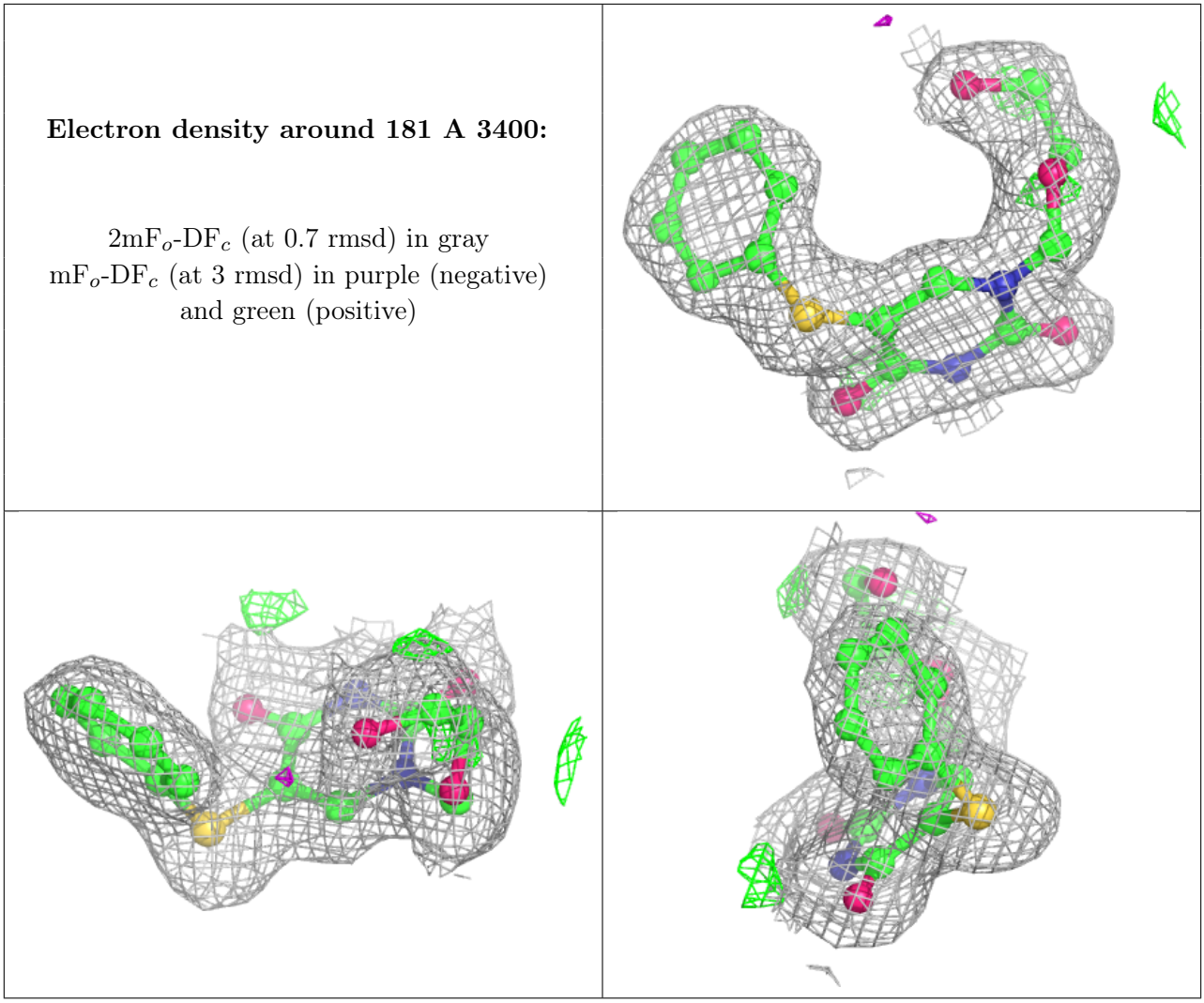
Electron density around 181 E 7400:

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



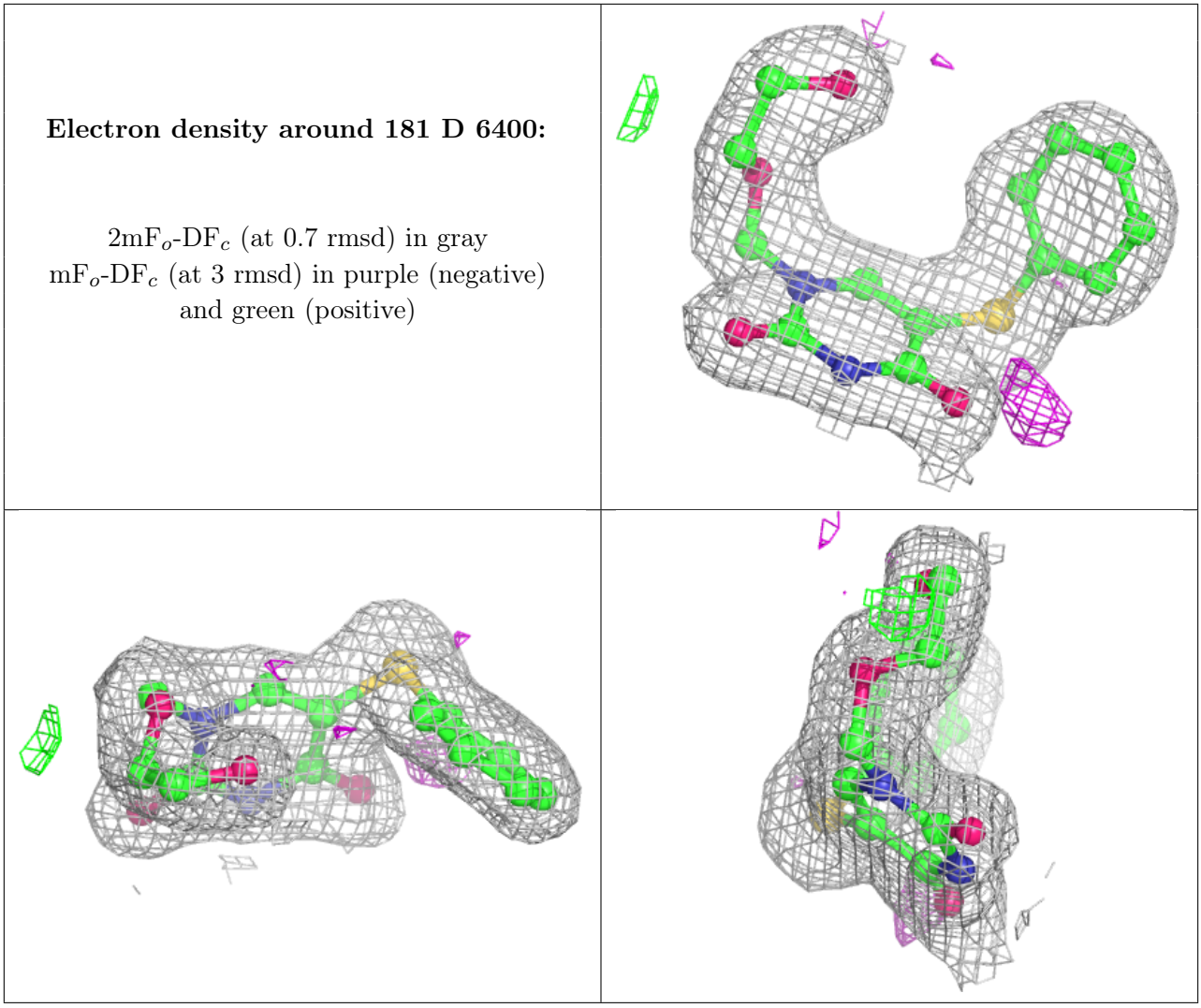
Electron density around 181 A 3400:

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



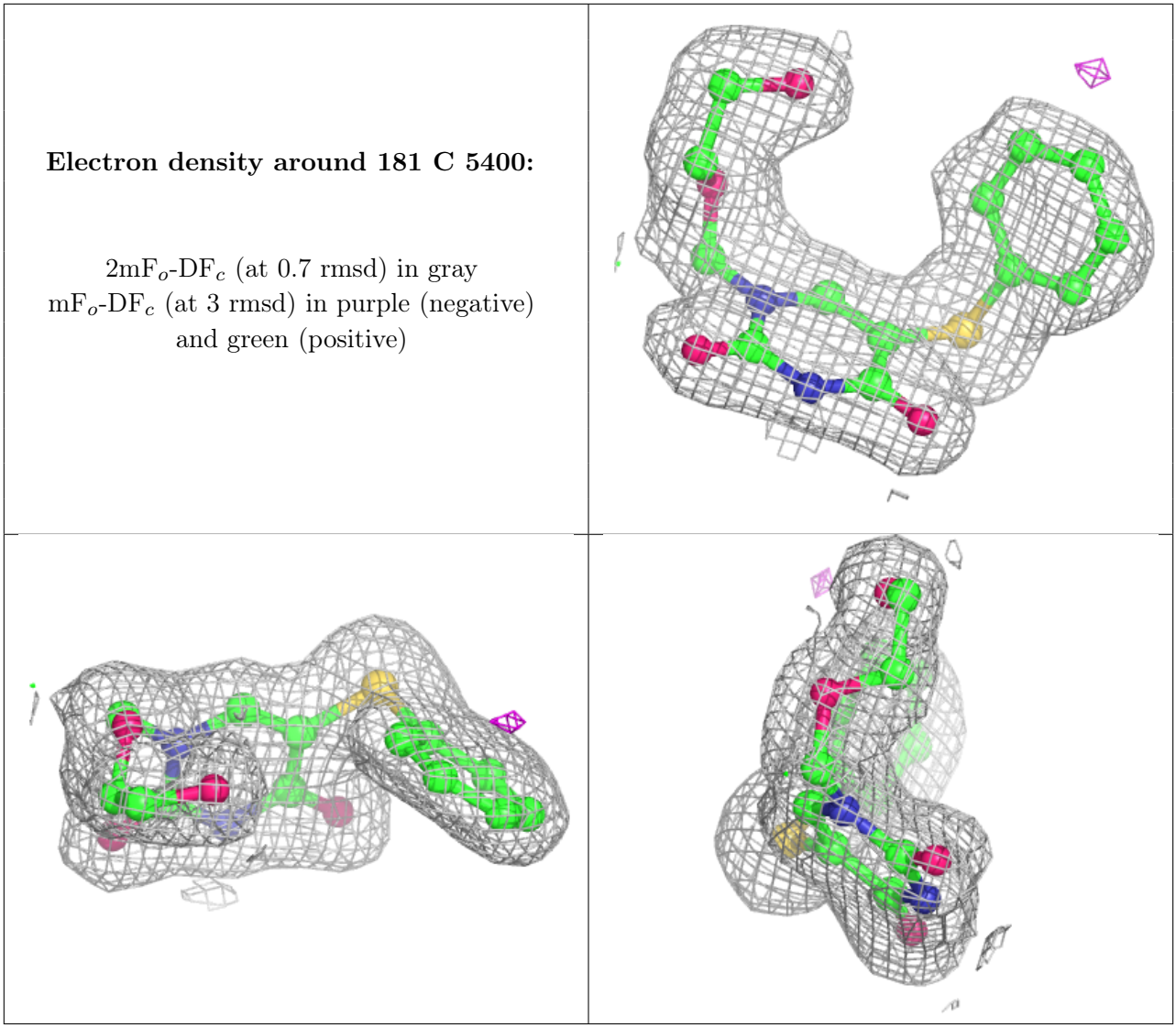
Electron density around 181 D 6400:

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



Electron density around 181 C 5400:

$2mF_o$-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.