wwPDB X-ray Structure Validation Summary Report (i)

Aug 22, 2020 – 08:09 AM BST

PDB ID	:	5DWK
Title	:	Diacylglycerol Kinase solved by multi crystal multi orientation native SAD
Authors	:	Weinert, T.; Olieric, V.; Finke, A.D.; Li, D.; Caffrey, M.; Wang, M.
Deposited on	:	2015-09-22
Resolution	:	2.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

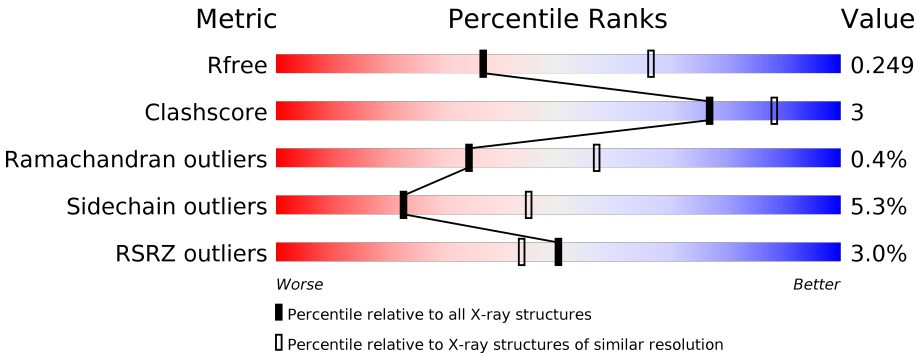
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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	130	2% 62% 10% • 27%
1	B	130	2% 82% • 15%
1	C	130	72% 9% • 18%
1	D	130	2% 59% 8% 33%
1	E	130	4% 58% 5% • 35%
1	F	130	3% 58% 5% • 36%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 4584 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 Diacylglycerol kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	95	Total	C	N	O	S	0	0	0
			716	465	118	130	3			
1	B	111	Total	C	N	O	S	0	1	0
			839	550	142	144	3			
1	C	106	Total	C	N	O	S	0	0	0
			814	533	135	143	3			
1	D	87	Total	C	N	O	S	0	0	0
			656	430	105	118	3			
1	E	84	Total	C	N	O	S	0	0	0
			630	412	102	113	3			
1	F	83	Total	C	N	O	S	0	0	0
			588	378	100	108	2			

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	GLY	-	expression tag	UNP P0ABN1
A	-7	HIS	-	expression tag	UNP P0ABN1
A	-6	HIS	-	expression tag	UNP P0ABN1
A	-5	HIS	-	expression tag	UNP P0ABN1
A	-4	HIS	-	expression tag	UNP P0ABN1
A	-3	HIS	-	expression tag	UNP P0ABN1
A	-2	HIS	-	expression tag	UNP P0ABN1
A	-1	GLU	-	expression tag	UNP P0ABN1
A	0	LEU	-	expression tag	UNP P0ABN1
A	41	CYS	ALA	engineered mutation	UNP P0ABN1
A	46	ALA	CYS	engineered mutation	UNP P0ABN1
A	53	VAL	ILE	engineered mutation	UNP P0ABN1
A	70	LEU	ILE	engineered mutation	UNP P0ABN1
A	96	LEU	MET	engineered mutation	UNP P0ABN1
A	107	ASP	VAL	engineered mutation	UNP P0ABN1
A	113	ALA	CYS	engineered mutation	UNP P0ABN1
B	-8	GLY	-	expression tag	UNP P0ABN1

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-7	HIS	-	expression tag	UNP P0ABN1
B	-6	HIS	-	expression tag	UNP P0ABN1
B	-5	HIS	-	expression tag	UNP P0ABN1
B	-4	HIS	-	expression tag	UNP P0ABN1
B	-3	HIS	-	expression tag	UNP P0ABN1
B	-2	HIS	-	expression tag	UNP P0ABN1
B	-1	GLU	-	expression tag	UNP P0ABN1
B	0	LEU	-	expression tag	UNP P0ABN1
B	41	CYS	ALA	engineered mutation	UNP P0ABN1
B	46	ALA	CYS	engineered mutation	UNP P0ABN1
B	53	VAL	ILE	engineered mutation	UNP P0ABN1
B	73	LEU	ILE	engineered mutation	UNP P0ABN1
B	99	LEU	MET	engineered mutation	UNP P0ABN1
B	110	ASP	VAL	engineered mutation	UNP P0ABN1
B	116	ALA	CYS	engineered mutation	UNP P0ABN1
C	-8	GLY	-	expression tag	UNP P0ABN1
C	-7	HIS	-	expression tag	UNP P0ABN1
C	-6	HIS	-	expression tag	UNP P0ABN1
C	-5	HIS	-	expression tag	UNP P0ABN1
C	-4	HIS	-	expression tag	UNP P0ABN1
C	-3	HIS	-	expression tag	UNP P0ABN1
C	-2	HIS	-	expression tag	UNP P0ABN1
C	-1	GLU	-	expression tag	UNP P0ABN1
C	0	LEU	-	expression tag	UNP P0ABN1
C	41	CYS	ALA	engineered mutation	UNP P0ABN1
C	46	ALA	CYS	engineered mutation	UNP P0ABN1
C	53	VAL	ILE	engineered mutation	UNP P0ABN1
C	70	LEU	ILE	engineered mutation	UNP P0ABN1
C	96	LEU	MET	engineered mutation	UNP P0ABN1
C	107	ASP	VAL	engineered mutation	UNP P0ABN1
C	113	ALA	CYS	engineered mutation	UNP P0ABN1
D	-8	GLY	-	expression tag	UNP P0ABN1
D	-7	HIS	-	expression tag	UNP P0ABN1
D	-6	HIS	-	expression tag	UNP P0ABN1
D	-5	HIS	-	expression tag	UNP P0ABN1
D	-4	HIS	-	expression tag	UNP P0ABN1
D	-3	HIS	-	expression tag	UNP P0ABN1
D	-2	HIS	-	expression tag	UNP P0ABN1
D	-1	GLU	-	expression tag	UNP P0ABN1
D	0	LEU	-	expression tag	UNP P0ABN1
D	41	CYS	ALA	engineered mutation	UNP P0ABN1
D	46	ALA	CYS	engineered mutation	UNP P0ABN1

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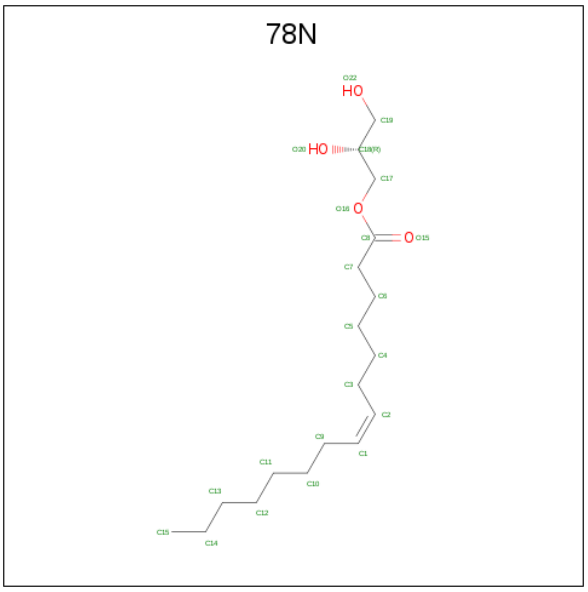
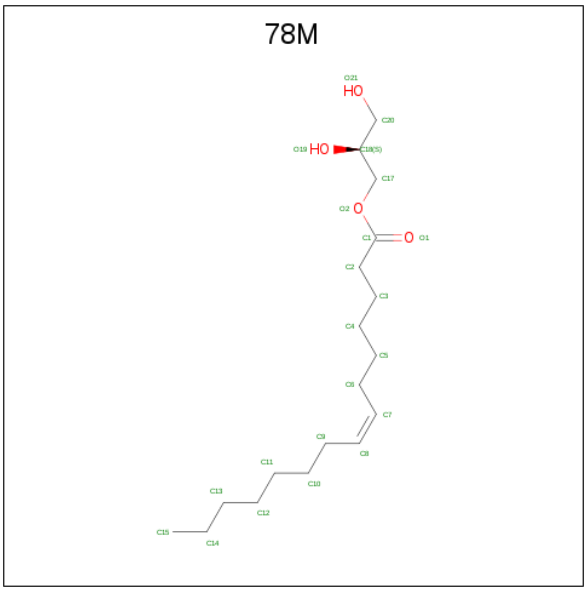
Chain	Residue	Modelled	Actual	Comment	Reference
D	53	VAL	ILE	engineered mutation	UNP P0ABN1
D	70	LEU	ILE	engineered mutation	UNP P0ABN1
D	96	LEU	MET	engineered mutation	UNP P0ABN1
D	107	ASP	VAL	engineered mutation	UNP P0ABN1
D	113	ALA	CYS	engineered mutation	UNP P0ABN1
E	-8	GLY	-	expression tag	UNP P0ABN1
E	-7	HIS	-	expression tag	UNP P0ABN1
E	-6	HIS	-	expression tag	UNP P0ABN1
E	-5	HIS	-	expression tag	UNP P0ABN1
E	-4	HIS	-	expression tag	UNP P0ABN1
E	-3	HIS	-	expression tag	UNP P0ABN1
E	-2	HIS	-	expression tag	UNP P0ABN1
E	-1	GLU	-	expression tag	UNP P0ABN1
E	0	LEU	-	expression tag	UNP P0ABN1
E	41	CYS	ALA	engineered mutation	UNP P0ABN1
E	46	ALA	CYS	engineered mutation	UNP P0ABN1
E	53	VAL	ILE	engineered mutation	UNP P0ABN1
E	70	LEU	ILE	engineered mutation	UNP P0ABN1
E	96	LEU	MET	engineered mutation	UNP P0ABN1
E	107	ASP	VAL	engineered mutation	UNP P0ABN1
E	113	ALA	CYS	engineered mutation	UNP P0ABN1
F	-8	GLY	-	expression tag	UNP P0ABN1
F	-7	HIS	-	expression tag	UNP P0ABN1
F	-6	HIS	-	expression tag	UNP P0ABN1
F	-5	HIS	-	expression tag	UNP P0ABN1
F	-4	HIS	-	expression tag	UNP P0ABN1
F	-3	HIS	-	expression tag	UNP P0ABN1
F	-2	HIS	-	expression tag	UNP P0ABN1
F	-1	GLU	-	expression tag	UNP P0ABN1
F	0	LEU	-	expression tag	UNP P0ABN1
F	41	CYS	ALA	engineered mutation	UNP P0ABN1
F	46	ALA	CYS	engineered mutation	UNP P0ABN1
F	53	VAL	ILE	engineered mutation	UNP P0ABN1
F	70	LEU	ILE	engineered mutation	UNP P0ABN1
F	96	LEU	MET	engineered mutation	UNP P0ABN1
F	107	ASP	VAL	engineered mutation	UNP P0ABN1
F	113	ALA	CYS	engineered mutation	UNP P0ABN1

- Molecule 2 is (2R)-2,3-DIHYDROXYPROPYL(7Z)-PENTADEC-7-ENOATE (three-letter code: 78N) (formula: $C_{18}H_{34}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 22 18 4	0	0
2	A	1	Total C O 22 18 4	0	0
2	A	1	Total C O 22 18 4	0	0
2	B	1	Total C O 22 18 4	0	0
2	B	1	Total C O 22 18 4	0	0
2	B	1	Total C O 22 18 4	0	0
2	D	1	Total C O 22 18 4	0	0

- Molecule 3 is (2S)-2,3-DIHYDROXYPROPYL(7Z)-PENTADEC-7-ENOATE (three-letter code: 78M) (formula: $C_{18}H_{34}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 22 18 4	0	0
3	B	1	Total C O 22 18 4	0	0
3	C	1	Total C O 22 18 4	0	0
3	C	1	Total C O 22 18 4	0	0
3	C	1	Total C O 22 18 4	0	0
3	C	1	Total C O 22 18 4	0	0

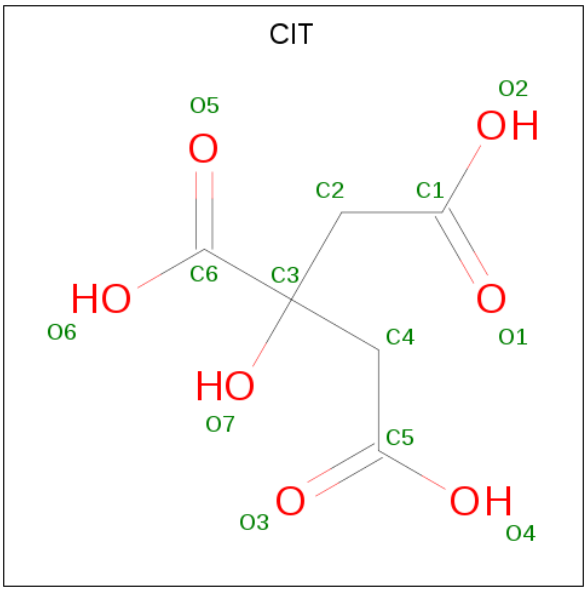
- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total Na 1 1	0	0

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

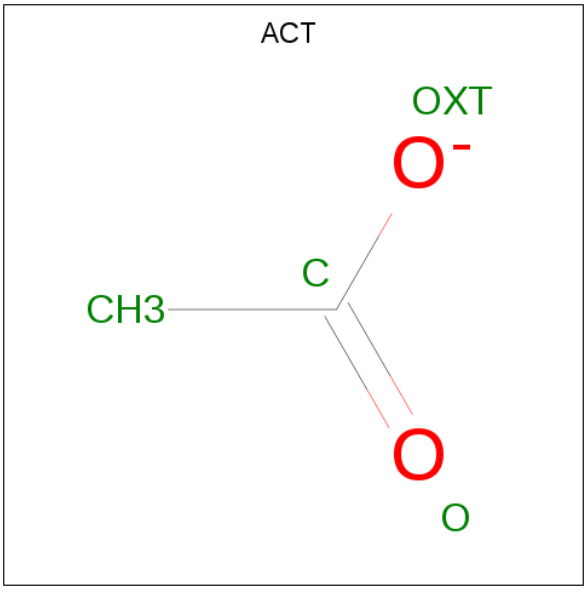
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total Zn 1 1	0	0

- Molecule 6 is CITRIC ACID (three-letter code: CIT) (formula: $C_6H_8O_7$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	C	1	Total C O 13 6 7	0	0

- Molecule 7 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	C	1	Total C O 4 2 2	0	0

- Molecule 8 is water.

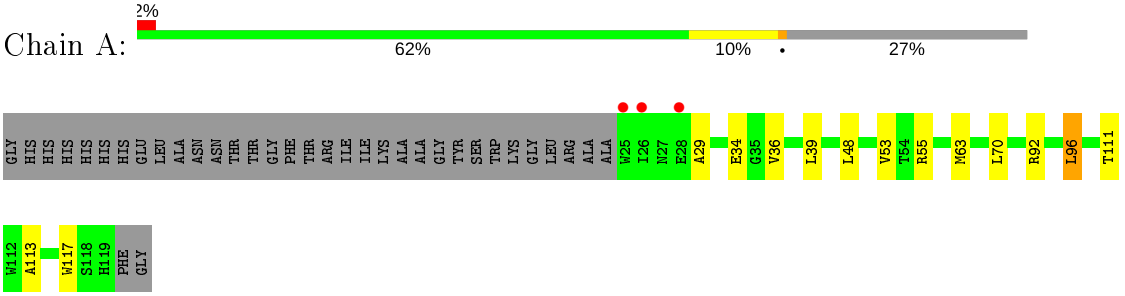
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	9	Total O 9 9	0	0
8	B	5	Total O 5 5	0	0
8	C	4	Total O 4 4	0	0
8	D	1	Total O 1 1	0	0
8	E	10	Total O 10 10	0	0
8	F	7	Total O 7 7	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

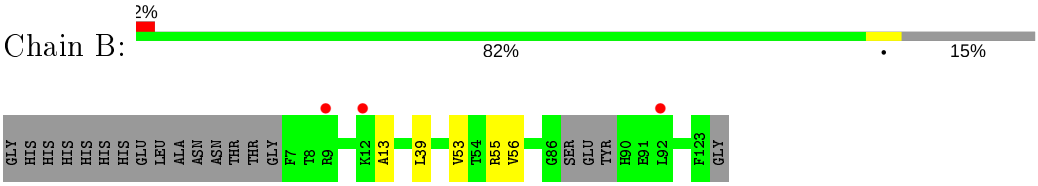
- Molecule 1: Diacylglycerol kinase

Chain A:



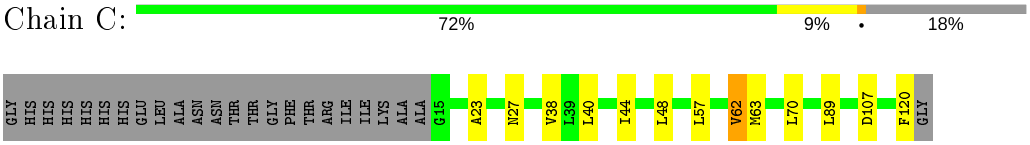
- Molecule 1: Diacylglycerol kinase

Chain B:



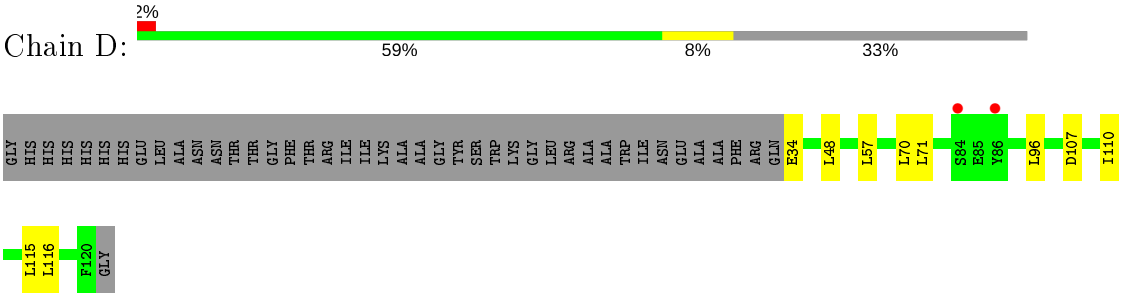
- Molecule 1: Diacylglycerol kinase

Chain C:



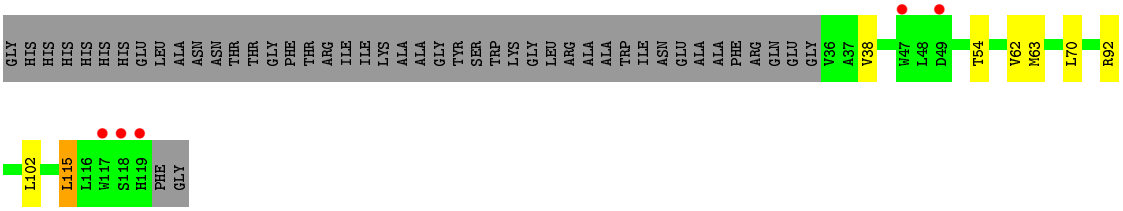
- Molecule 1: Diacylglycerol kinase

Chain D:



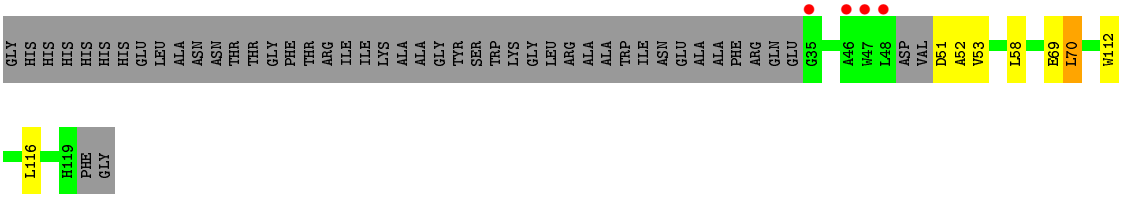
- Molecule 1: Diacylglycerol kinase

Chain E:



- Molecule 1: Diacylglycerol kinase

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	75.29Å 91.57Å 143.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.78 – 2.60 47.91 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.5 (45.78-2.60) 99.7 (47.91-2.60)	Depositor EDS
R_{merge}	0.22	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.05 (at 2.61Å)	Xtriage
Refinement program	PHENIX (dev_2067: ???)	Depositor
R, R_{free}	0.201 , 0.245 0.206 , 0.249	Depositor DCC
R_{free} test set	1556 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	47.2	Xtriage
Anisotropy	0.147	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 61.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	4584	wwPDB-VP
Average B, all atoms (Å^2)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.52% 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: ZN, NA, CIT, ACT, 78M, 78N

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	0.29	0/725	0.42	0/991
1	B	0.27	0/852	0.37	0/1162
1	C	0.27	0/829	0.38	0/1132
1	D	0.27	0/665	0.44	0/910
1	E	0.24	0/638	0.38	0/874
1	F	0.25	0/593	0.37	0/809
All	All	0.27	0/4302	0.39	0/5878

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	716	0	748	12	0
1	B	839	0	872	5	0
1	C	814	0	842	7	0
1	D	656	0	692	3	0
1	E	630	0	667	4	0
1	F	588	0	586	3	0
2	A	66	0	102	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	66	0	102	5	0
2	D	22	0	34	0	0
3	A	22	0	34	0	0
3	B	22	0	34	0	0
3	C	88	0	136	0	0
4	B	1	0	0	0	0
5	C	1	0	0	0	0
6	C	13	0	5	0	0
7	C	4	0	3	0	0
8	A	9	0	0	0	0
8	B	5	0	0	0	0
8	C	4	0	0	0	0
8	D	1	0	0	0	0
8	E	10	0	0	0	0
8	F	7	0	0	0	0
All	All	4584	0	4857	28	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.

The worst 5 of 28 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:A:55:ARG:NH1	2:A:203:78N:O20	2.25	0.69
2:A:201:78N:H18	1:B:13:ALA:HB1	1.75	0.69
1:E:38:VAL:HG13	1:E:62:VAL:HG12	1.85	0.59
1:C:107:ASP:HB2	1:E:63:MET:HG2	1.85	0.58
2:A:203:78N:H2	1:D:110:ILE:HG23	1.88	0.54

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	93/130 (72%)	89 (96%)	3 (3%)	1 (1%)	14 30
1	B	108/130 (83%)	108 (100%)	0	0	100 100
1	C	104/130 (80%)	104 (100%)	0	0	100 100
1	D	85/130 (65%)	85 (100%)	0	0	100 100
1	E	82/130 (63%)	81 (99%)	1 (1%)	0	100 100
1	F	79/130 (61%)	72 (91%)	6 (8%)	1 (1%)	12 24
All	All	551/780 (71%)	539 (98%)	10 (2%)	2 (0%)	34 57

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	52	ALA
1	A	29	ALA

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	76/102 (74%)	73 (96%)	3 (4%)	32 58
1	B	84/102 (82%)	84 (100%)	0	100 100
1	C	84/102 (82%)	78 (93%)	6 (7%)	14 29
1	D	71/102 (70%)	64 (90%)	7 (10%)	8 15
1	E	68/102 (67%)	64 (94%)	4 (6%)	19 39
1	F	56/102 (55%)	53 (95%)	3 (5%)	22 44
All	All	439/612 (72%)	416 (95%)	23 (5%)	22 46

5 of 23 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	48	LEU
1	D	71	LEU
1	F	69	GLU

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Mol	Chain	Res	Type
1	D	70	LEU
1	D	96	LEU

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

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 17 ligands modelled in this entry, 2 are monoatomic - leaving 15 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	$\#\|Z\| > 2$
7	ACT	C	207	5	1,3,3	1.33	0	0,3,3	0.00	-
2	78N	A	201	-	21,21,21	0.86	2 (9%)	22,22,22	0.98	1 (4%)
2	78N	D	201	-	21,21,21	0.86	2 (9%)	22,22,22	0.92	1 (4%)
2	78N	B	201	-	21,21,21	0.84	2 (9%)	22,22,22	0.94	1 (4%)
3	78M	C	202	-	21,21,21	0.86	2 (9%)	22,22,22	0.93	1 (4%)
3	78M	C	201	-	21,21,21	0.87	2 (9%)	22,22,22	0.95	1 (4%)
3	78M	C	204	-	21,21,21	0.87	2 (9%)	22,22,22	0.88	1 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	78N	A	202	-	21,21,21	0.87	1 (4%)	22,22,22	0.91	1 (4%)
2	78N	B	203	-	21,21,21	0.87	2 (9%)	22,22,22	0.87	1 (4%)
2	78N	A	203	-	21,21,21	0.86	1 (4%)	22,22,22	1.07	1 (4%)
3	78M	B	204	-	21,21,21	0.86	1 (4%)	22,22,22	0.97	1 (4%)
6	CIT	C	206	-	3,12,12	1.30	0	3,17,17	2.05	1 (33%)
3	78M	C	203	-	21,21,21	0.86	2 (9%)	22,22,22	0.90	1 (4%)
2	78N	B	202	-	21,21,21	0.85	2 (9%)	22,22,22	0.92	1 (4%)
3	78M	A	204	-	21,21,21	0.86	1 (4%)	22,22,22	1.00	1 (4%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	78N	A	201	-	-	14/21/21/21	-
2	78N	D	201	-	-	14/21/21/21	-
2	78N	B	201	-	-	9/21/21/21	-
3	78M	C	204	-	-	5/21/21/21	-
3	78M	C	201	-	-	9/21/21/21	-
6	CIT	C	206	-	-	4/6/16/16	-
2	78N	A	202	-	-	10/21/21/21	-
2	78N	B	203	-	-	4/21/21/21	-
2	78N	A	203	-	-	9/21/21/21	-
3	78M	B	204	-	-	7/21/21/21	-
3	78M	C	202	-	-	12/21/21/21	-
3	78M	C	203	-	-	12/21/21/21	-
2	78N	B	202	-	-	10/21/21/21	-
3	78M	A	204	-	-	10/21/21/21	-

The worst 5 of 22 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	202	78N	O16-C8	2.57	1.40	1.33
2	B	203	78N	O16-C8	2.55	1.40	1.33
3	C	201	78M	O2-C1	2.49	1.40	1.33
3	B	204	78M	O2-C1	2.47	1.40	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	203	78N	O16-C8	2.46	1.40	1.33

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	203	78N	O16-C8-C7	3.26	122.13	111.91
6	C	206	CIT	C3-C4-C5	-2.91	110.32	114.98
3	B	204	78M	O2-C1-C2	2.88	120.94	111.91
3	C	202	78M	O2-C1-C2	2.80	120.68	111.91
3	A	204	78M	O2-C1-C2	2.77	120.62	111.91

There are no chirality outliers.

5 of 129 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	78N	O16-C17-C18-C19
2	A	201	78N	O16-C17-C18-O20
2	B	201	78N	O20-C18-C19-O22
2	B	201	78N	C17-C18-C19-O22
2	B	201	78N	O16-C17-C18-C19

There are no ring outliers.

5 monomers are involved in 10 short contacts:

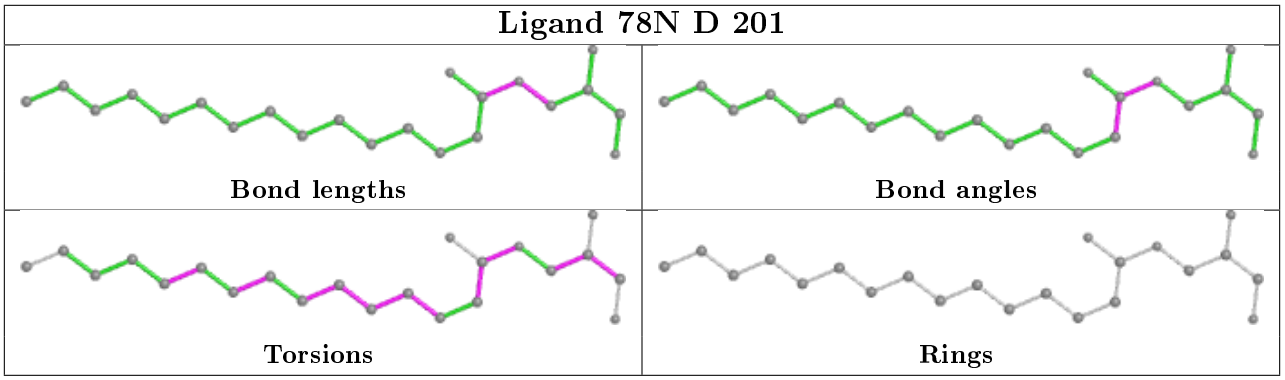
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	201	78N	1	0
2	B	201	78N	2	0
2	A	202	78N	2	0
2	B	203	78N	3	0
2	A	203	78N	3	0

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

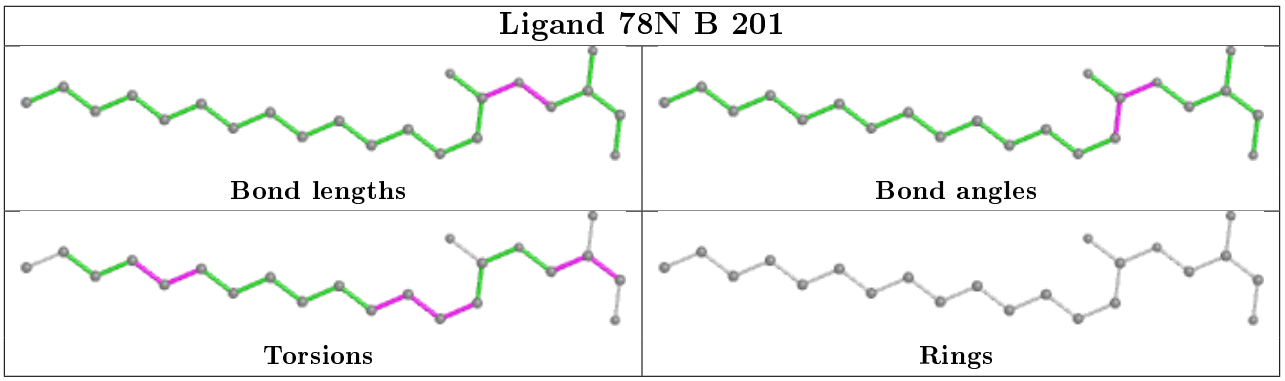
equivalents in the CSD to analyse the geometry.

Ligand 78N A 201

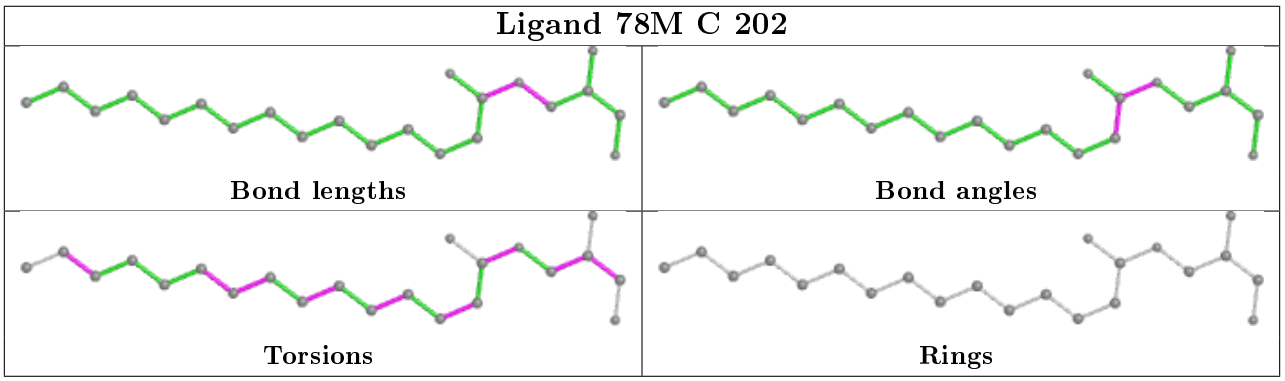
Ligand 78N D 201



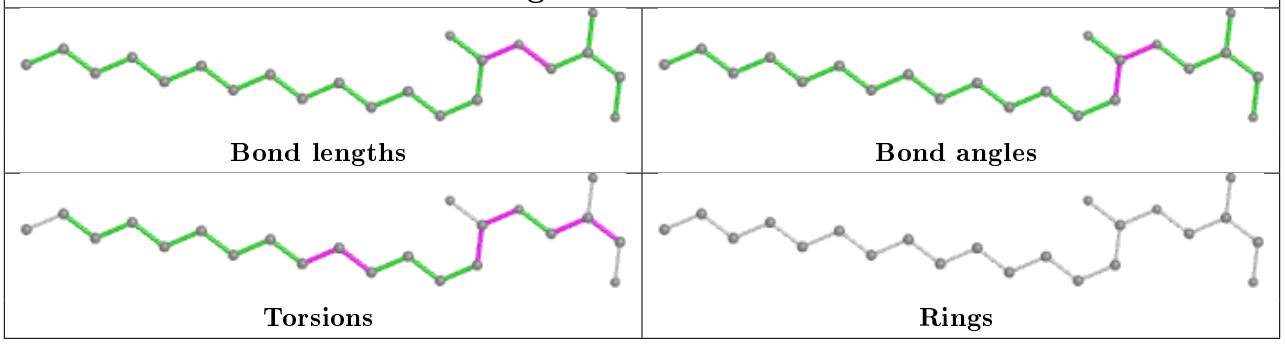
Ligand 78N B 201



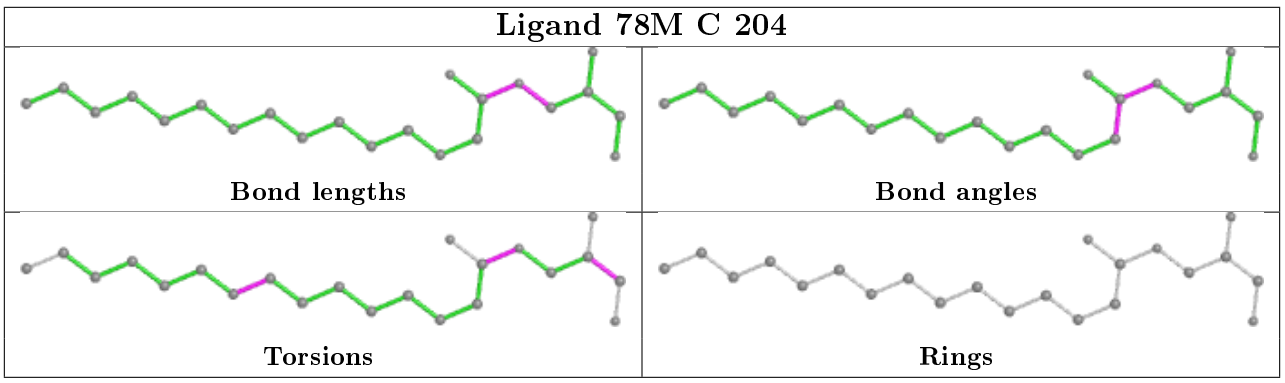
Ligand 78M C 202



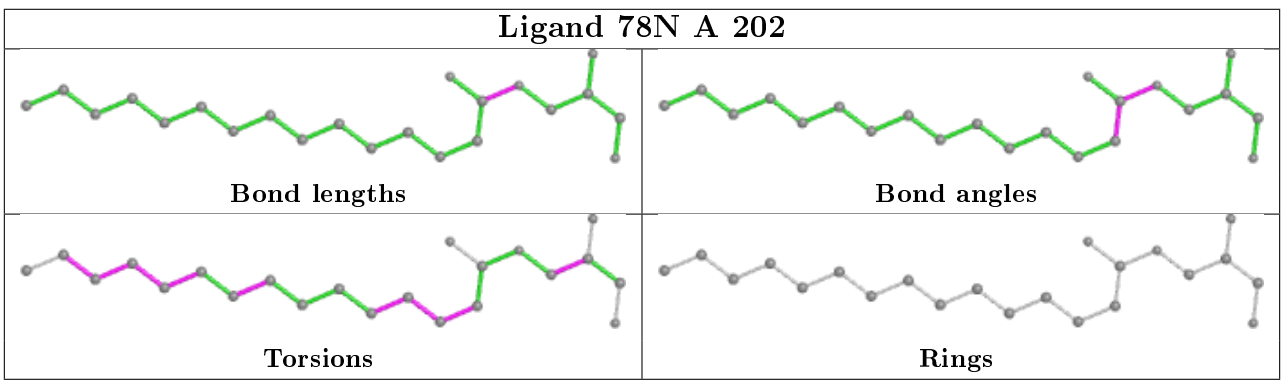
Ligand 78M C 201



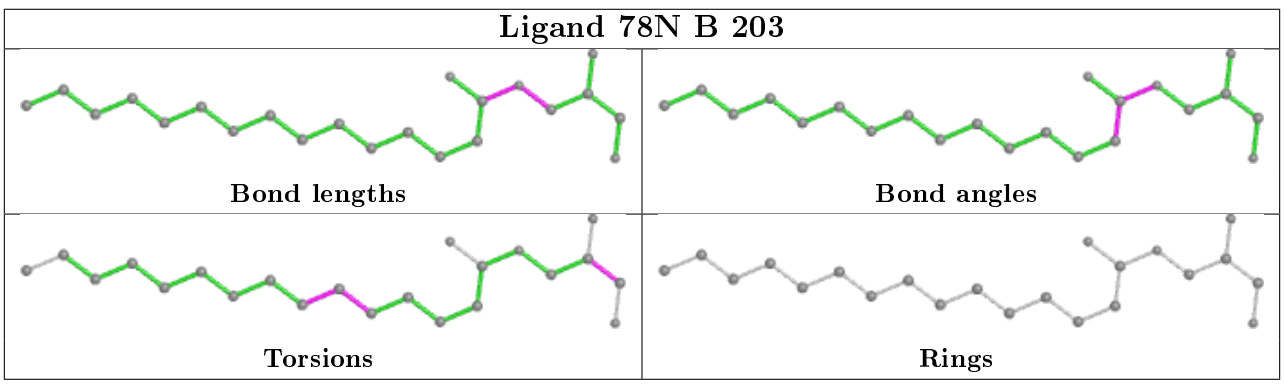
Ligand 78M C 204



Ligand 78N A 202

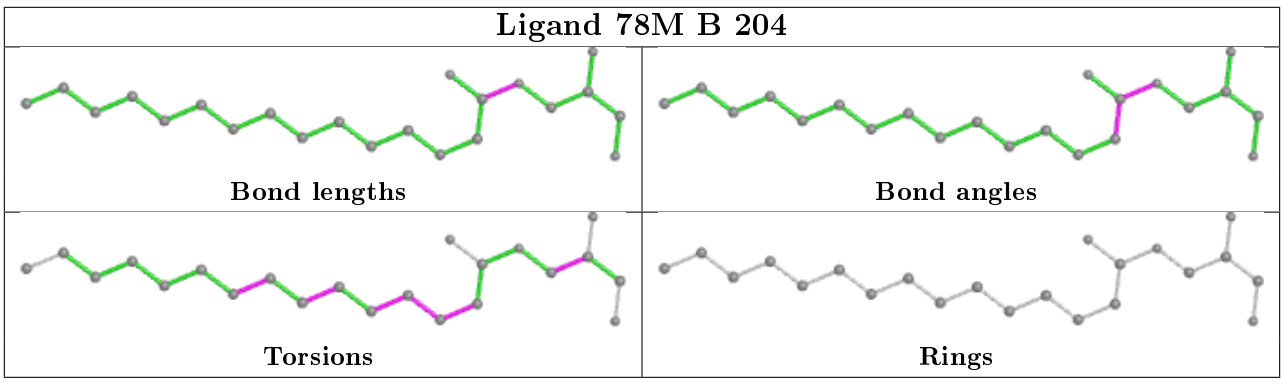


Ligand 78N B 203

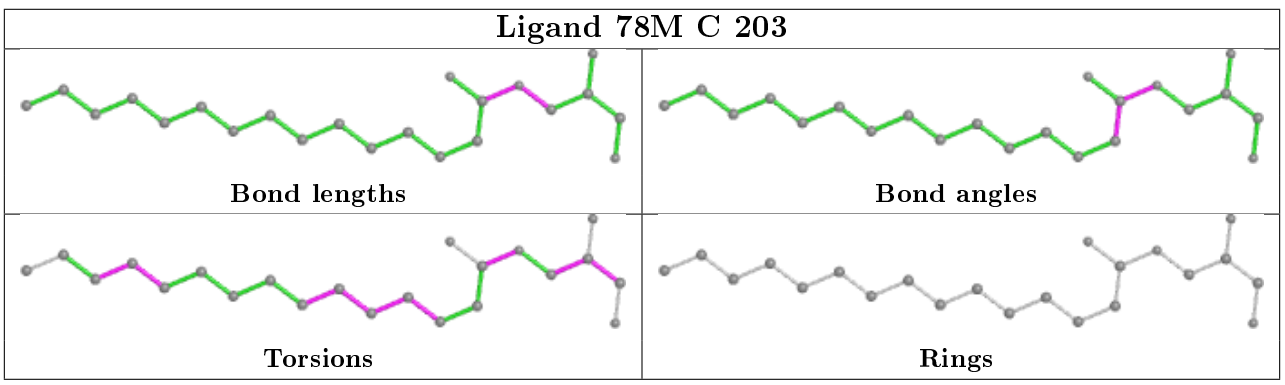


Ligand 78N A 203

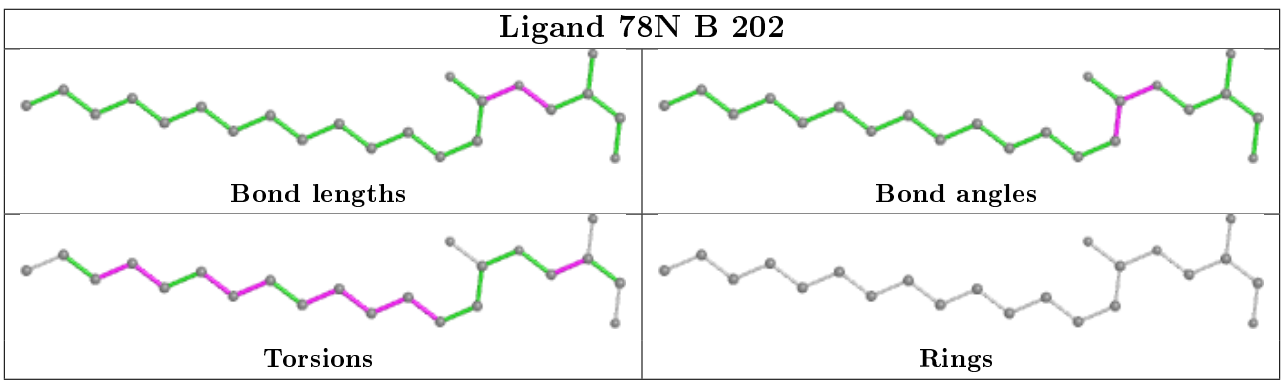
Ligand 78M B 204

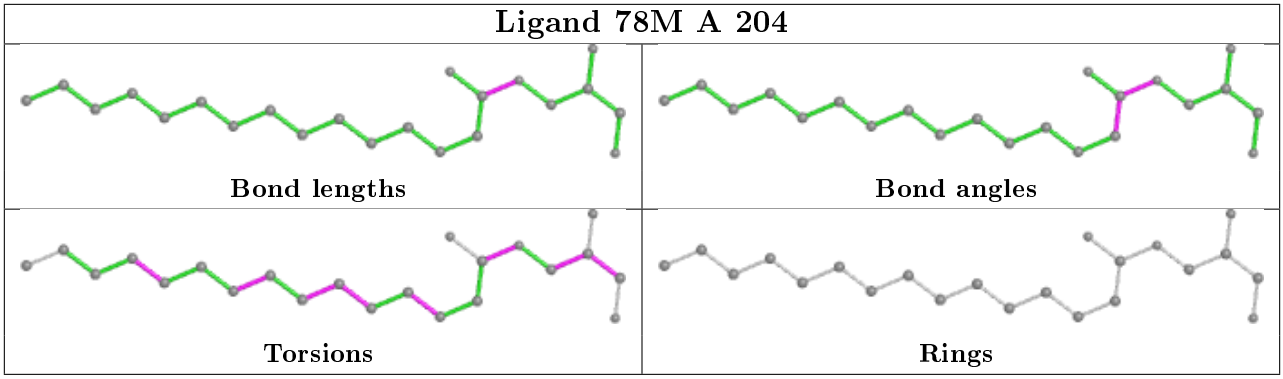


Ligand 78M C 203



Ligand 78N B 202





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	95/130 (73%)	-0.42	3 (3%) 47 40	33, 45, 98, 138	0
1	B	111/130 (85%)	-0.31	3 (2%) 54 48	34, 47, 97, 117	0
1	C	106/130 (81%)	-0.47	0 100 100	36, 49, 81, 134	0
1	D	87/130 (66%)	-0.44	2 (2%) 60 54	35, 47, 100, 151	0
1	E	84/130 (64%)	-0.07	5 (5%) 21 16	36, 58, 118, 147	0
1	F	83/130 (63%)	-0.18	4 (4%) 30 24	35, 61, 139, 152	0
All	All	566/780 (72%)	-0.32	17 (3%) 50 43	33, 50, 116, 152	0

The worst 5 of 17 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	25	TRP	4.9
1	F	47	TRP	4.7
1	E	118	SER	4.3
1	E	49	ASP	4.2
1	E	119	HIS	3.8

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

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

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands (i)

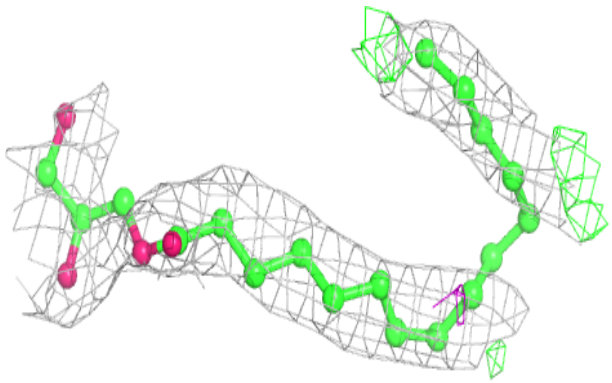
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

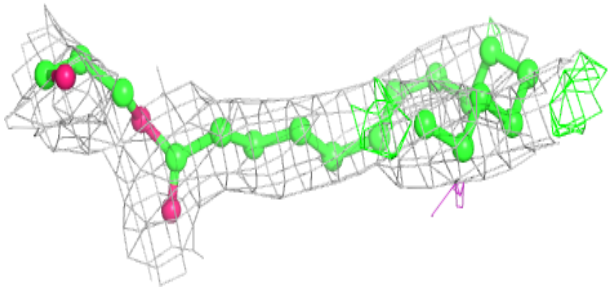
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	CIT	C	206	13/13	0.42	0.38	183,204,209,211	0
3	78M	C	201	22/22	0.58	0.36	66,86,113,122	0
2	78N	D	201	22/22	0.63	0.33	50,83,115,119	0
3	78M	C	204	22/22	0.74	0.27	68,83,92,104	0
2	78N	B	203	22/22	0.75	0.33	80,93,108,109	0
2	78N	A	202	22/22	0.79	0.31	59,89,114,121	0
2	78N	A	203	22/22	0.84	0.30	44,87,106,112	0
3	78M	C	202	22/22	0.85	0.33	45,81,99,113	0
3	78M	C	203	22/22	0.85	0.32	67,85,106,111	0
3	78M	A	204	22/22	0.86	0.20	61,87,112,118	0
2	78N	B	202	22/22	0.86	0.22	64,100,115,121	0
3	78M	B	204	22/22	0.88	0.27	72,91,102,105	0
2	78N	A	201	22/22	0.88	0.54	72,97,110,116	0
4	NA	B	205	1/1	0.89	0.63	72,72,72,72	0
2	78N	B	201	22/22	0.90	0.38	67,83,106,113	0
7	ACT	C	207	4/4	0.90	0.37	124,136,141,146	0
5	ZN	C	205	1/1	0.98	0.09	70,70,70,70	0

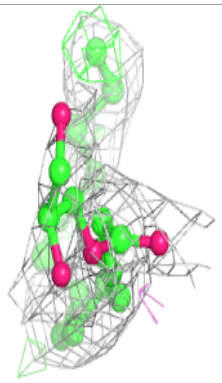
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 78M C 201:

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

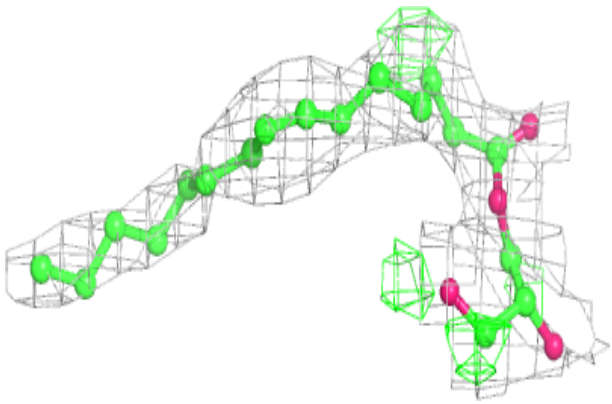


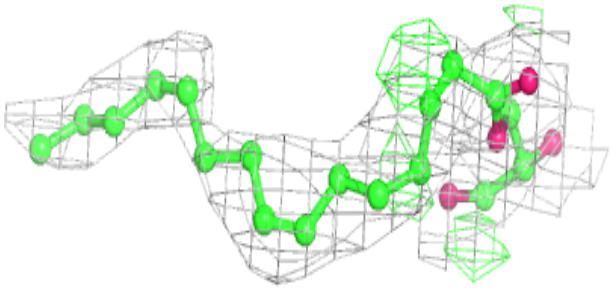


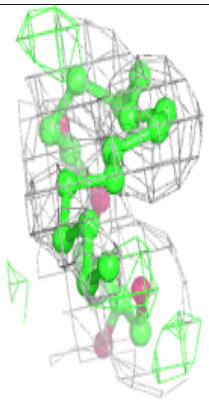


Electron density around 78N D 201:

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

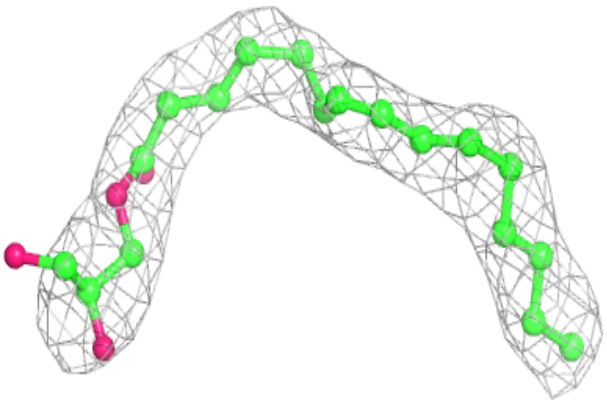


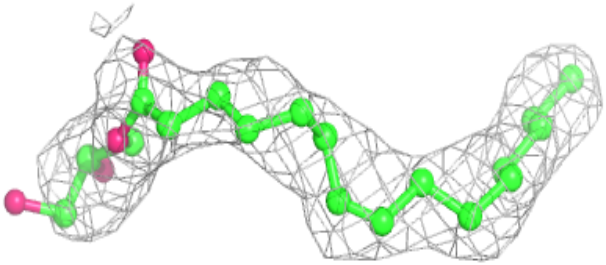


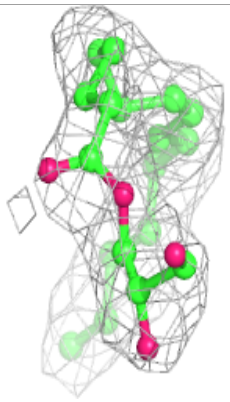


Electron density around 78M C 204:

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

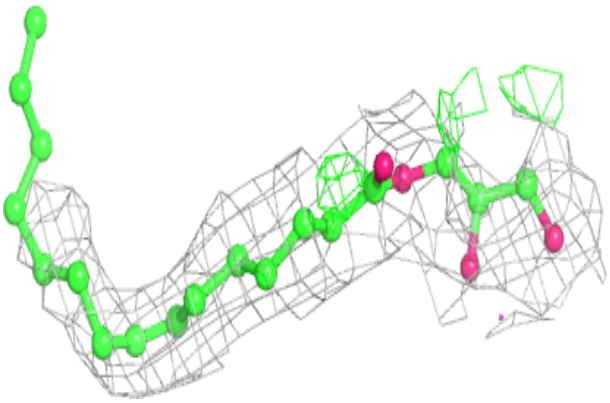


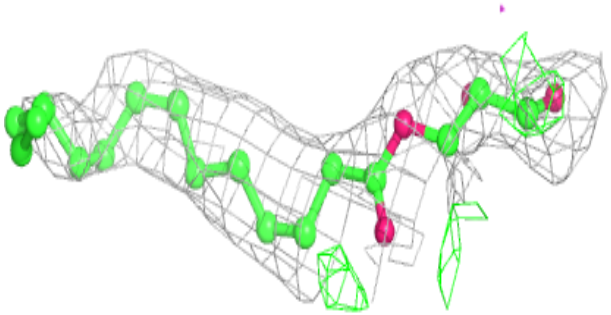


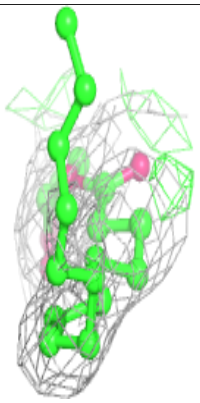


Electron density around 78N B 203:

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

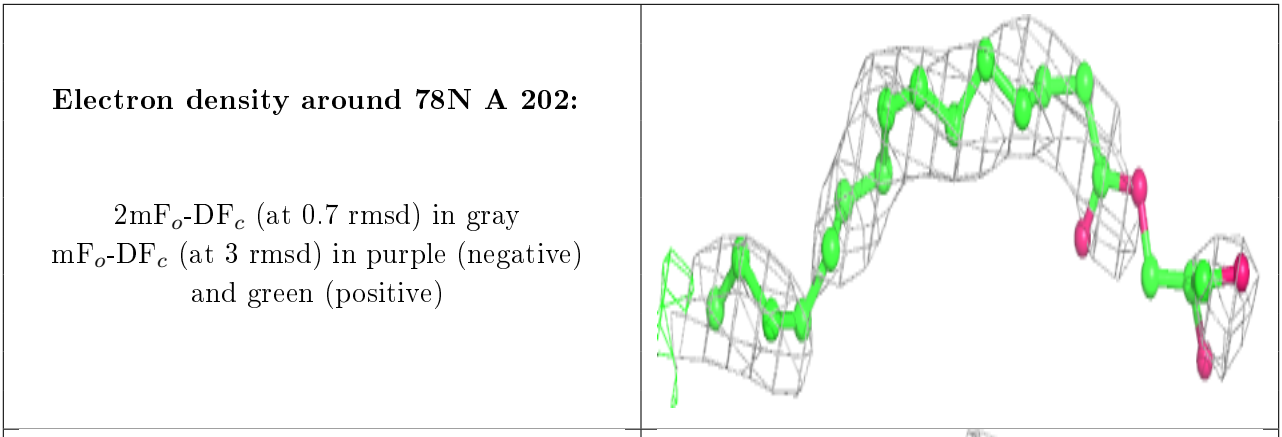






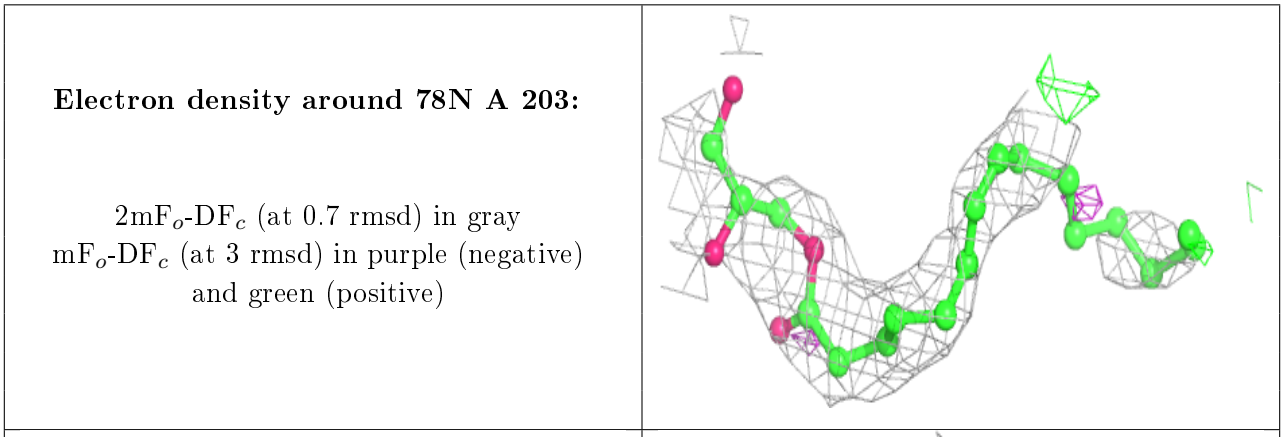
Electron density around 78N A 202:

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



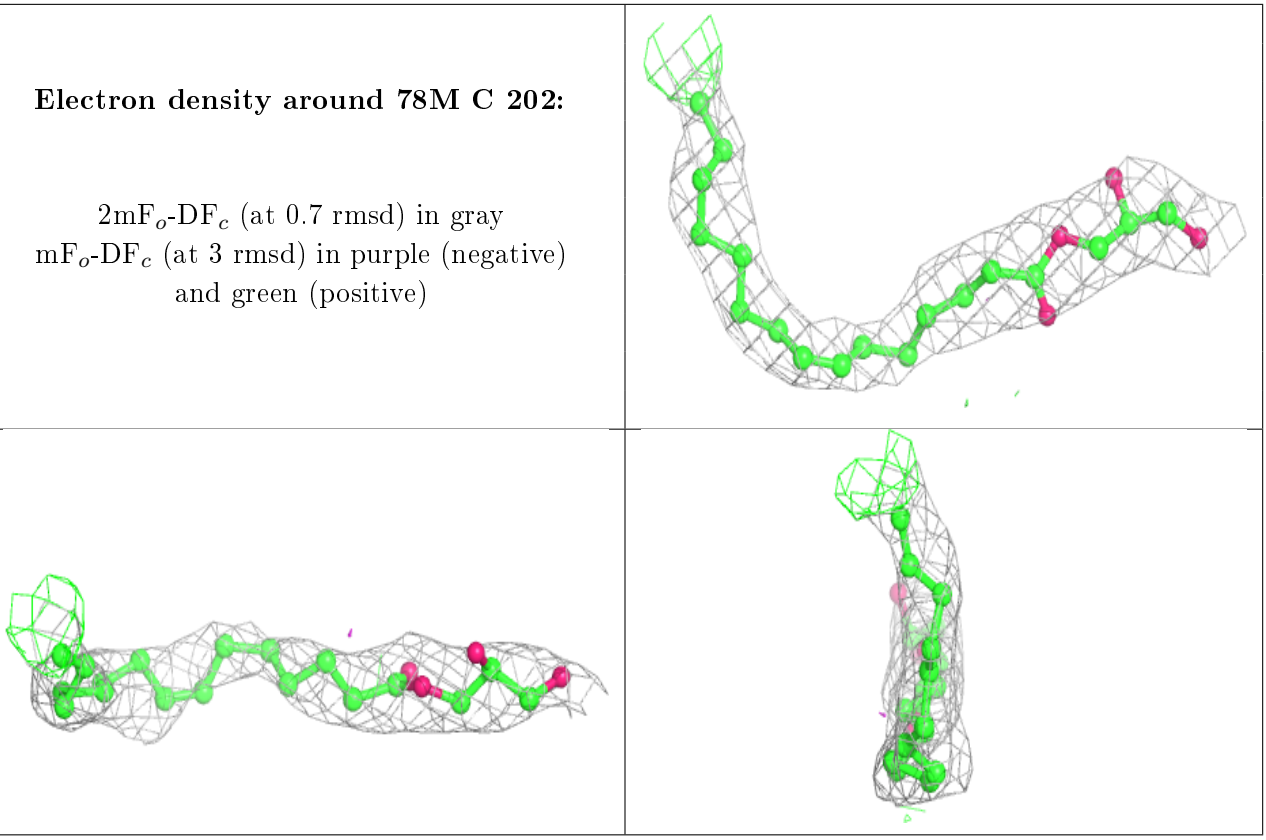
Electron density around 78N A 203:

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



Electron density around 78M C 202:

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



Electron density around 78M C 203:

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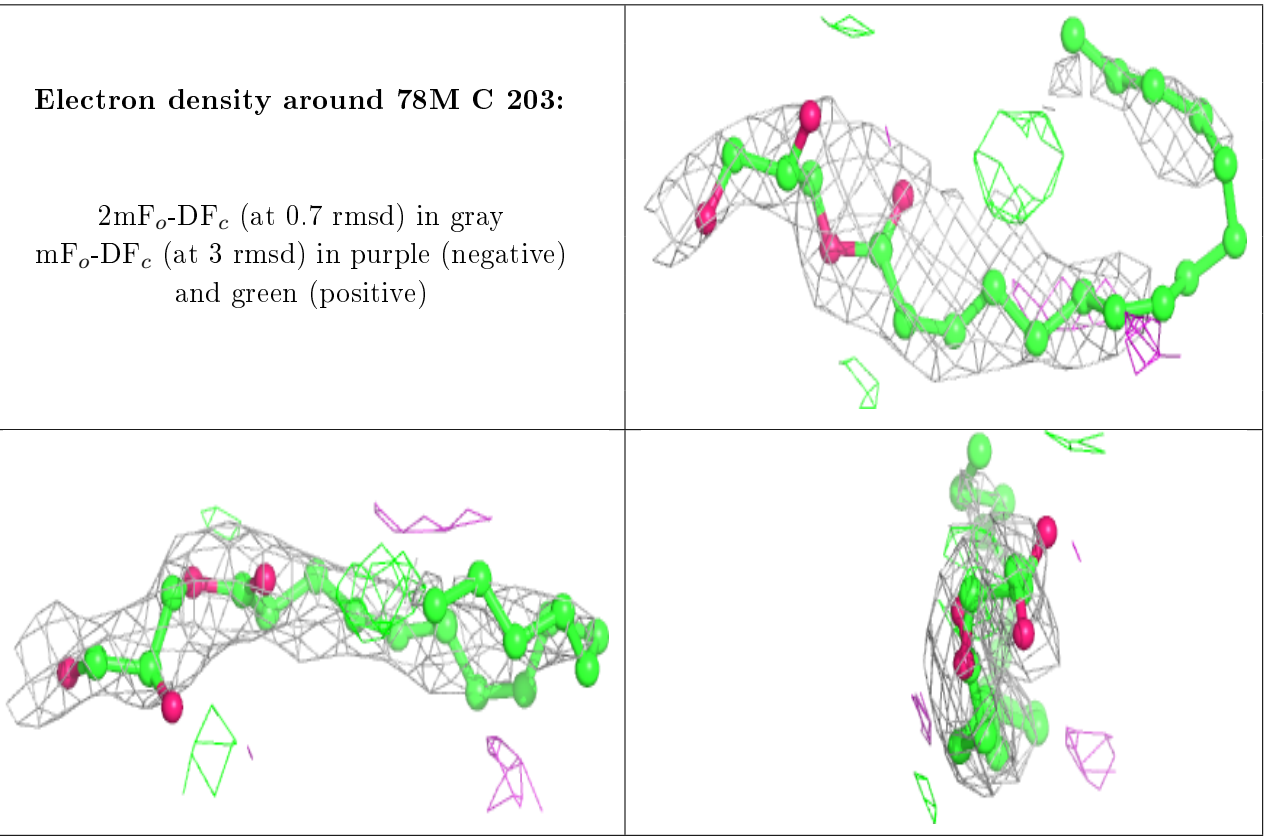
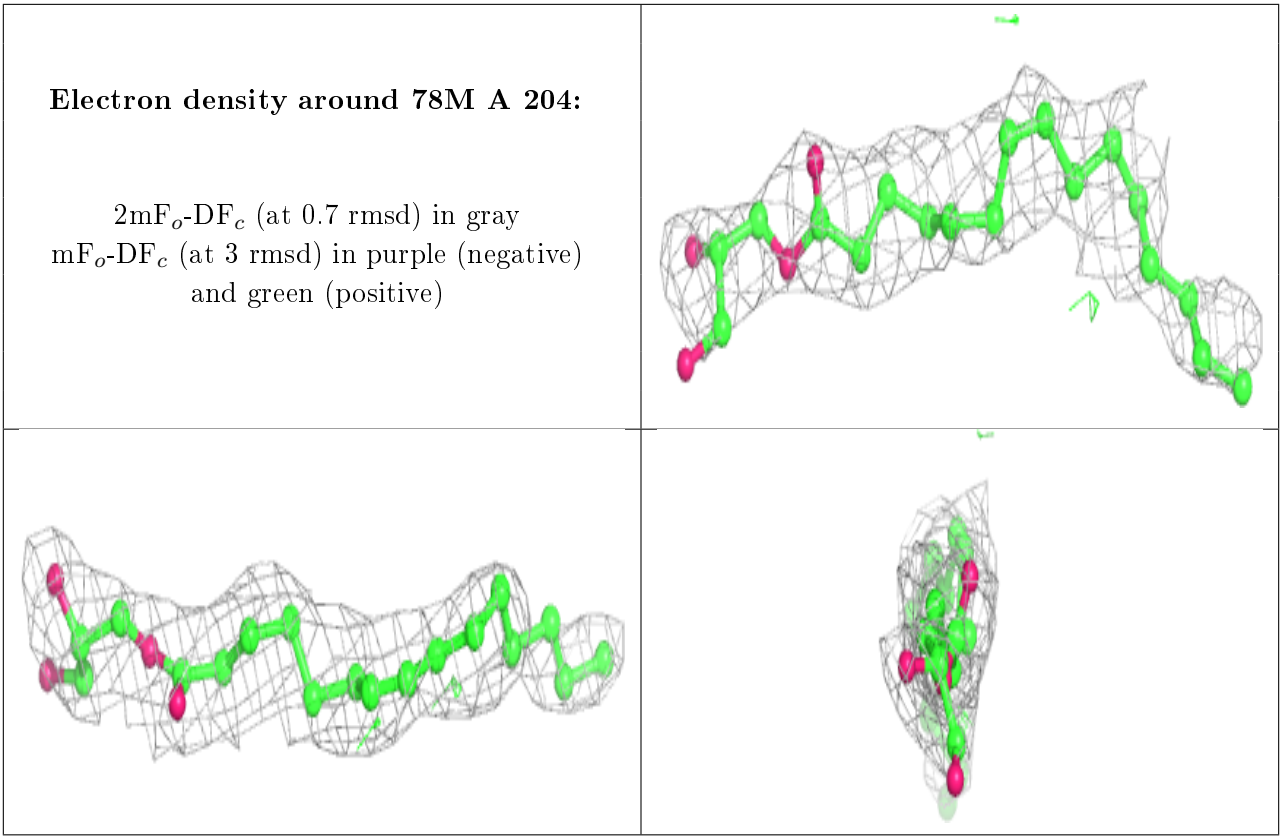
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



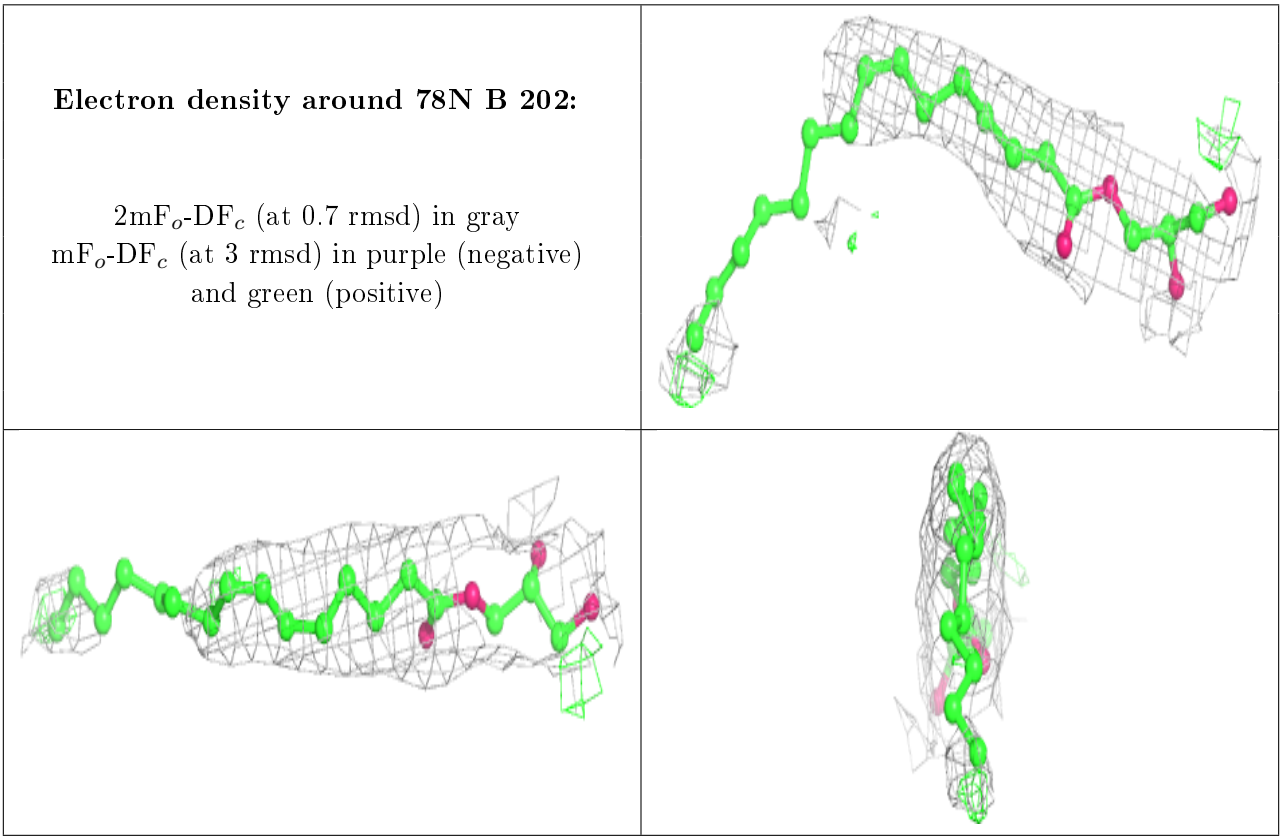
Electron density around 78M A 204:

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



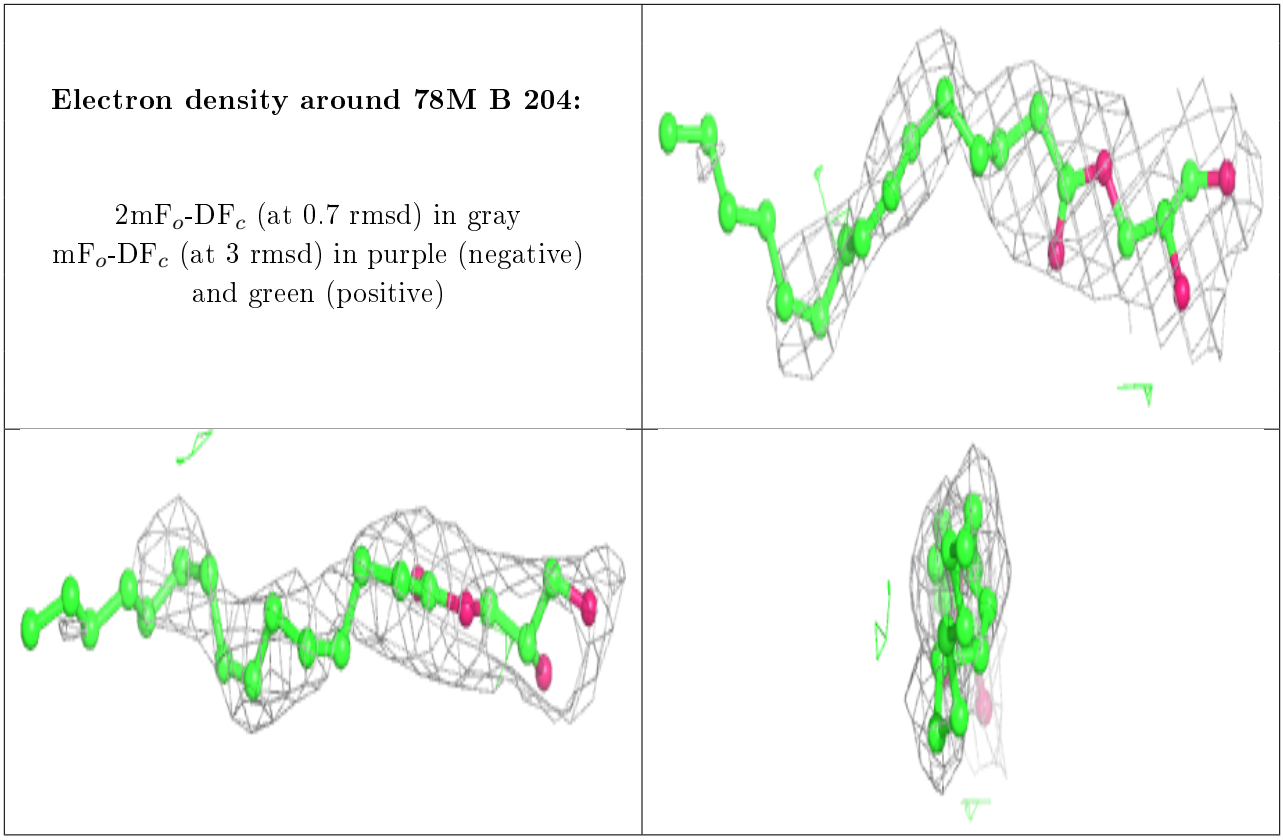
Electron density around 78N B 202:

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



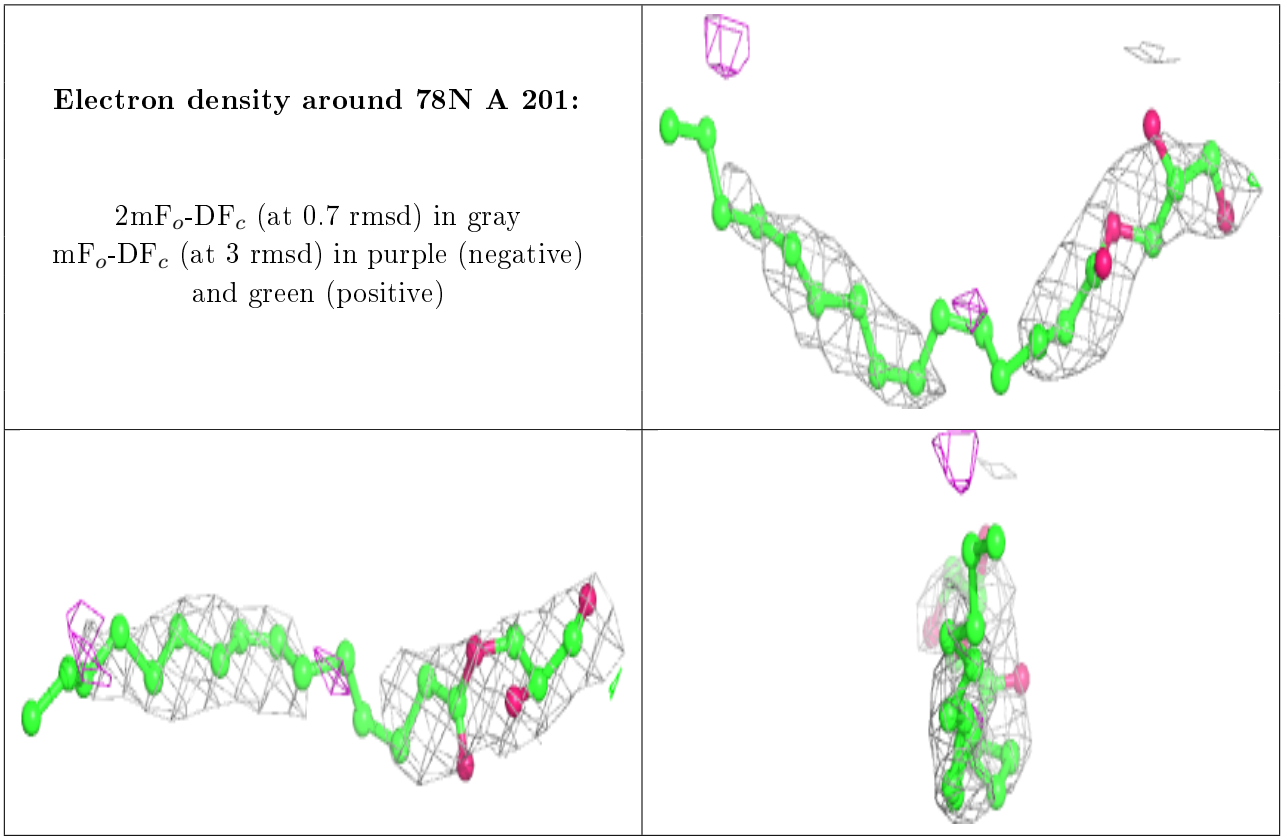
Electron density around 78M B 204:

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



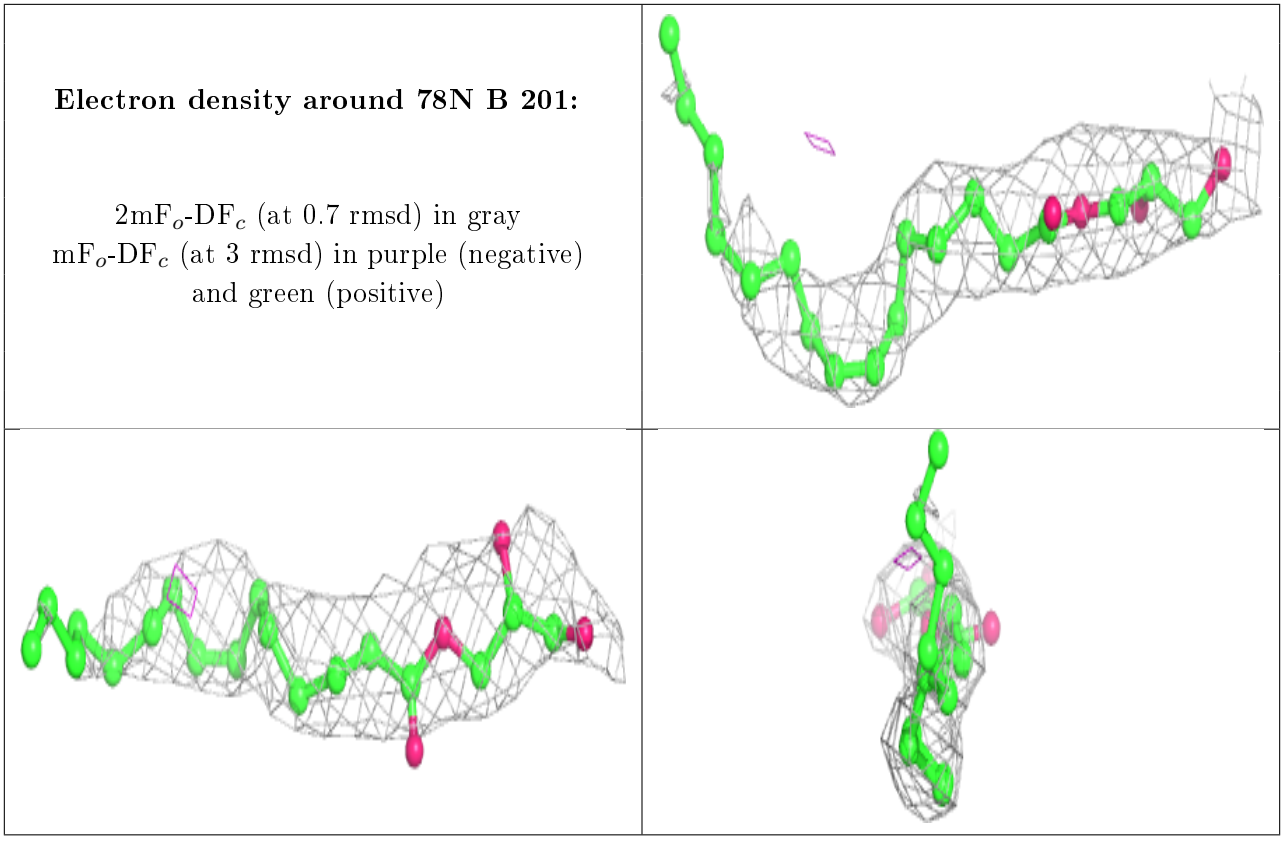
Electron density around 78N A 201:

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



Electron density around 78N 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)



6.5 Other polymers

There are no such residues in this entry.