Full wwPDB X-ray Structure Validation Report (i)

Sep 24, 2023 – 07:41 AM EDT

PDB ID	:	5UVK
Title	:	Serial Millisecond Crystallography of Membrane and Soluble Protein Microcrystals using Synchrotron Radiation
Authors	:	Martin-Garcia, J.M.; Conrad, C.E.; Nelson, G.; Stander, N.; Zatsepin, N.A.; Zook, J.; Zhu, L.; Geiger, J.; Chun, E.; Kissick, D.; Hilgart, M.C.; Ogata, C.; Ishchenko, A.; Nagaratnam, N.; Roy-Chowdhury, S.; Coe, J.; Subramanian, G.; Schaffer, A.; James, D.; Ketawala, G.; Venugopalan, N.; Xu, S.; Corcoran, S.; Ferguson, D.; Weierstall, U.; Spence, J.C.H.; Cherezov, V.; Fromme, P.; Fischetti, R.F.; Liu, W.
Deposited on	:	2017-02-20
Resolution	:	3.10 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 (i) 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 (1)) were used in the production of this report:

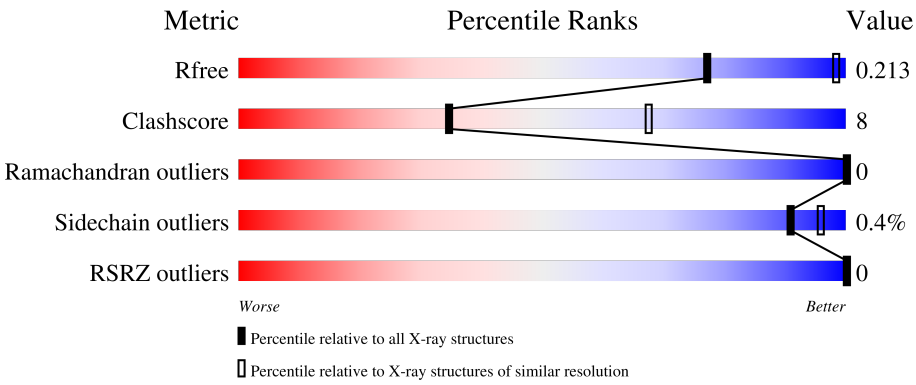
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158

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 3.10 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	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

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	162	94% 6%
2	B	172	90% 10%

CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	CYC	B	201	-	-	X	-

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 2664 atoms, of which 38 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.

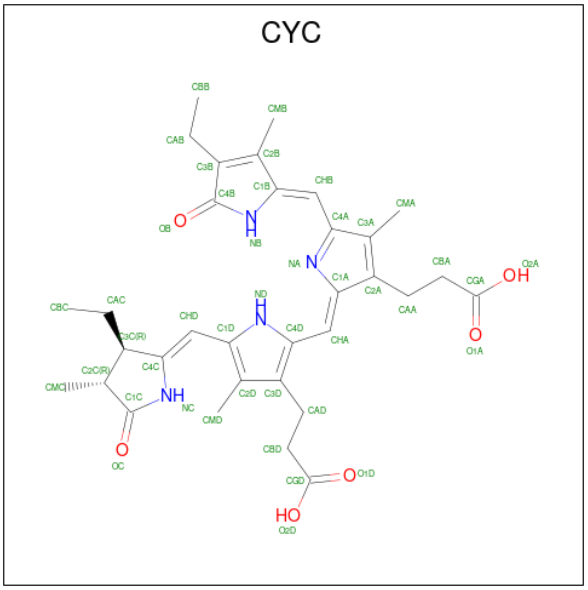
- Molecule 1 is a protein called C-phycocyanin alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	162	1224	771	205	241	7	0	0	0

- Molecule 2 is a protein called C-phycocyanin beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	172	1273	789	228	248	8	0	0	0

- Molecule 3 is PHYCOCYANOBILIN (three-letter code: CYC) (formula: $C_{33}H_{40}N_4O_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
3	A	1	81	33	38	4	6	0	0
			Total	C	N	O			
3	B	1	43	33	4	6		0	0

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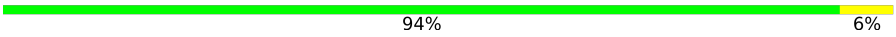
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	B	1	43	33	4	6	0	0

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: C-phycocyanin alpha chain

Chain A:



- Molecule 2: C-phycocyanin beta chain

Chain B:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α, β, γ	186.40Å 186.40Å 60.30Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.01 – 3.10 23.38 – 3.10	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.01-3.10) 100.0 (23.38-3.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.00 (at 3.10Å)	Xtriage
Refinement program	REFMAC 5.8.0135	Depositor
R, R_{free}	0.172 , 0.205 0.186 , 0.213	Depositor DCC
R_{free} test set	1082 reflections (14.70%)	wwPDB-VP
Wilson B-factor (Å^2)	47.5	Xtriage
Anisotropy	0.148	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 15.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	2664	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.45% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: MEN, CYC

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	0.56	0/1246	0.66	1/1691 (0.1%)
2	B	0.59	0/1277	0.71	1/1729 (0.1%)
All	All	0.58	0/2523	0.69	2/3420 (0.1%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	57	ARG	NE-CZ-NH1	5.79	123.19	120.30
1	A	18	PHE	N-CA-C	-5.03	97.43	111.00

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	1224	0	1202	8	0
2	B	1273	0	1275	20	0
3	A	43	38	37	5	0
3	B	86	0	72	25	0
All	All	2626	38	2586	43	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 8.

All (43) 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)
3:A:200:CYC:C3C	3:A:200:CYC:C4C	1.80	1.30
2:B:88:ILE:CG2	3:B:201:CYC:HAB1	1.83	1.09
2:B:88:ILE:HG21	3:B:201:CYC:CAB	1.86	1.05
2:B:72:MEN:HE22	3:B:201:CYC:HBD2	1.39	1.01
2:B:88:ILE:HG21	3:B:201:CYC:HAB1	0.94	0.88
3:B:201:CYC:HMD2	3:B:201:CYC:HC	1.44	0.81
2:B:72:MEN:HE22	3:B:201:CYC:CBD	2.12	0.79
2:B:1:MET:HE3	2:B:104:VAL:HB	1.64	0.79
1:A:140:HIS:CE1	1:A:142:LEU:HB2	2.21	0.75
3:B:201:CYC:HMD2	3:B:201:CYC:NC	2.03	0.72
2:B:82:CYS:HA	3:B:201:CYC:CHD	2.27	0.65
3:B:201:CYC:NB	3:B:201:CYC:HMA1	2.14	0.62
3:A:200:CYC:HMD2	3:A:200:CYC:HC	1.66	0.61
2:B:78:ARG:O	3:B:201:CYC:HMD3	2.03	0.59
2:B:15:ARG:NE	2:B:17:GLU:OE1	2.33	0.57
3:A:200:CYC:HMD2	3:A:200:CYC:NC	2.19	0.57
3:B:201:CYC:HC	3:B:201:CYC:CMD	2.17	0.57
2:B:72:MEN:O	2:B:78:ARG:HB3	2.04	0.56
3:B:201:CYC:HB	3:B:201:CYC:CMA	2.18	0.56
3:B:201:CYC:NA	3:B:201:CYC:ND	2.50	0.56
3:B:202:CYC:NC	3:B:202:CYC:HMD2	2.24	0.53
2:B:71:GLY:O	2:B:78:ARG:NH2	2.43	0.52
3:B:201:CYC:NB	3:B:201:CYC:CMA	2.73	0.51
3:B:202:CYC:HHA	3:B:202:CYC:O1A	2.10	0.51
2:B:66:LEU:O	2:B:73:ALA:HB3	2.11	0.51
1:A:140:HIS:HE1	1:A:142:LEU:HB2	1.73	0.49
1:A:140:HIS:ND1	1:A:142:LEU:HG	2.27	0.49
3:A:200:CYC:C4C	3:A:200:CYC:CAC	2.82	0.49
2:B:60:PHE:HB3	2:B:67:ILE:HD13	1.95	0.49
2:B:82:CYS:O	3:B:201:CYC:HAC1	2.13	0.49
1:A:59:VAL:HG11	3:A:200:CYC:HMC1	1.96	0.48
3:B:201:CYC:NC	3:B:201:CYC:CMD	2.73	0.47
2:B:36:LYS:HE2	3:B:202:CYC:HMD3	1.97	0.47
2:B:82:CYS:C	3:B:201:CYC:HAC1	2.33	0.46
2:B:86:MET:HG3	3:B:201:CYC:HBC1	2.00	0.44
2:B:82:CYS:HA	3:B:201:CYC:HHD	2.00	0.43
1:A:87:ASP:O	1:A:90:TYR:HB2	2.18	0.43
1:A:43:ALA:HB3	1:A:142:LEU:HD21	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:202:CYC:HAC1	3:B:202:CYC:HHD	1.85	0.42
1:A:30:ARG:HD2	1:A:30:ARG:O	2.20	0.42
2:B:82:CYS:HA	3:B:201:CYC:HAC1	1.52	0.41
2:B:116:THR:HG21	3:B:201:CYC:HMA2	2.01	0.41
1:A:98:CYS:SG	1:A:107:MET:HB2	2.60	0.41

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	160/162 (99%)	157 (98%)	3 (2%)	0	100	100
2	B	169/172 (98%)	164 (97%)	5 (3%)	0	100	100
All	All	329/334 (98%)	321 (98%)	8 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	123/123 (100%)	123 (100%)	0	100	100
2	B	127/127 (100%)	126 (99%)	1 (1%)	81	92
All	All	250/250 (100%)	249 (100%)	1 (0%)	91	96

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

Mol	Chain	Res	Type
2	B	32	LYS

Sometimes 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)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	MEN	B	72	2	7,8,9	0.67	0	6,9,11	0.75	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
2	MEN	B	72	2	-	4/7/8/10	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	72	MEN	C-CA-CB-CG
2	B	72	MEN	CA-CB-CG-OD1
2	B	72	MEN	CA-CB-CG-ND2
2	B	72	MEN	N-CA-CB-CG

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	72	MEN	3	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

3 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	CYC	A	200	1	42,46,46	5.24	24 (57%)	50,67,67	1.93	13 (26%)
3	CYC	B	201	2	42,46,46	3.25	10 (23%)	50,67,67	3.18	18 (36%)
3	CYC	B	202	2	42,46,46	2.70	14 (33%)	50,67,67	3.61	23 (46%)

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
3	CYC	A	200	1	-	8/25/74/74	0/4/4/4
3	CYC	B	201	2	-	8/25/74/74	0/4/4/4

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CYC	B	202	2	-	9/25/74/74	0/4/4/4

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	200	CYC	C3C-C4C	20.13	1.80	1.50
3	B	201	CYC	CHA-C1A	16.30	1.48	1.35
3	A	200	CYC	C1C-NC	13.53	1.55	1.37
3	B	202	CYC	CHA-C1A	11.97	1.45	1.35
3	A	200	CYC	C2C-C3C	-8.60	1.30	1.54
3	A	200	CYC	C1B-NB	8.07	1.51	1.37
3	A	200	CYC	C2C-C1C	8.07	1.59	1.52
3	A	200	CYC	C4C-NC	-7.22	1.22	1.37
3	A	200	CYC	C4B-NB	6.74	1.52	1.38
3	A	200	CYC	CMC-C2C	5.93	1.65	1.53
3	B	201	CYC	C3B-C2B	5.76	1.49	1.36
3	B	201	CYC	C2A-C3A	5.69	1.48	1.36
3	A	200	CYC	C1A-NA	5.63	1.50	1.38
3	A	200	CYC	CHB-C4A	5.00	1.52	1.40
3	A	200	CYC	C2A-C3A	4.74	1.46	1.36
3	B	202	CYC	C3B-C2B	4.69	1.46	1.36
3	B	202	CYC	C1C-NC	-4.60	1.31	1.37
3	B	201	CYC	CHB-C1B	4.48	1.48	1.38
3	A	200	CYC	C4A-NA	4.34	1.46	1.36
3	A	200	CYC	C1A-C2A	4.12	1.52	1.45
3	B	202	CYC	CHB-C1B	3.99	1.47	1.38
3	B	202	CYC	C2A-C3A	3.96	1.45	1.36
3	B	201	CYC	C3D-C2D	3.78	1.48	1.37
3	B	201	CYC	CHB-C4A	3.55	1.48	1.40
3	A	200	CYC	C1D-CHD	3.35	1.54	1.41
3	B	201	CYC	C1C-NC	-3.25	1.33	1.37
3	B	202	CYC	CHB-C4A	2.92	1.47	1.40
3	A	200	CYC	CAC-C3C	2.92	1.59	1.54
3	A	200	CYC	OB-C4B	-2.91	1.18	1.23
3	A	200	CYC	CHB-C1B	-2.86	1.31	1.38
3	B	201	CYC	OB-C4B	2.81	1.28	1.23
3	B	202	CYC	CAC-C3C	-2.77	1.48	1.54
3	A	200	CYC	C4D-CHA	2.76	1.51	1.41
3	A	200	CYC	CHA-C1A	-2.70	1.32	1.35
3	B	202	CYC	C1B-NB	-2.65	1.33	1.37
3	A	200	CYC	C3B-C2B	2.61	1.42	1.36
3	A	200	CYC	CMB-C2B	2.57	1.56	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	201	CYC	C1B-C2B	2.56	1.49	1.45
3	A	200	CYC	OC-C1C	-2.53	1.18	1.23
3	B	202	CYC	C4B-NB	-2.50	1.32	1.38
3	B	202	CYC	C1A-NA	-2.49	1.33	1.38
3	B	202	CYC	C3D-C2D	2.39	1.44	1.37
3	B	202	CYC	O2D-CGD	-2.34	1.22	1.30
3	B	202	CYC	C2C-C3C	-2.34	1.47	1.54
3	A	200	CYC	CBA-CGA	2.30	1.55	1.50
3	B	201	CYC	C1A-C2A	2.29	1.49	1.45
3	A	200	CYC	C4A-C3A	2.27	1.50	1.45
3	B	202	CYC	O2A-CGA	-2.21	1.23	1.30

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	202	CYC	C3B-C4B-NB	11.93	116.42	106.78
3	B	201	CYC	C3B-C4B-NB	11.14	115.78	106.78
3	B	202	CYC	C2C-C3C-C4C	-8.47	88.65	101.34
3	B	201	CYC	CHA-C1A-NA	-7.52	118.40	128.83
3	B	201	CYC	C4D-CHA-C1A	-7.33	120.05	128.81
3	B	202	CYC	OB-C4B-C3B	-6.02	121.51	128.04
3	B	202	CYC	CMC-C2C-C1C	6.02	125.37	112.40
3	B	202	CYC	CAB-C3B-C4B	5.78	130.51	121.38
3	B	201	CYC	OB-C4B-C3B	-5.52	122.05	128.04
3	A	200	CYC	CBD-CAD-C3D	-5.42	103.38	112.62
3	B	202	CYC	CBC-CAC-C3C	-5.27	101.73	113.47
3	B	202	CYC	C2B-C1B-NB	5.21	114.62	106.99
3	B	201	CYC	C2B-C1B-NB	5.12	114.49	106.99
3	B	202	CYC	C1B-NB-C4B	-5.11	104.16	110.67
3	B	202	CYC	CHD-C4C-NC	5.11	131.28	125.20
3	B	201	CYC	CAB-C3B-C4B	4.88	129.09	121.38
3	A	200	CYC	CHD-C4C-NC	4.65	130.74	125.20
3	B	201	CYC	C1B-NB-C4B	-4.65	104.75	110.67
3	B	201	CYC	C1B-C2B-C3B	-4.58	103.09	107.87
3	B	202	CYC	C2C-C1C-NC	-4.52	104.38	108.27
3	B	202	CYC	CHB-C4A-NA	-4.34	115.84	124.93
3	B	202	CYC	C1B-C2B-C3B	-4.32	103.36	107.87
3	B	202	CYC	C2A-C1A-NA	4.32	116.33	110.05
3	B	202	CYC	CMA-C3A-C4A	4.28	131.66	125.06
3	A	200	CYC	C1B-NB-C4B	-4.08	105.47	110.67
3	B	202	CYC	CHA-C1A-NA	-3.91	123.40	128.83
3	B	201	CYC	OC-C1C-C2C	-3.87	123.10	126.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	202	CYC	OC-C1C-C2C	3.75	129.15	126.17
3	B	202	CYC	C1A-C2A-C3A	-3.74	102.64	106.78
3	B	201	CYC	CHB-C1B-NB	-3.62	118.28	126.06
3	B	202	CYC	CMB-C2B-C1B	3.62	128.69	124.17
3	B	201	CYC	C2C-C1C-NC	3.47	111.26	108.27
3	B	201	CYC	CMB-C2B-C1B	3.42	128.44	124.17
3	B	201	CYC	C1A-C2A-C3A	-3.37	103.06	106.78
3	B	201	CYC	C1B-CHB-C4A	-3.30	120.02	128.08
3	A	200	CYC	CHB-C4A-NA	-3.20	118.25	124.93
3	A	200	CYC	CMA-C3A-C4A	3.18	129.96	125.06
3	A	200	CYC	CMB-C2B-C1B	-3.17	120.20	124.17
3	B	201	CYC	CHB-C4A-NA	-3.13	118.39	124.93
3	A	200	CYC	C1B-CHB-C4A	-3.11	120.48	128.08
3	B	201	CYC	C4A-C3A-C2A	-2.98	103.09	106.51
3	B	202	CYC	C4A-C3A-C2A	-2.97	103.10	106.51
3	B	201	CYC	C2A-C1A-NA	2.83	114.17	110.05
3	B	202	CYC	CAA-CBA-CGA	-2.62	107.97	113.60
3	A	200	CYC	CHA-C1A-NA	2.53	132.34	128.83
3	A	200	CYC	CHA-C1A-C2A	-2.51	119.53	125.32
3	A	200	CYC	O2D-CGD-CBD	2.37	121.63	114.03
3	B	201	CYC	CMA-C3A-C4A	2.19	128.43	125.06
3	B	202	CYC	CHA-C1A-C2A	-2.19	120.27	125.32
3	A	200	CYC	C2C-C1C-NC	-2.16	106.41	108.27
3	A	200	CYC	OC-C1C-NC	2.14	127.53	124.94
3	B	202	CYC	CAC-C3C-C4C	2.09	118.04	112.67
3	B	202	CYC	CMD-C2D-C3D	2.08	128.85	124.94
3	A	200	CYC	CMC-C2C-C1C	-2.03	108.02	112.40

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	200	CYC	NA-C4A-CHB-C1B
3	A	200	CYC	C3A-C4A-CHB-C1B
3	A	200	CYC	C2C-C3C-CAC-CBC
3	A	200	CYC	C4C-C3C-CAC-CBC
3	A	200	CYC	ND-C1D-CHD-C4C
3	A	200	CYC	C2D-C1D-CHD-C4C
3	B	201	CYC	NA-C4A-CHB-C1B
3	B	201	CYC	C3A-C4A-CHB-C1B
3	B	202	CYC	NA-C4A-CHB-C1B
3	B	202	CYC	C3A-C4A-CHB-C1B

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Mol	Chain	Res	Type	Atoms
3	B	202	CYC	C2C-C3C-CAC-CBC
3	B	202	CYC	C4C-C3C-CAC-CBC
3	B	201	CYC	C2B-C3B-CAB-CBB
3	B	202	CYC	C2B-C3B-CAB-CBB
3	B	201	CYC	C4B-C3B-CAB-CBB
3	B	202	CYC	C4B-C3B-CAB-CBB
3	B	201	CYC	CAA-CBA-CGA-O1A
3	A	200	CYC	CAA-CBA-CGA-O1A
3	A	200	CYC	CAA-CBA-CGA-O2A
3	B	201	CYC	CAA-CBA-CGA-O2A
3	B	202	CYC	C3D-CAD-CBD-CGD
3	B	202	CYC	CAD-CBD-CGD-O1D
3	B	201	CYC	CAD-CBD-CGD-O1D
3	B	202	CYC	CAD-CBD-CGD-O2D
3	B	201	CYC	CAD-CBD-CGD-O2D

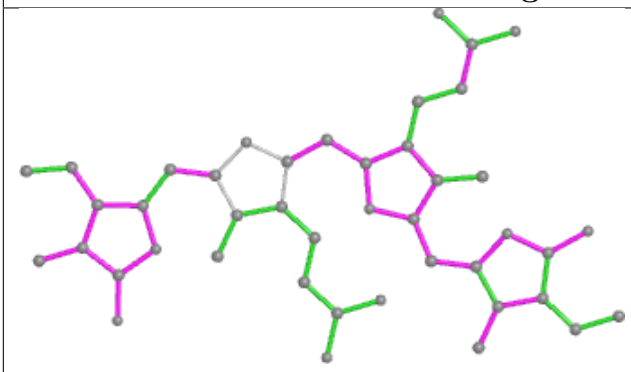
There are no ring outliers.

3 monomers are involved in 30 short contacts:

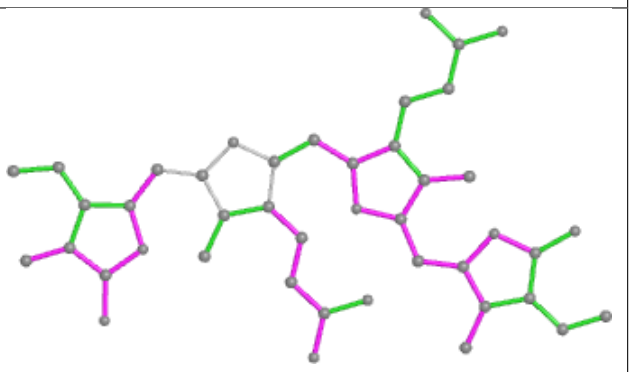
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	200	CYC	5	0
3	B	201	CYC	21	0
3	B	202	CYC	4	0

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.

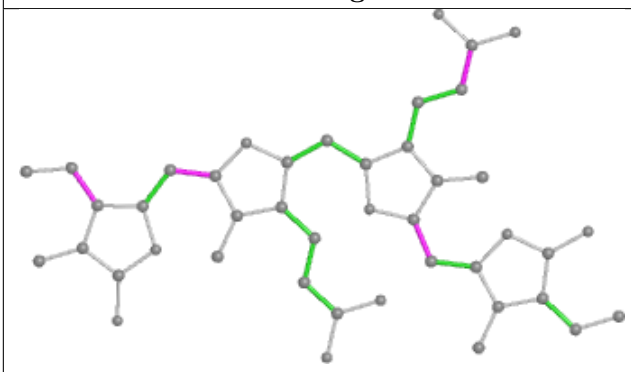
Ligand CYC A 200



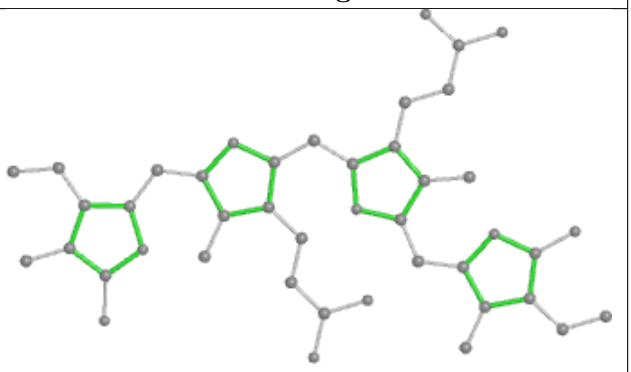
Bond lengths



Bond angles

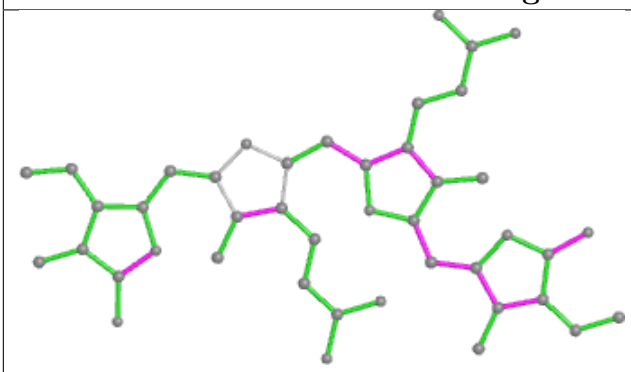


Torsions

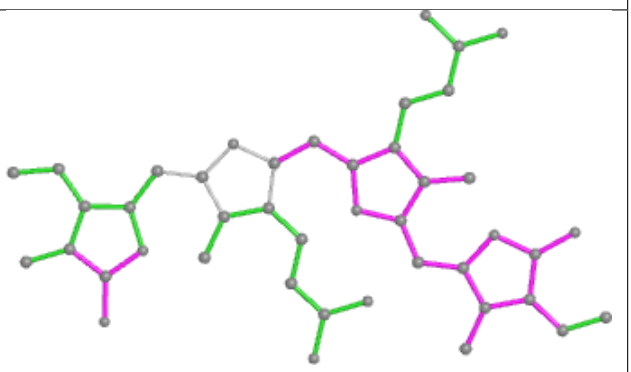


Rings

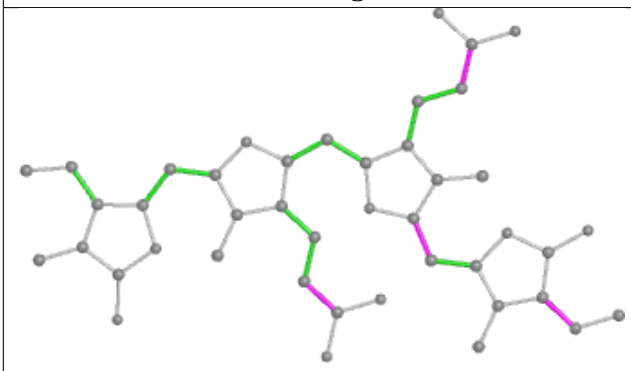
Ligand CYC B 201



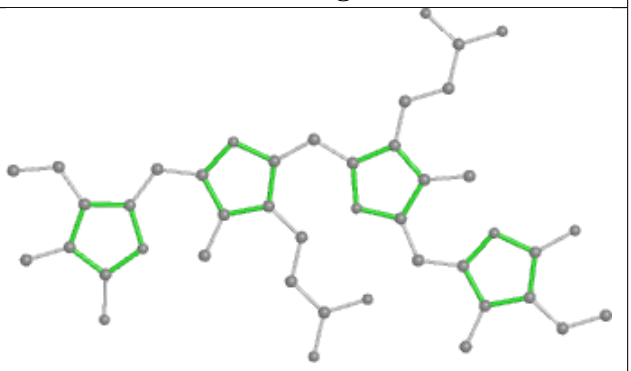
Bond lengths



Bond angles

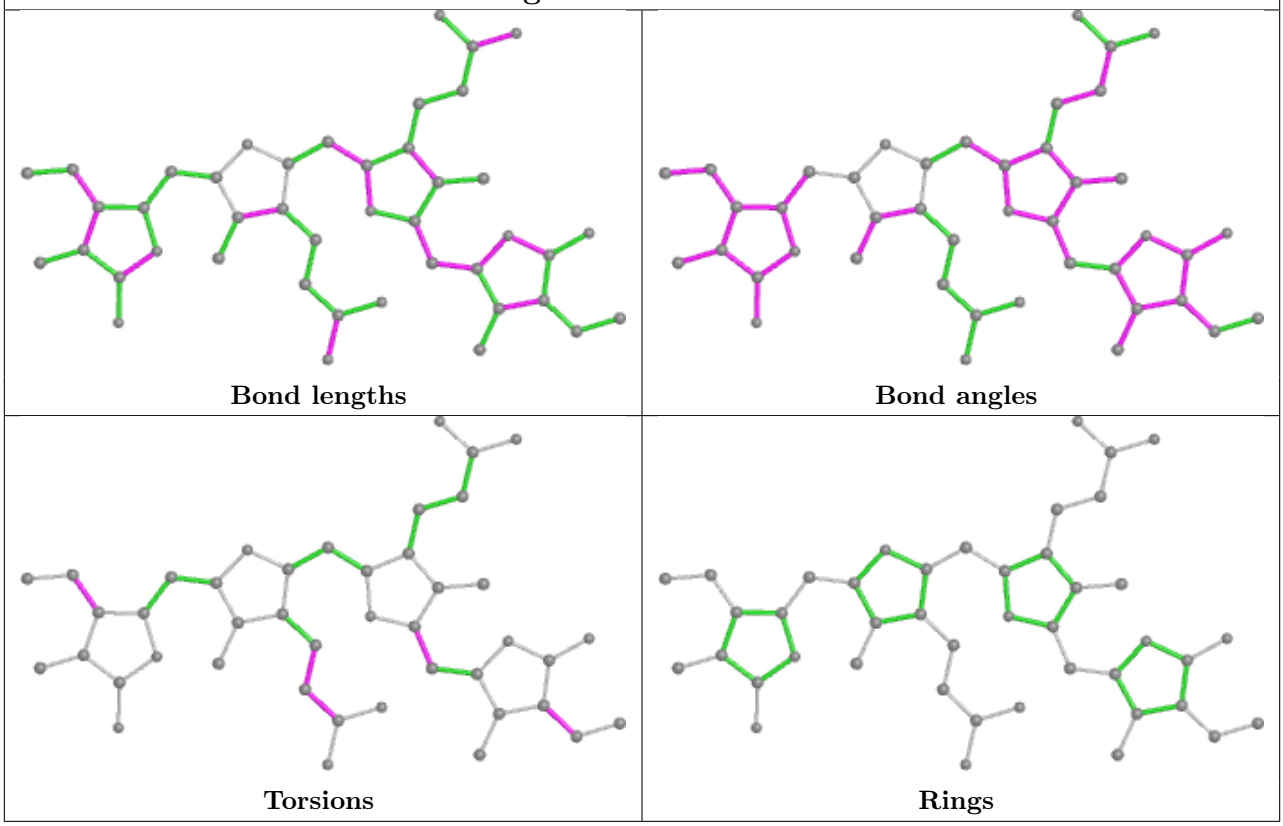


Torsions



Rings

Ligand CYC B 202



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 (i)

6.1 Protein, DNA and RNA chains (i)

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	162/162 (100%)	-0.65	0	100	100	32, 43, 60, 76	0
2	B	171/172 (99%)	-0.51	0	100	100	36, 49, 67, 83	0
All	All	333/334 (99%)	-0.58	0	100	100	32, 46, 65, 83	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains (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
2	MEN	B	72	9/10	0.89	0.22	46,49,57,62	0

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, 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
3	CYC	B	201	43/43	0.83	0.33	42,51,69,76	0

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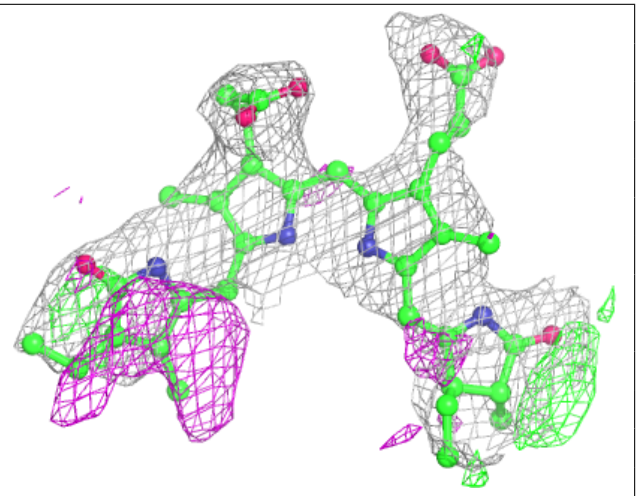
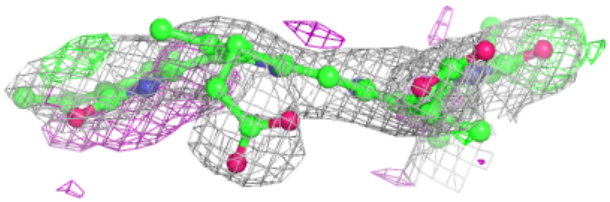
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	CYC	B	202	43/43	0.93	0.23	46,49,59,62	0
3	CYC	A	200	43/43	0.94	0.17	18,30,42,51	0

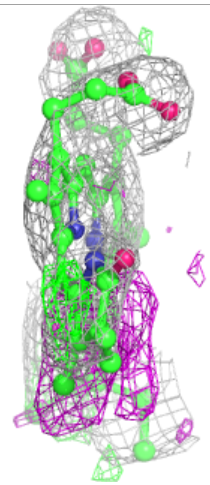
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around CYC 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)

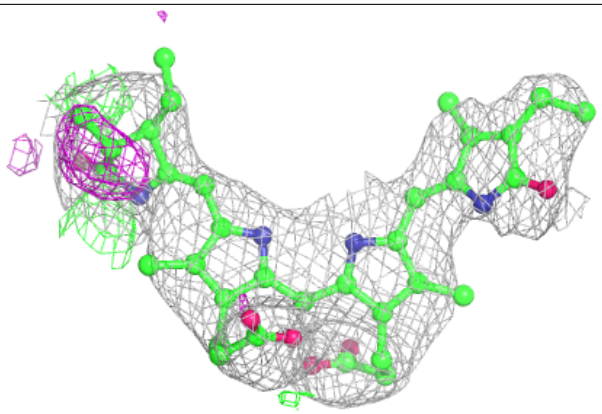


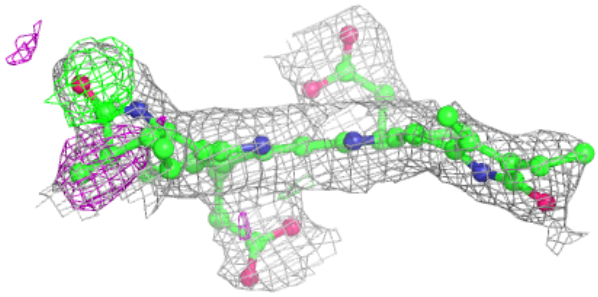




Electron density around CYC B 202:

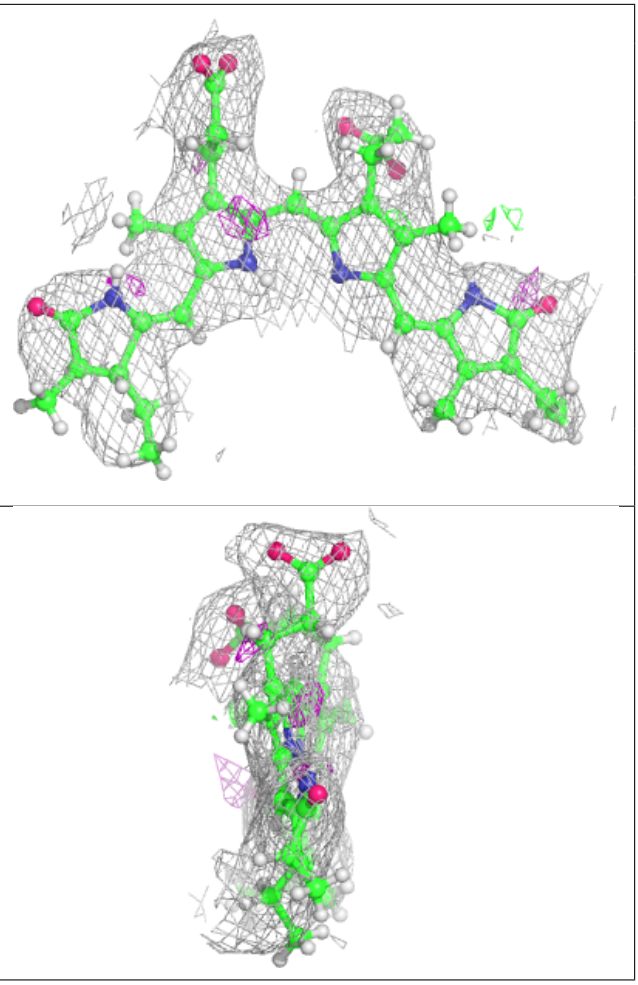
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





Electron density around CYC A 200:

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.