W O R L D W I D E

wwPDB

P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Oct 17, 2023 – 10:15 AM EDT

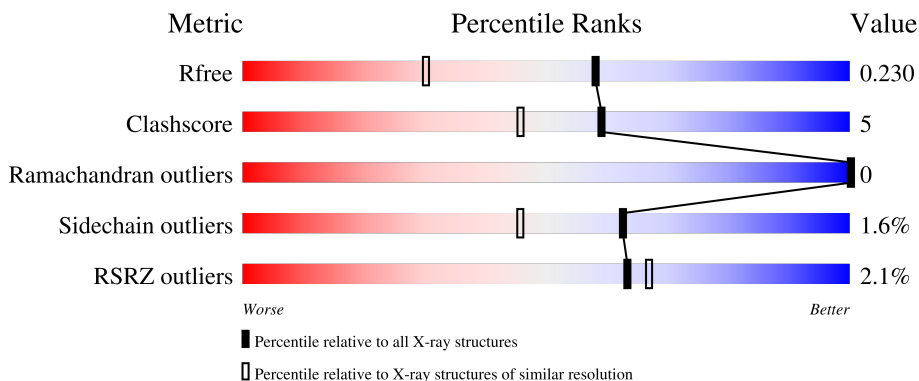|		
PDB ID	:	8EL5
Title	:	Light harvesting phycobiliprotein HaPE555 from the cryptophyte Hemiselmis andersenii CCMP644 in an alternating tight to loose interface filament
Authors	:	Rathbone, H.W.; Michie, K.A.; Laos, A.L.; Curmi, P.M.G.
Deposited on	:	2022-09-23
Resolution	:	1.67 Å(reported)

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 1.67 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
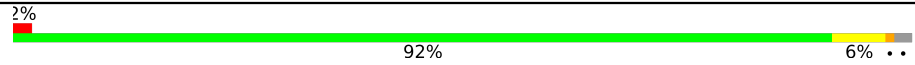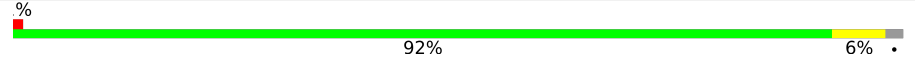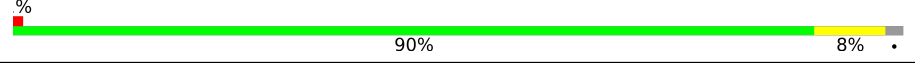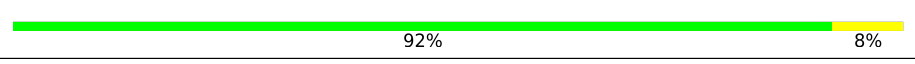
Metric	Percentile Ranks	Value
Rfree		0.230
Clashscore		5
Ramachandran outliers		0
Sidechain outliers		1.6%
RSRZ outliers		2.1%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
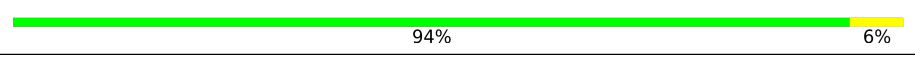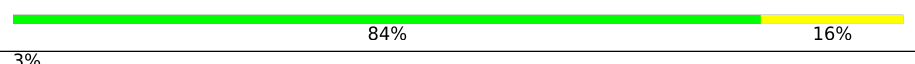
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	6780 (1.70-1.66)
Clashscore	141614	7310 (1.70-1.66)
Ramachandran outliers	138981	7173 (1.70-1.66)
Sidechain outliers	138945	7172 (1.70-1.66)
RSRZ outliers	127900	6661 (1.70-1.66)

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	67	4% / 84% / 12% •
1	G	67	4% / 88% / 7% •
1	J	67	4% / 90% / 6% •
1	K	67	4% / 85% / 9% • •
2	B	177	2% / 92% / 6% •

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Mol	Chain	Length	Quality of chain
2	D	177	2% 92% 6% ··
2	F	177	% 92% 6% ·
2	H	177	% 90% 8% ·
3	C	62	92% 8%
3	E	62	94% 6%
3	I	62	84% 16%
3	L	62	3% 92% 8%

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 19890 atoms, of which 9718 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 Phycoerythrin alpha-1 subunit.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	64	Total	C	H	N	O	S	0	64	0
			924	287	459	82	91	5			
1	G	64	Total	C	H	N	O	S	0	64	0
			923	287	458	82	91	5			
1	J	64	Total	C	H	N	O	S	0	64	0
			927	287	462	82	91	5			
1	K	64	Total	C	H	N	O	S	0	64	0
			925	287	460	82	91	5			

- Molecule 2 is a protein called Phycoerythrin550 beta subunit.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	173	Total	C	H	N	O	S	0	9	0
			2616	804	1309	225	269	9			
2	D	174	Total	C	H	N	O	S	0	8	0
			2636	810	1321	227	269	9			
2	F	173	Total	C	H	N	O	S	0	10	0
			2632	809	1319	225	270	9			
2	H	173	Total	C	H	N	O	S	0	9	0
			2623	807	1314	225	268	9			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	172	VAL	GLU	conflict	UNP U5T8W0
D	172	VAL	GLU	conflict	UNP U5T8W0
F	172	VAL	GLU	conflict	UNP U5T8W0
H	172	VAL	GLU	conflict	UNP U5T8W0

- Molecule 3 is a protein called Phycoerythrin alpha-2 subunit.

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf	Trace
3	C	62	Total	C	H	N	O	S		0	62	0
			918	280	460	79	93	6				
3	E	62	Total	C	H	N	O	S		0	62	0
			918	280	460	79	93	6				
3	I	62	Total	C	H	N	O	S		0	62	0
			917	280	459	79	93	6				
3	L	62	Total	C	H	N	O	S		0	62	0
			915	280	457	79	93	6				

- Molecule 4 is PHYCOERYTHROBILIN (three-letter code: PEB) (formula: $C_{33}H_{40}N_4O_6$).

PEB

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	B	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	B	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	C	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	D	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	D	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	E	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	F	1	Total	C	H	N	O	0	0
			80	33	37	4	6		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	F	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	G	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	H	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	H	1	Total	C	H	N	O	0	0
			80	33	37	4	6		
4	I	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	J	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	K	1	Total	C	H	N	O	0	1
			80	33	37	4	6		
4	L	1	Total	C	H	N	O	0	1
			80	33	37	4	6		

- Molecule 5 is DiCys-(15,16)-Dihydrobiliverdin (three-letter code: AX9) (formula: $C_{33}H_{40}N_4O_6$).
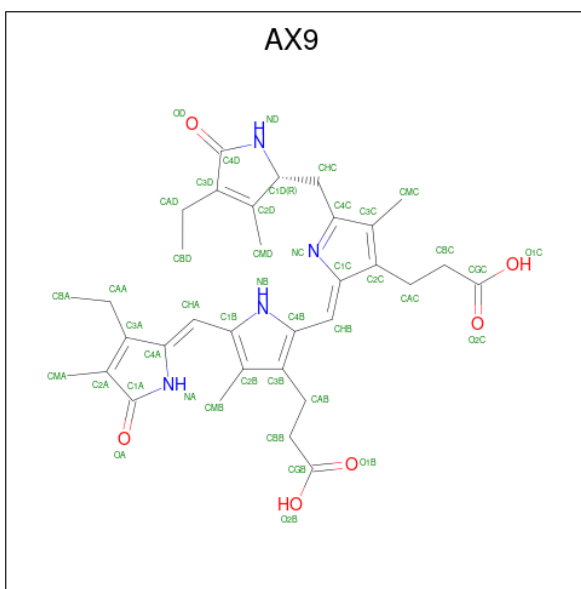
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	B	1	Total	C	H	N	O	0	0
			79	33	36	4	6		
5	D	1	Total	C	H	N	O	0	0
			79	33	36	4	6		
5	F	1	Total	C	H	N	O	0	0
			79	33	36	4	6		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	H	N	O		
5	H	1	79	33	36	4	6	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	C	1	Total 13	C 3	H 7	O 3	0	1
6	E	1	Total 13	C 3	H 7	O 3	0	1
6	G	1	Total 14	C 3	H 8	O 3	0	1
6	J	1	Total 13	C 3	H 7	O 3	0	1
6	K	1	Total 13	C 3	H 7	O 3	0	1
6	L	1	Total 14	C 3	H 8	O 3	0	1

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	23	Total 23	O 23	0	1
7	B	54	Total 54	O 54	0	5

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	26	Total 26	O 26	0	1
7	D	50	Total 51	O 51	0	6
7	E	26	Total 26	O 26	0	0
7	F	46	Total 46	O 46	0	4
7	G	30	Total 30	O 30	0	2
7	H	73	Total 73	O 73	0	3
7	I	4	Total 4	O 4	0	1
7	J	4	Total 4	O 4	0	2
7	K	2	Total 2	O 2	0	0
7	L	1	Total 1	O 1	0	1

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: Phycoerythrin alpha-1 subunit
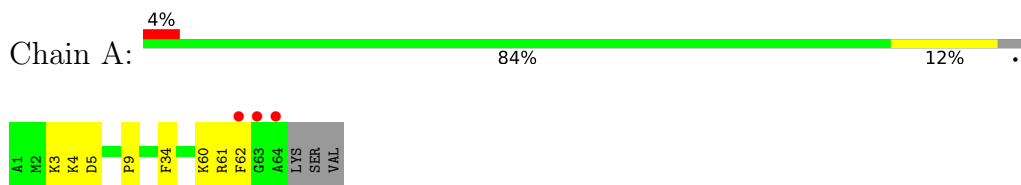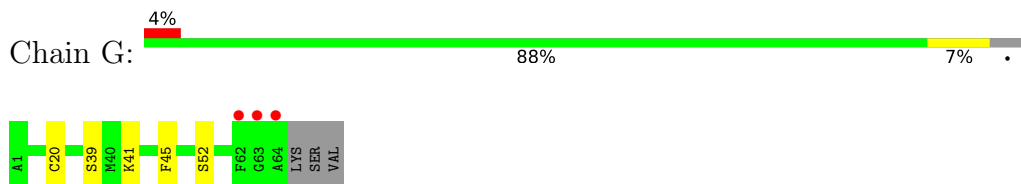
Chain A:

- Molecule 1: Phycoerythrin alpha-1 subunit

Chain G:

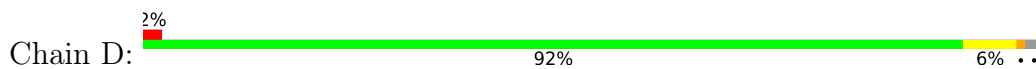- Molecule 1: Phycoerythrin alpha-1 subunit

Chain J:

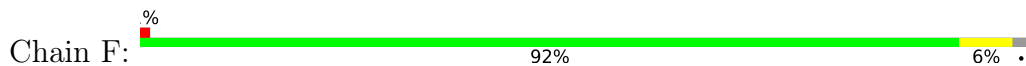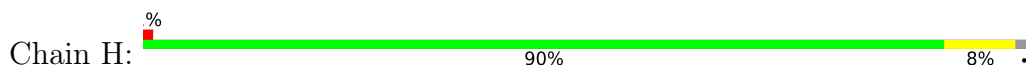- Molecule 1: Phycoerythrin alpha-1 subunit

Chain K:

- Molecule 2: Phycoerythrin550 beta subunit
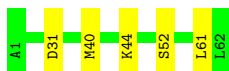
Chain B:

- Molecule 2: Phycoerythrin550 beta subunit

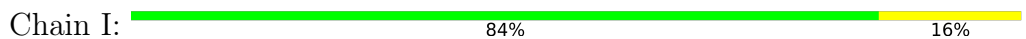Chain D:

• Molecule 2: Phycoerythrin550 beta subunit

Chain F:

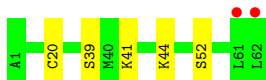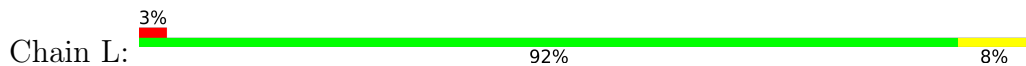• Molecule 2: Phycoerythrin550 beta subunit

Chain H:

• Molecule 3: Phycoerythrin alpha-2 subunit

Chain C:

• Molecule 3: Phycoerythrin alpha-2 subunit

Chain E:

• Molecule 3: Phycoerythrin alpha-2 subunit

Chain I:

• Molecule 3: Phycoerythrin alpha-2 subunit

Chain L:
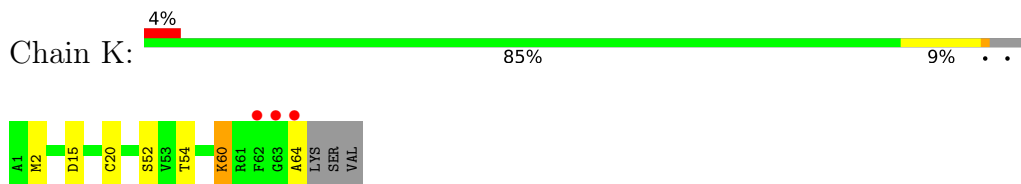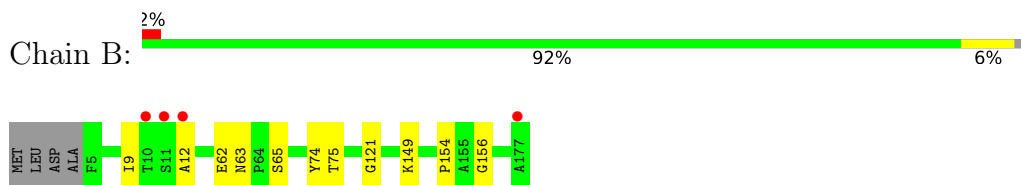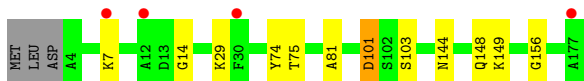
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	64.86Å 75.60Å 99.36Å 90.00° 110.30° 90.00°	Depositor
Resolution (Å)	61.66 – 1.67 61.66 – 1.67	Depositor EDS
% Data completeness (in resolution range)	99.7 (61.66-1.67) 99.7 (61.66-1.67)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.12 (at 1.67Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.186 , 0.231 0.185 , 0.230	Depositor DCC
R_{free} test set	1998 reflections (1.92%)	wwPDB-VP
Wilson B-factor (Å^2)	28.0	Xtriage
Anisotropy	0.482	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.43 , 44.7	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.011 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	19890	wwPDB-VP
Average B, all atoms (Å^2)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.91% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: LYZ, AX9, GOL, PEB

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	0.51	0/459	0.73	0/609
1	G	0.66	0/459	0.75	0/609
1	J	0.55	0/459	0.71	0/609
1	K	0.61	0/459	0.71	0/609
2	B	0.58	0/1328	0.72	0/1791
2	D	0.56	0/1336	0.69	0/1801
2	F	0.57	0/1334	0.70	0/1799
2	H	0.56	0/1330	0.70	0/1794
3	C	0.55	0/450	0.71	0/597
3	E	0.61	0/450	0.70	0/597
3	I	0.50	0/450	0.68	0/597
3	L	0.66	0/450	0.73	0/597
All	All	0.57	0/8964	0.71	0/12009

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	465	459	451	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	465	458	448	4	0
1	J	465	462	452	4	0
1	K	465	460	450	8	0
2	B	1307	1309	1294	9	2
2	D	1315	1321	1307	11	0
2	F	1313	1319	1304	9	0
2	H	1309	1314	1300	12	0
3	C	458	460	450	3	0
3	E	458	460	451	6	0
3	I	458	459	448	8	2
3	L	458	457	447	8	0
4	A	43	37	37	2	0
4	B	86	74	74	5	0
4	C	43	37	37	1	0
4	D	86	74	74	7	0
4	E	43	37	37	2	0
4	F	86	74	74	9	0
4	G	43	37	37	2	0
4	H	86	74	74	4	0
4	I	43	37	37	2	0
4	J	43	37	37	2	0
4	K	43	37	37	7	0
4	L	43	37	37	1	0
5	B	43	36	0	0	0
5	D	43	36	0	0	0
5	F	43	36	0	0	0
5	H	43	36	0	0	0
6	C	6	7	5	0	0
6	E	6	7	5	2	0
6	G	6	8	5	0	0
6	J	6	7	5	0	0
6	K	6	7	5	2	0
6	L	6	8	5	0	0
7	A	23	0	0	0	0
7	B	54	0	0	0	0
7	C	26	0	0	1	0
7	D	51	0	0	1	0
7	E	26	0	0	0	0
7	F	46	0	0	0	0
7	G	30	0	0	0	0
7	H	73	0	0	0	0
7	I	4	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	J	4	0	0	0	0
7	K	2	0	0	0	0
7	L	1	0	0	0	0
All	All	10172	9718	9424	90	2

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 5.

The worst 5 of 90 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)
4:K:101[B]:PEB:O1B	3:L:44[B]:LYS:HD2	1.55	1.06
3:I:44[B]:LYS:HD3	4:J:101[B]:PEB:O2B	1.65	0.96
4:K:101[B]:PEB:CGB	3:L:44[B]:LYS:HD2	2.08	0.84
4:F:202:PEB:HNA	4:F:202:PEB:HMB2	1.51	0.75
3:I:56[B]:ASN:O	3:I:59[B]:THR:HG22	1.89	0.73

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:12:ALA:O	3:I:58[B]:ASN:ND2[2_546]	1.90	0.30
2:B:12:ALA:O	3:I:58[B]:ASN:HD22[2_546]	1.46	0.14

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	61/67 (91%)	61 (100%)	0	0	100	100
1	G	61/67 (91%)	61 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	61/67 (91%)	61 (100%)	0	0	100	100
1	K	61/67 (91%)	61 (100%)	0	0	100	100
2	B	180/177 (102%)	174 (97%)	6 (3%)	0	100	100
2	D	181/177 (102%)	179 (99%)	2 (1%)	0	100	100
2	F	181/177 (102%)	179 (99%)	2 (1%)	0	100	100
2	H	180/177 (102%)	177 (98%)	3 (2%)	0	100	100
3	C	59/62 (95%)	59 (100%)	0	0	100	100
3	E	59/62 (95%)	59 (100%)	0	0	100	100
3	I	59/62 (95%)	59 (100%)	0	0	100	100
3	L	59/62 (95%)	59 (100%)	0	0	100	100
All	All	1202/1224 (98%)	1189 (99%)	13 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	45/48 (94%)	43 (96%)	2 (4%)	28	9
1	G	45/48 (94%)	45 (100%)	0	100	100
1	J	45/48 (94%)	44 (98%)	1 (2%)	52	32
1	K	45/48 (94%)	44 (98%)	1 (2%)	52	32
2	B	146/140 (104%)	145 (99%)	1 (1%)	84	76
2	D	146/140 (104%)	143 (98%)	3 (2%)	53	33
2	F	147/140 (105%)	144 (98%)	3 (2%)	55	36
2	H	146/140 (104%)	144 (99%)	2 (1%)	67	51
3	C	48/48 (100%)	46 (96%)	2 (4%)	30	10
3	E	48/48 (100%)	48 (100%)	0	100	100
3	I	48/48 (100%)	48 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	L	48/48 (100%)	48 (100%)	0	100	100
All	All	957/944 (101%)	942 (98%)	15 (2%)	62	46

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	101	ASP
1	J	31[B]	ASP
2	F	15	LYS
1	K	60[B]	LYS
2	H	7	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
3	L	26[B]	GLN
1	K	46[B]	ASN
3	I	46[B]	ASN
1	G	46[A]	ASN
1	J	46[B]	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
1	LYZ	G	4[A]	1	7,9,10	0.68	0	4,10,12	0.96	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
1	LYZ	K	4[B]	1	7,9,10	0.69	0	4,10,12	1.15	0
1	LYZ	J	4[B]	1	7,9,10	0.91	0	4,10,12	1.00	0
3	LYZ	L	4[B]	3	7,9,10	0.68	0	4,10,12	0.96	0
3	LYZ	C	4[A]	3	7,9,10	0.91	0	4,10,12	1.00	0
3	LYZ	I	4[B]	3	7,9,10	1.00	0	4,10,12	1.38	1 (25%)
1	LYZ	A	4[A]	1	7,9,10	1.00	0	4,10,12	1.38	1 (25%)
3	LYZ	E	4[A]	3	7,9,10	0.69	0	4,10,12	1.15	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
1	LYZ	G	4[A]	1	-	0/8/9/11	-
1	LYZ	K	4[B]	1	-	0/8/9/11	-
1	LYZ	J	4[B]	1	-	0/8/9/11	-
3	LYZ	L	4[B]	3	-	0/8/9/11	-
3	LYZ	C	4[A]	3	-	0/8/9/11	-
3	LYZ	I	4[B]	3	-	1/8/9/11	-
1	LYZ	A	4[A]	1	-	1/8/9/11	-
3	LYZ	E	4[A]	3	-	0/8/9/11	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	4[A]	LYZ	CG-CD-CE	-2.21	107.10	112.16
3	I	4[B]	LYZ	CG-CD-CE	-2.21	107.10	112.16

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	4[A]	LYZ	O-C-CA-CB
3	I	4[B]	LYZ	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

26 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	#$|Z| > 2$
4	PEB	G	101[A]	1	43,46,46	4.62	31 (72%)	45,67,67	2.08	14 (31%)
4	PEB	D	202	2	43,46,46	4.52	32 (74%)	45,67,67	2.52	12 (26%)
4	PEB	L	101[B]	3	43,46,46	4.62	31 (72%)	45,67,67	2.08	14 (31%)
4	PEB	E	101[A]	3	43,46,46	4.35	27 (62%)	45,67,67	2.09	10 (22%)
4	PEB	A	101[A]	1	43,46,46	4.55	31 (72%)	45,67,67	2.21	9 (20%)
5	AX9	D	201	2	41,46,46	1.60	10 (24%)	41,67,67	1.36	6 (14%)
6	GOL	G	102[A]	-	5,5,5	0.80	0	5,5,5	0.87	0
6	GOL	C	102[A]	-	5,5,5	0.92	0	5,5,5	0.19	0
4	PEB	B	202	2	43,46,46	4.37	30 (69%)	45,67,67	2.06	14 (31%)
4	PEB	D	203	2	43,46,46	4.32	31 (72%)	45,67,67	1.79	12 (26%)
6	GOL	E	102[A]	-	5,5,5	1.17	0	5,5,5	0.94	0
4	PEB	H	202	2	43,46,46	4.45	30 (69%)	45,67,67	2.14	11 (24%)
4	PEB	C	101[A]	3	43,46,46	4.34	29 (67%)	45,67,67	2.34	13 (28%)
5	AX9	F	201	2	41,46,46	1.77	12 (29%)	41,67,67	1.47	6 (14%)
5	AX9	H	201	2	41,46,46	1.72	8 (19%)	41,67,67	1.15	5 (12%)
6	GOL	J	102[B]	-	5,5,5	0.92	0	5,5,5	0.19	0
4	PEB	J	101[B]	1	43,46,46	4.34	29 (67%)	45,67,67	2.34	13 (28%)
4	PEB	F	202	2	43,46,46	4.68	33 (76%)	45,67,67	2.17	14 (31%)
4	PEB	F	203	2	43,46,46	4.22	28 (65%)	45,67,67	1.84	13 (28%)
4	PEB	I	101[B]	3	43,46,46	4.55	31 (72%)	45,67,67	2.21	9 (20%)
5	AX9	B	201	2	41,46,46	1.67	9 (21%)	41,67,67	1.41	7 (17%)
6	GOL	K	102[B]	-	5,5,5	1.17	0	5,5,5	0.94	0
6	GOL	L	102[B]	-	5,5,5	0.80	0	5,5,5	0.87	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
4	PEB	B	203	2	43,46,46	4.56	31 (72%)	45,67,67	1.80	9 (20%)
4	PEB	H	203	2	43,46,46	4.42	31 (72%)	45,67,67	1.81	10 (22%)
4	PEB	K	101[B]	1	43,46,46	4.35	27 (62%)	45,67,67	2.09	10 (22%)

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	PEB	G	101[A]	1	-	2/24/74/74	0/4/4/4
4	PEB	D	202	2	-	4/24/74/74	0/4/4/4
4	PEB	L	101[B]	3	-	2/24/74/74	0/4/4/4
4	PEB	E	101[A]	3	-	4/24/74/74	0/4/4/4
4	PEB	A	101[A]	1	-	5/24/74/74	0/4/4/4
5	AX9	D	201	2	-	6/26/74/74	0/4/4/4
6	GOL	G	102[A]	-	-	2/4/4/4	-
6	GOL	C	102[A]	-	-	0/4/4/4	-
4	PEB	B	202	2	-	3/24/74/74	0/4/4/4
4	PEB	D	203	2	-	6/24/74/74	0/4/4/4
6	GOL	E	102[A]	-	-	3/4/4/4	-
4	PEB	H	202	2	-	5/24/74/74	0/4/4/4
4	PEB	C	101[A]	3	-	4/24/74/74	0/4/4/4
5	AX9	F	201	2	-	4/26/74/74	0/4/4/4
5	AX9	H	201	2	-	6/26/74/74	0/4/4/4
6	GOL	J	102[B]	-	-	0/4/4/4	-
4	PEB	J	101[B]	1	-	4/24/74/74	0/4/4/4
4	PEB	F	202	2	-	6/24/74/74	0/4/4/4
4	PEB	F	203	2	-	7/24/74/74	0/4/4/4
4	PEB	I	101[B]	3	-	5/24/74/74	0/4/4/4
5	AX9	B	201	2	-	6/26/74/74	0/4/4/4
6	GOL	K	102[B]	-	-	3/4/4/4	-
6	GOL	L	102[B]	-	-	2/4/4/4	-
4	PEB	B	203	2	-	4/24/74/74	0/4/4/4
4	PEB	H	203	2	-	6/24/74/74	0/4/4/4
4	PEB	K	101[B]	1	-	4/24/74/74	0/4/4/4

The worst 5 of 521 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	202	PEB	CHB-C4B	11.93	1.45	1.35
4	G	101[A]	PEB	C2A-C1A	11.60	1.62	1.52
4	L	101[B]	PEB	C2A-C1A	11.60	1.62	1.52
4	G	101[A]	PEB	CHB-C4B	11.49	1.44	1.35
4	L	101[B]	PEB	CHB-C4B	11.49	1.44	1.35

The worst 5 of 211 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	101[A]	PEB	C1C-CHB-C4B	-10.98	115.70	128.81
4	J	101[B]	PEB	C1C-CHB-C4B	-10.98	115.70	128.81
4	A	101[A]	PEB	C1C-CHB-C4B	-8.78	118.32	128.81
4	I	101[B]	PEB	C1C-CHB-C4B	-8.78	118.32	128.81
4	F	202	PEB	C1C-CHB-C4B	-8.54	118.61	128.81

There are no chirality outliers.

5 of 103 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	101[A]	PEB	NB-C1B-CHA-C4A
4	A	101[A]	PEB	C2B-C1B-CHA-C4A
4	B	203	PEB	NA-C4A-CHA-C1B
4	C	101[A]	PEB	NA-C4A-CHA-C1B
4	C	101[A]	PEB	NB-C1B-CHA-C4A

There are no ring outliers.

18 monomers are involved in 48 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	101[A]	PEB	2	0
4	D	202	PEB	1	0
4	L	101[B]	PEB	1	0
4	E	101[A]	PEB	2	0
4	A	101[A]	PEB	2	0
4	B	202	PEB	1	0
4	D	203	PEB	6	0
6	E	102[A]	GOL	2	0
4	H	202	PEB	1	0
4	C	101[A]	PEB	1	0
4	J	101[B]	PEB	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	202	PEB	4	0
4	F	203	PEB	5	0
4	I	101[B]	PEB	2	0
6	K	102[B]	GOL	2	0
4	B	203	PEB	4	0
4	H	203	PEB	3	0
4	K	101[B]	PEB	7	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 PEB G 101 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB D 202

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB L 101 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB E 101 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB A 101 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand AX9 D 201

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB B 202

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB D 203

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB H 202

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB C 101 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand AX9 F 201

Bond lengths

Bond angles

Torsions

Rings

Ligand AX9 H 201

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB J 101 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB F 202

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB F 203

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB I 101 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand AX9 B 201

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB B 203

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB H 203

Bond lengths

Bond angles

Torsions

Rings

Ligand PEB K 101 (B)

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, 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	63/67 (94%)	-0.09	3 (4%)	30	32	27, 37, 56, 87	63 (100%)
1	G	63/67 (94%)	-0.10	3 (4%)	30	32	24, 34, 54, 75	63 (100%)
1	J	63/67 (94%)	-0.22	3 (4%)	30	32	27, 36, 50, 70	63 (100%)
1	K	63/67 (94%)	-0.09	3 (4%)	30	32	27, 40, 55, 68	63 (100%)
2	B	173/177 (97%)	-0.14	4 (2%)	60	64	23, 36, 63, 118	0
2	D	174/177 (98%)	-0.22	4 (2%)	60	64	25, 38, 62, 80	0
2	F	173/177 (97%)	-0.11	2 (1%)	79	82	26, 40, 68, 98	0
2	H	173/177 (97%)	-0.35	1 (0%)	89	91	23, 34, 55, 68	0
3	C	61/62 (98%)	-0.31	0	100	100	27, 36, 52, 70	61 (100%)
3	E	61/62 (98%)	-0.26	0	100	100	27, 39, 54, 68	61 (100%)
3	I	61/62 (98%)	-0.22	0	100	100	27, 37, 56, 87	61 (100%)
3	L	61/62 (98%)	-0.26	2 (3%)	46	49	24, 34, 52, 75	61 (100%)
All	All	1189/1224 (97%)	-0.20	25 (2%)	63	67	23, 37, 60, 118	496 (41%)

The worst 5 of 25 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	12	ALA	11.0
1	G	62[A]	PHE	5.1
2	F	12	ALA	5.0
1	A	64[A]	ALA	4.4
1	K	64[B]	ALA	4.3

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	LYZ	C	4[A]	10/11	0.90	0.09	40,52,73,87	21
1	LYZ	J	4[B]	10/11	0.90	0.09	40,52,73,87	21
3	LYZ	E	4[A]	10/11	0.93	0.12	47,62,82,88	21
3	LYZ	I	4[B]	10/11	0.93	0.08	34,44,59,63	21
1	LYZ	A	4[A]	10/11	0.93	0.08	34,44,59,63	21
1	LYZ	K	4[B]	10/11	0.93	0.12	47,62,82,88	21
1	LYZ	G	4[A]	10/11	0.95	0.10	32,47,63,75	21
3	LYZ	L	4[B]	10/11	0.95	0.10	32,47,63,75	21

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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
6	GOL	E	102[A]	6/6	0.90	0.11	30,46,55,56	13
6	GOL	K	102[B]	6/6	0.90	0.11	30,46,55,56	13
6	GOL	G	102[A]	6/6	0.92	0.12	31,51,65,65	14
5	AX9	F	201	43/43	0.92	0.09	28,41,57,62	0
6	GOL	L	102[B]	6/6	0.92	0.12	31,51,65,65	14
6	GOL	C	102[A]	6/6	0.93	0.16	33,42,50,54	13
6	GOL	J	102[B]	6/6	0.93	0.16	33,42,50,54	13
4	PEB	J	101[B]	43/43	0.94	0.09	25,33,53,80	80
4	PEB	L	101[B]	43/43	0.94	0.10	25,36,66,86	80
5	AX9	B	201	43/43	0.94	0.08	26,38,54,54	0
5	AX9	D	201	43/43	0.94	0.08	29,38,50,52	0
4	PEB	A	101[A]	43/43	0.94	0.10	25,37,78,94	80
5	AX9	H	201	43/43	0.94	0.08	24,38,52,59	0
4	PEB	B	203	43/43	0.94	0.10	27,38,54,56	0
4	PEB	C	101[A]	43/43	0.94	0.09	25,33,53,80	80
4	PEB	F	202	43/43	0.94	0.10	24,39,57,58	0
4	PEB	G	101[A]	43/43	0.94	0.10	25,36,66,86	80
4	PEB	H	202	43/43	0.94	0.11	21,31,44,50	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	PEB	I	101[B]	43/43	0.94	0.10	25,37,78,94	80
4	PEB	K	101[B]	43/43	0.95	0.10	25,33,54,80	80
4	PEB	D	202	43/43	0.95	0.08	24,34,47,50	0
4	PEB	D	203	43/43	0.95	0.09	23,32,43,48	0
4	PEB	H	203	43/43	0.95	0.08	20,32,42,42	0
4	PEB	E	101[A]	43/43	0.95	0.10	25,33,54,80	80
4	PEB	B	202	43/43	0.95	0.09	21,31,42,65	0
4	PEB	F	203	43/43	0.96	0.08	20,32,42,44	0

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

Electron density around AX9 F 201:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
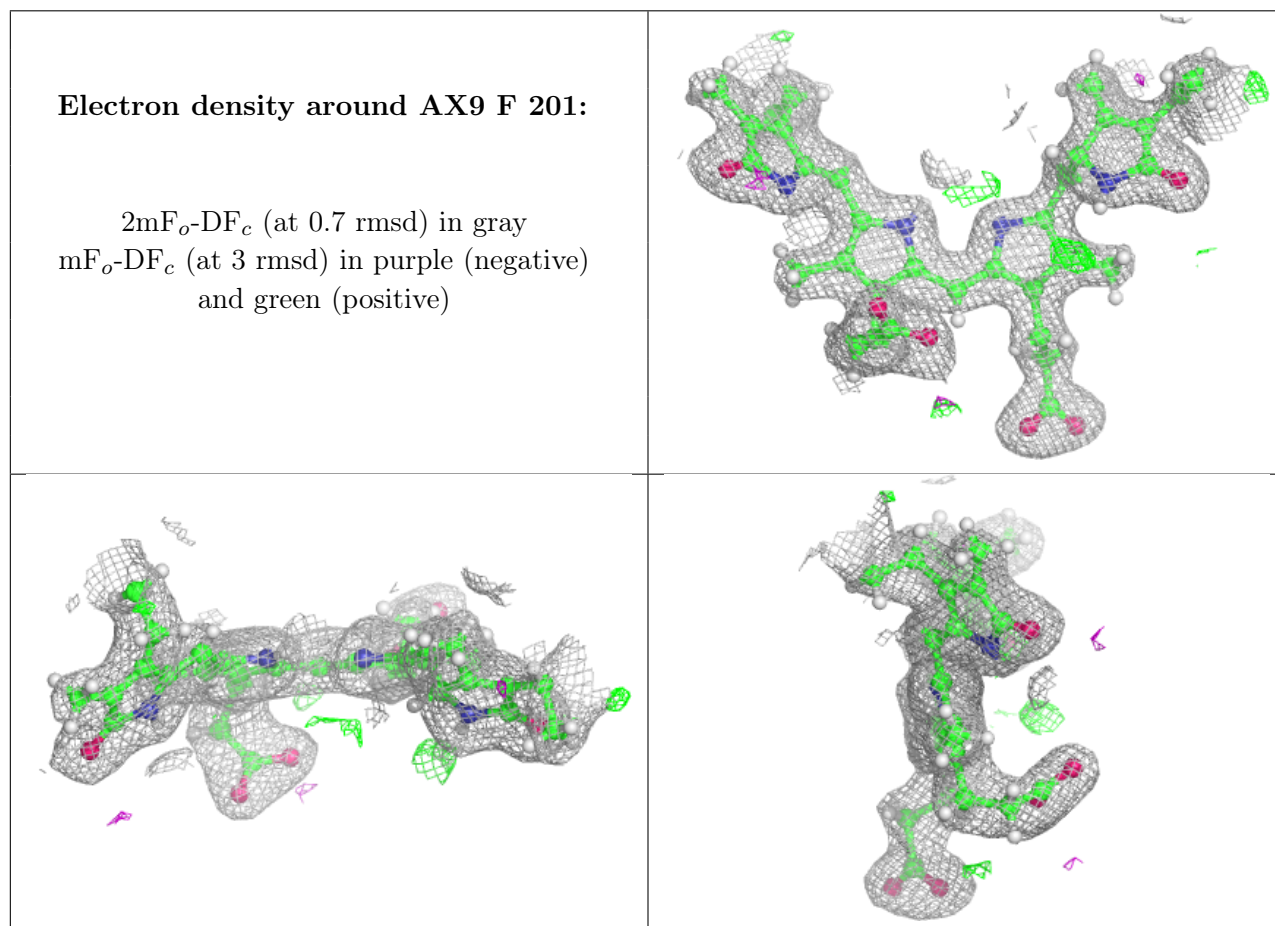
Electron density around PEB J 101 (B):

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
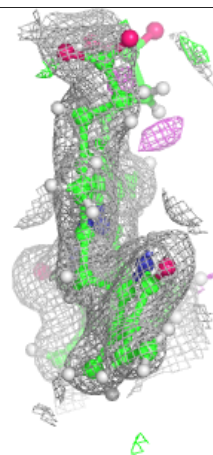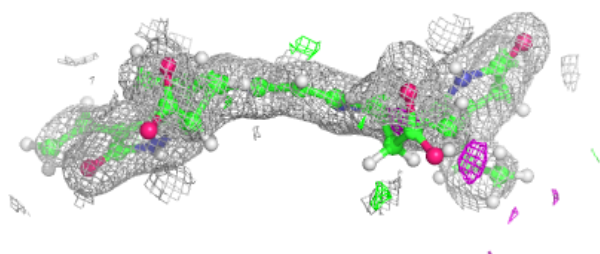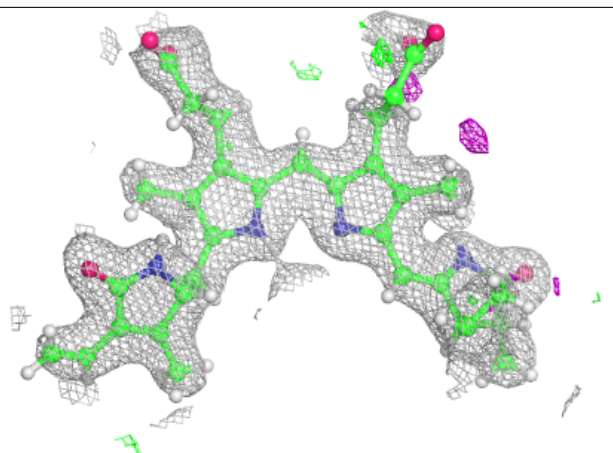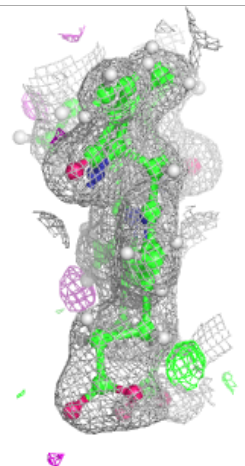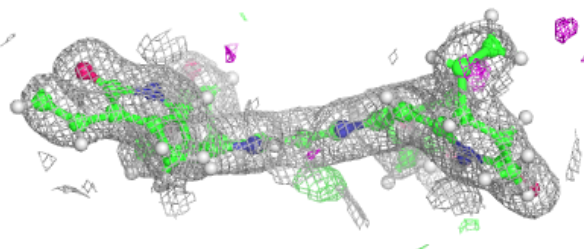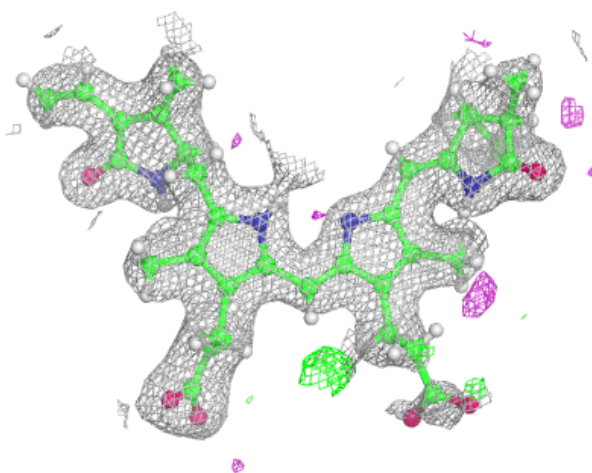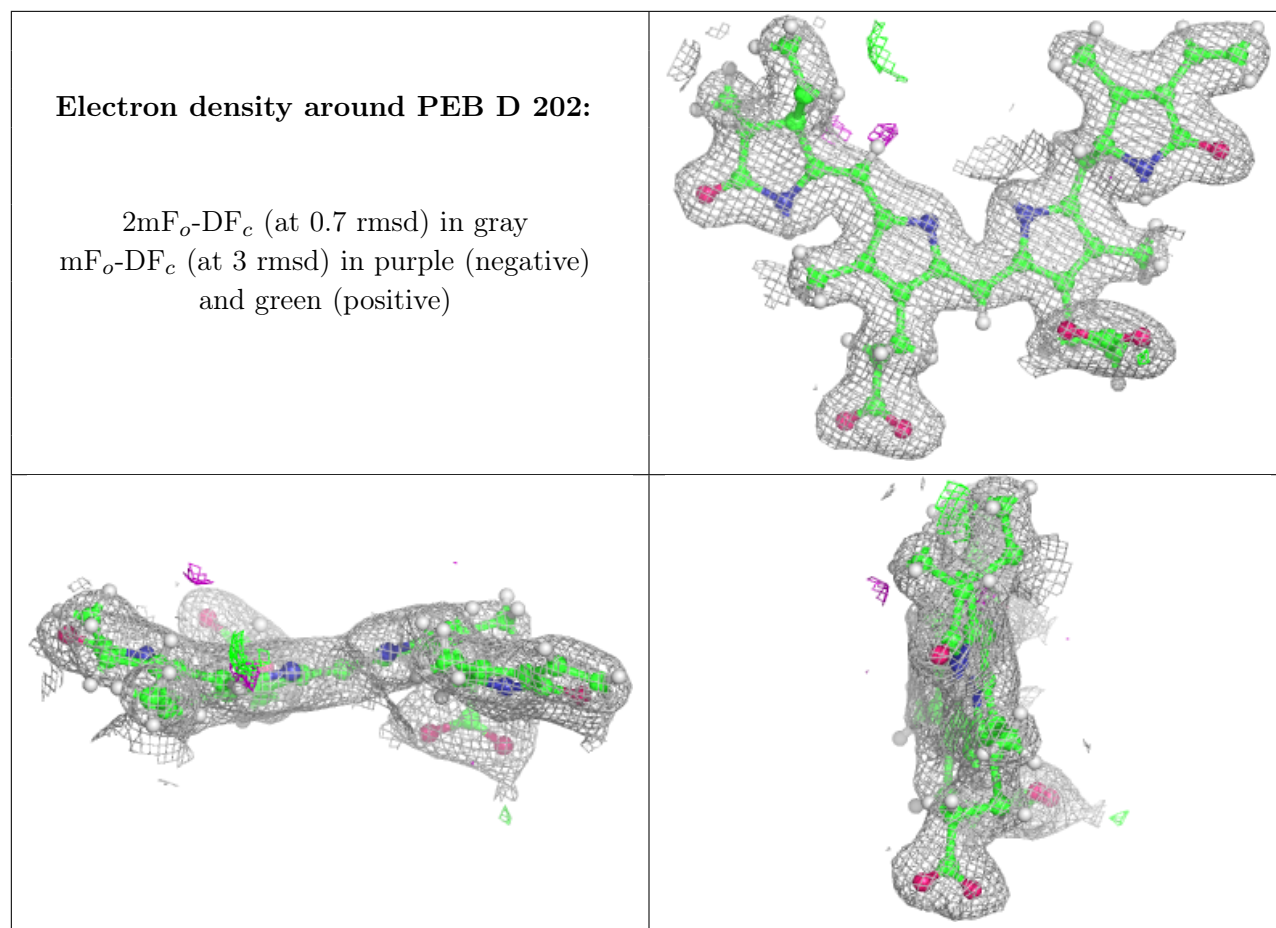$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
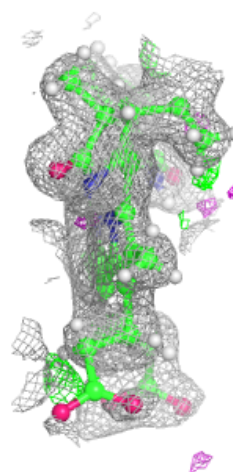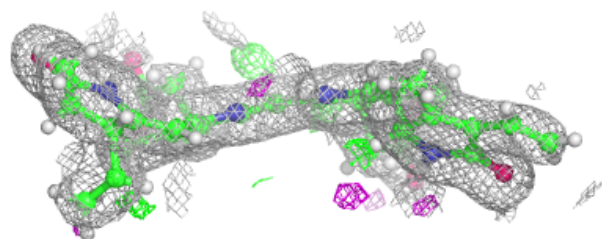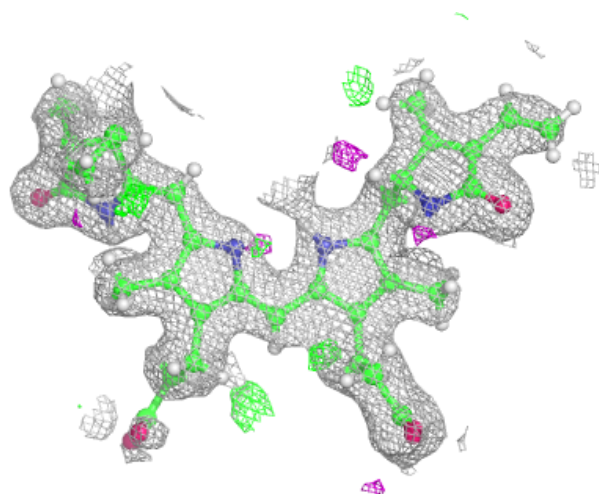
Electron density around PEB L 101 (B):

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
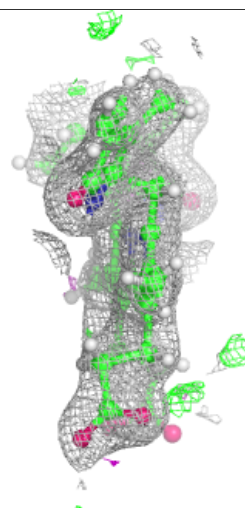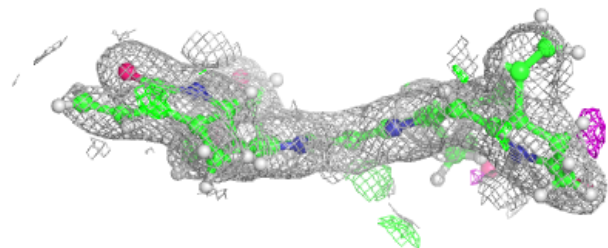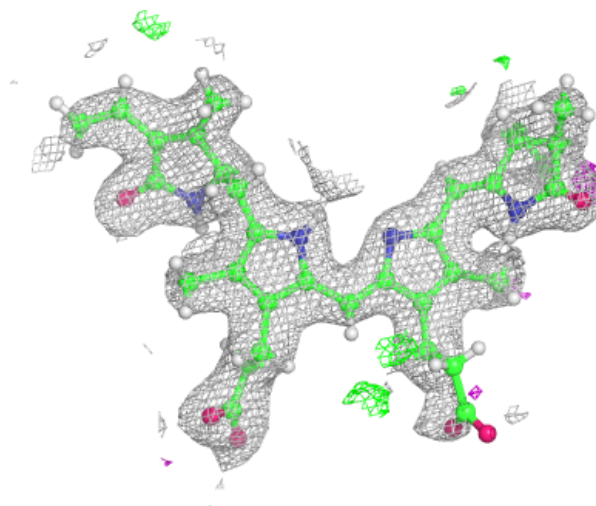
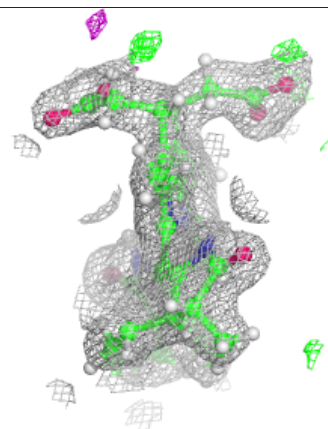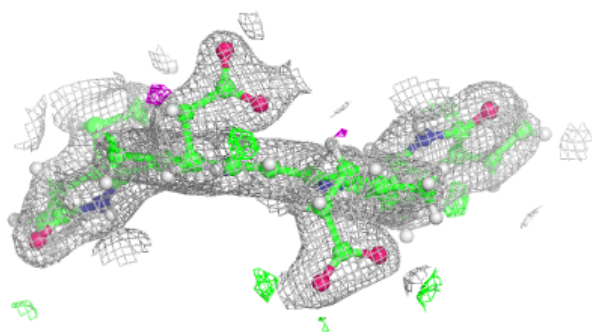**Electron density around AX9 B 201:**

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
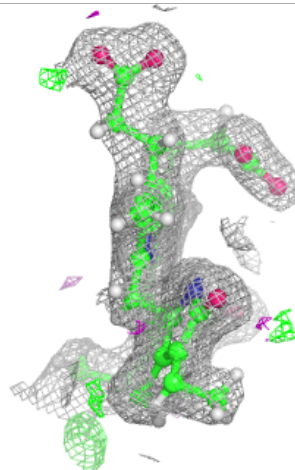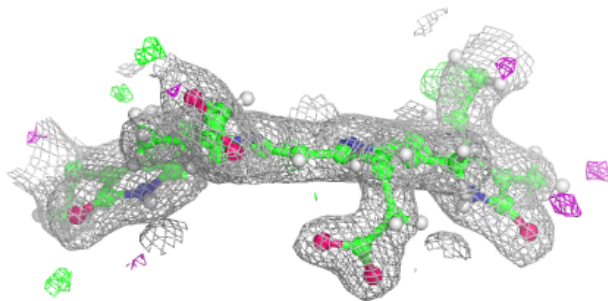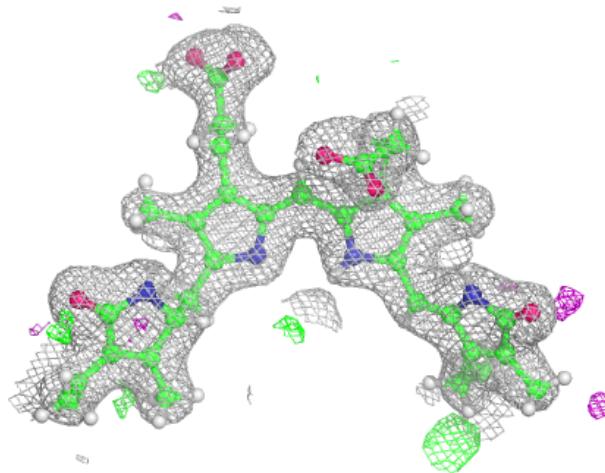
Electron density around AX9 D 201:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
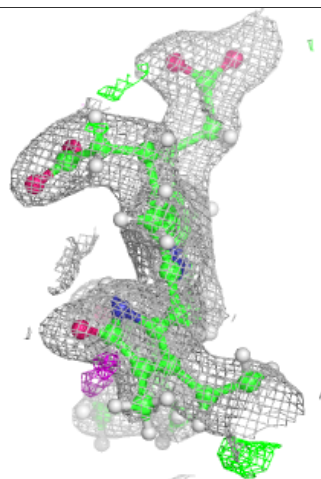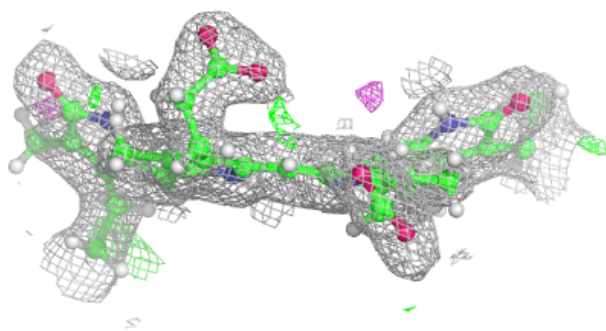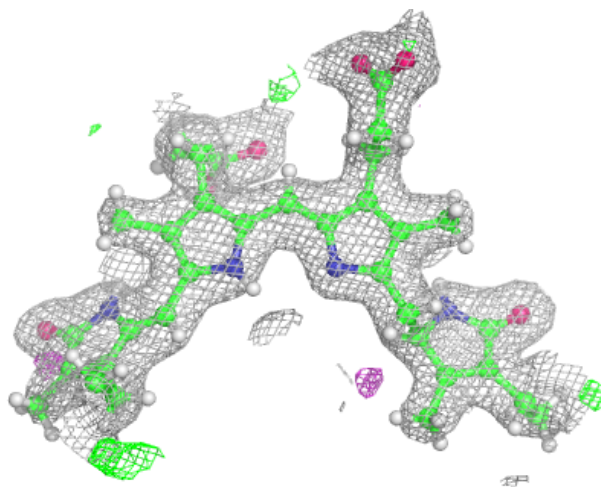
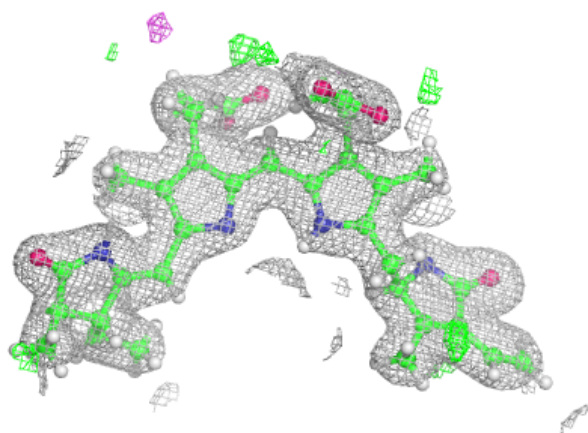**Electron density around PEB A 101 (A):**

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
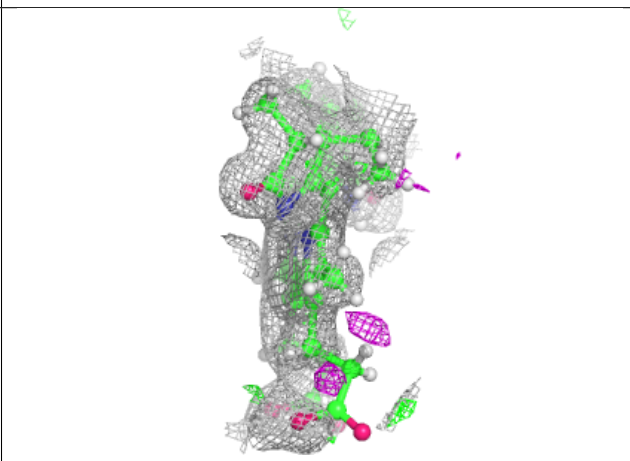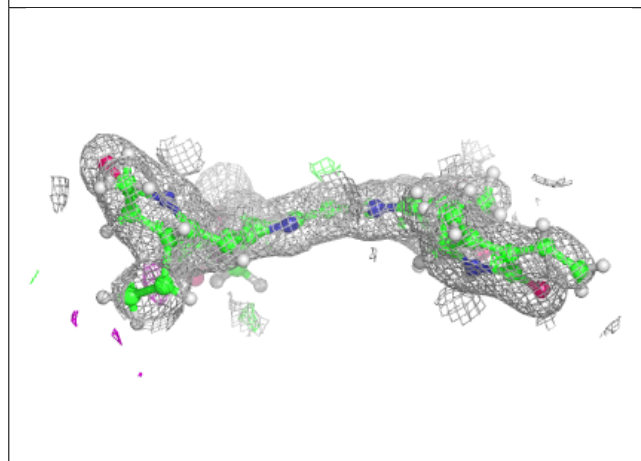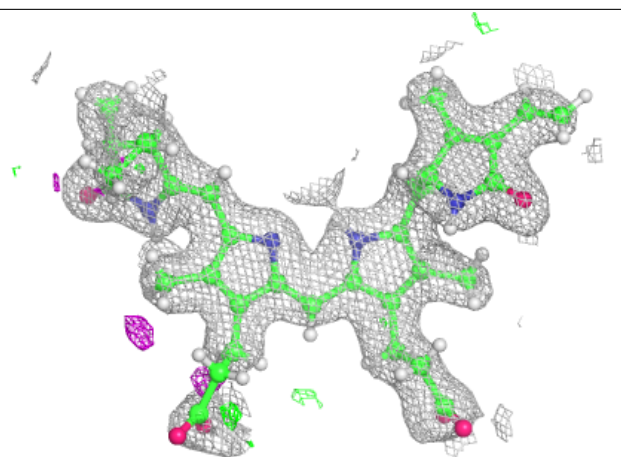
Electron density around AX9 H 201:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
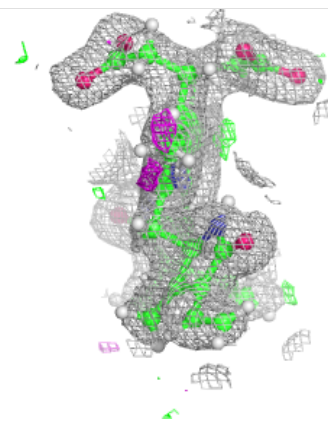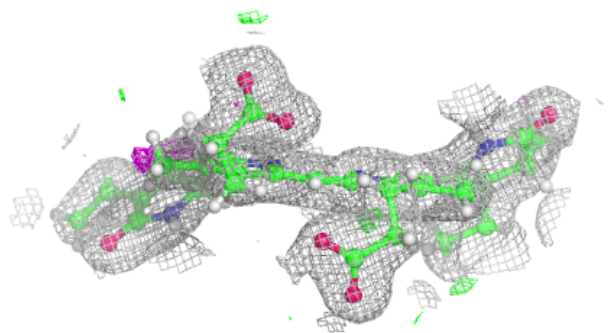and green (positive)
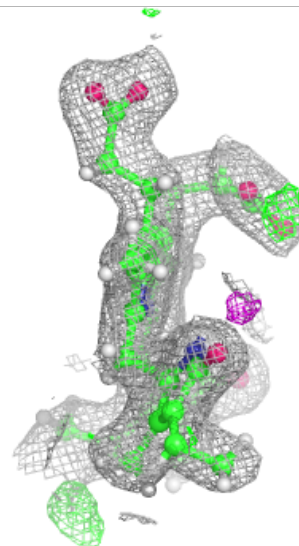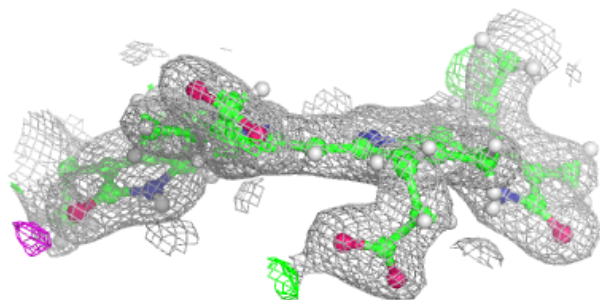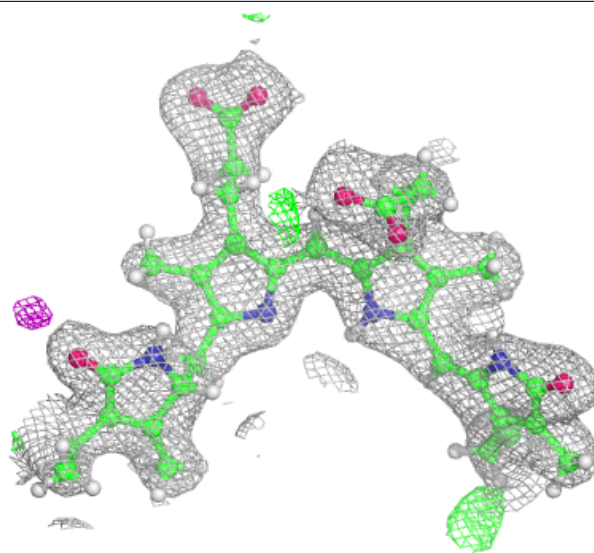
Electron density around PEB B 203:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
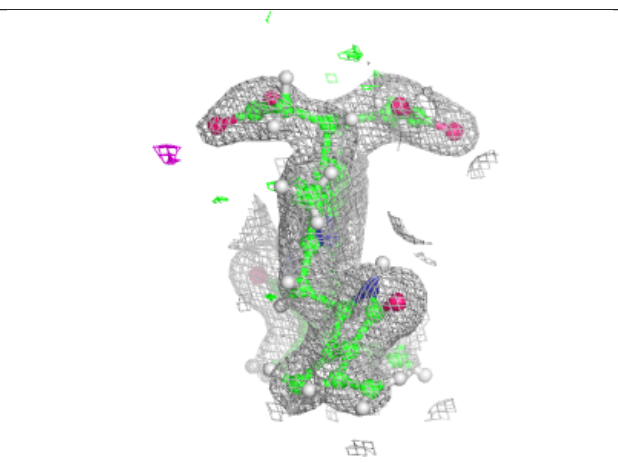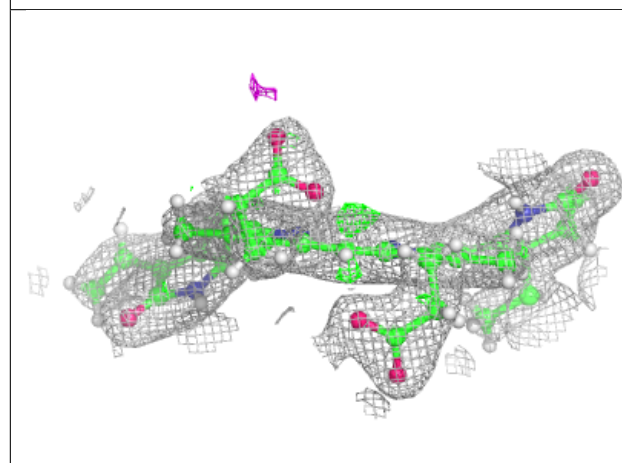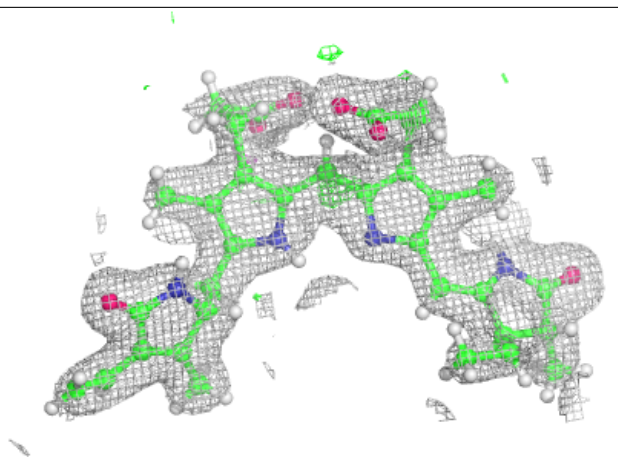
Electron density around PEB C 101 (A):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
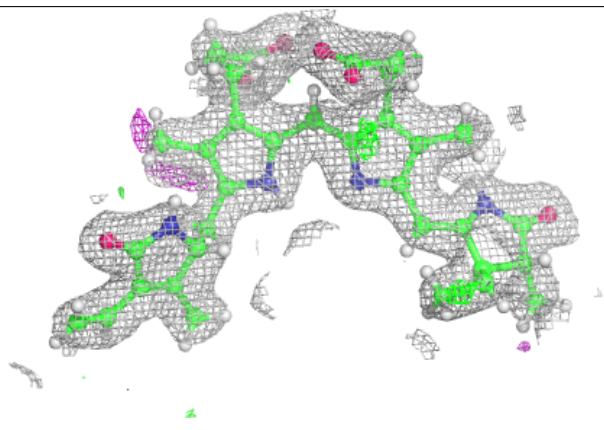and green (positive)
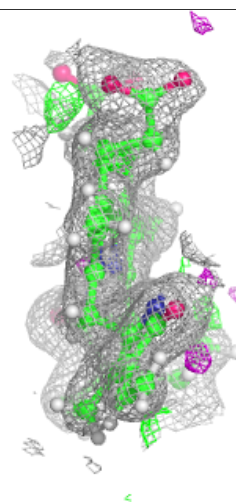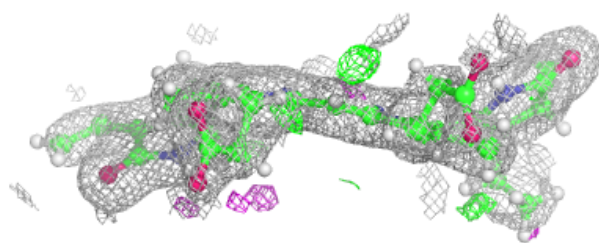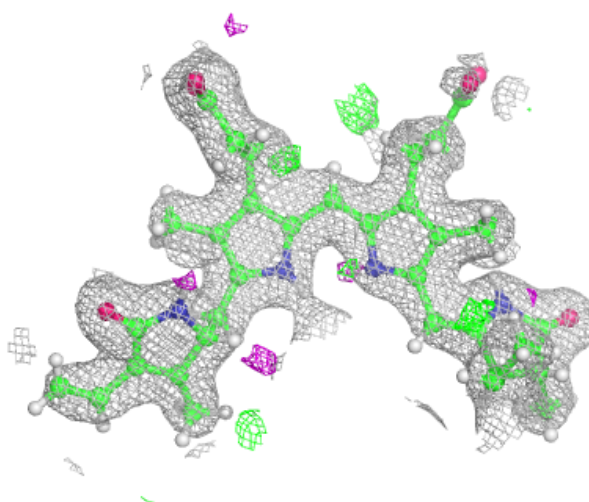
Electron density around PEB F 202:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
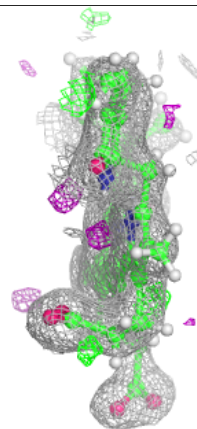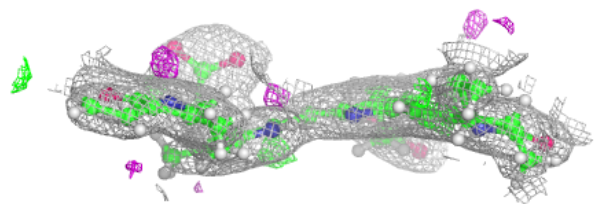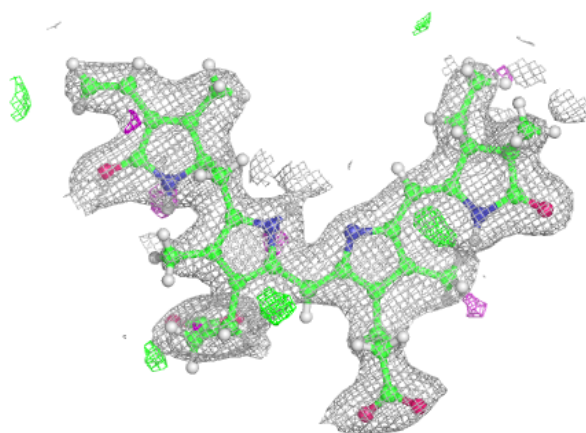
Electron density around PEB G 101 (A):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
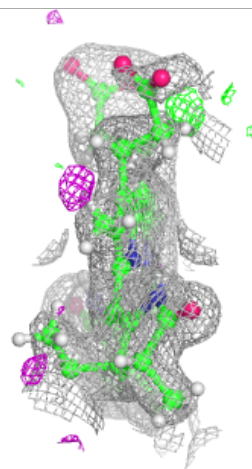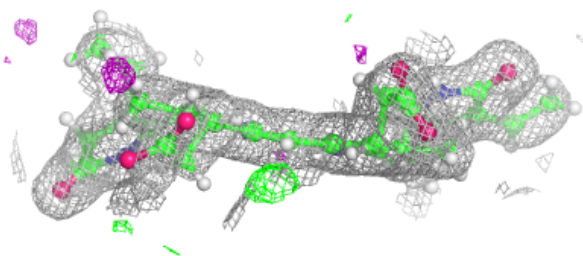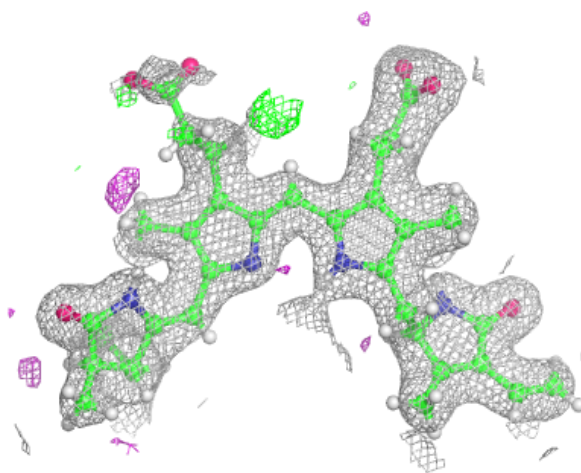and green (positive)
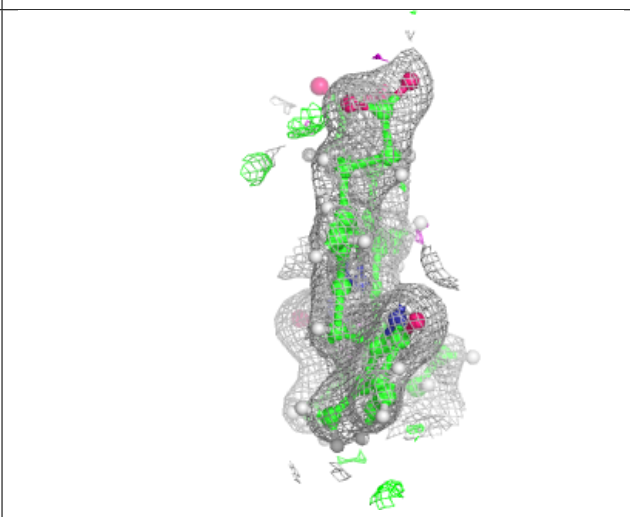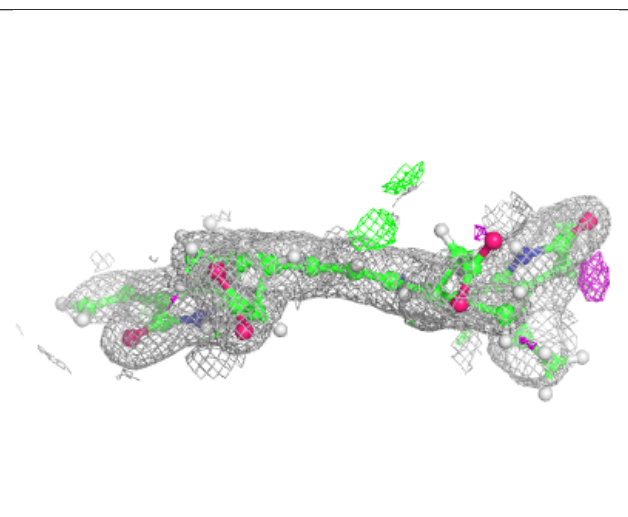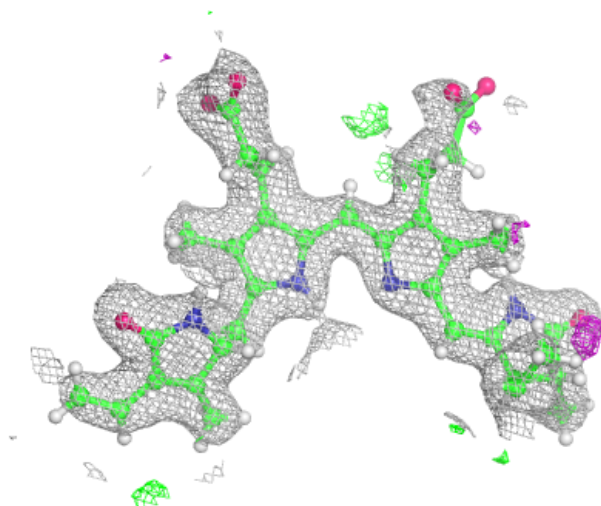
Electron density around PEB H 202:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
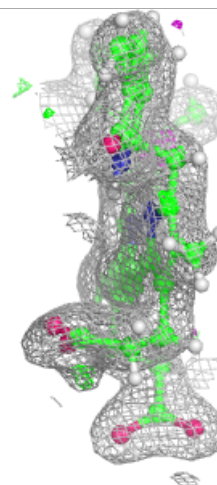and green (positive)
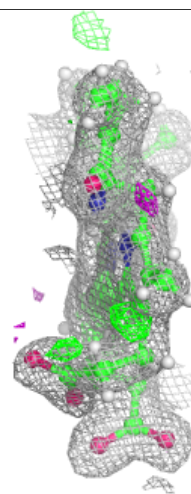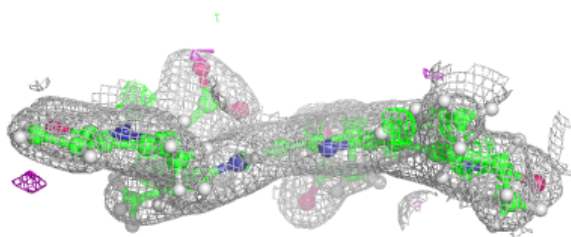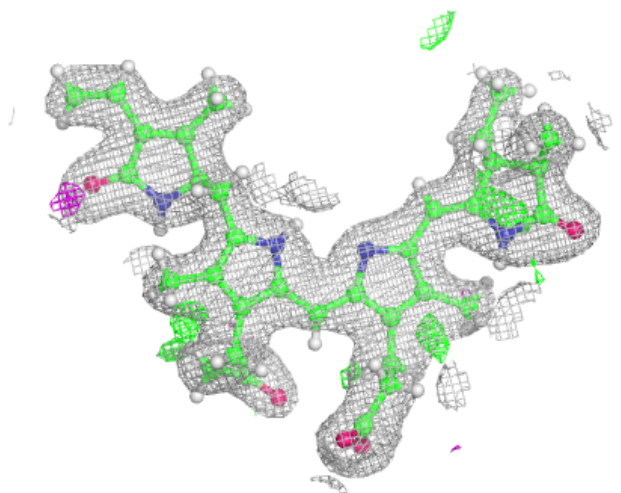
Electron density around PEB I 101 (B):

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

Electron density around PEB K 101 (B):

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

Electron density around PEB D 202:

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

Electron density around PEB D 203:

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

Electron density around PEB H 203:

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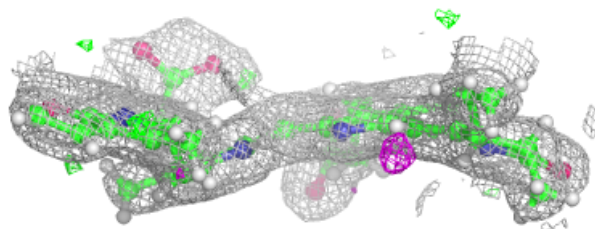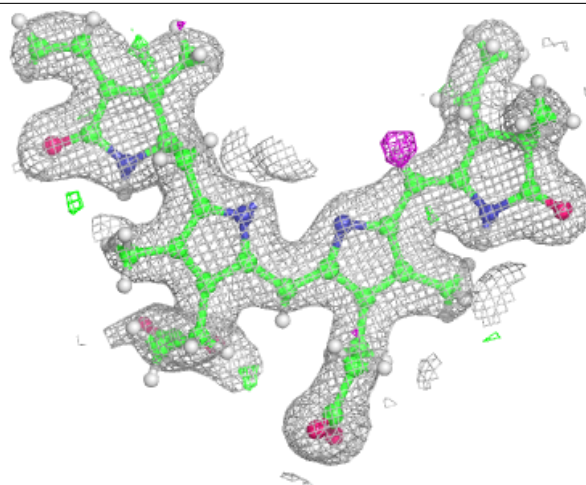$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
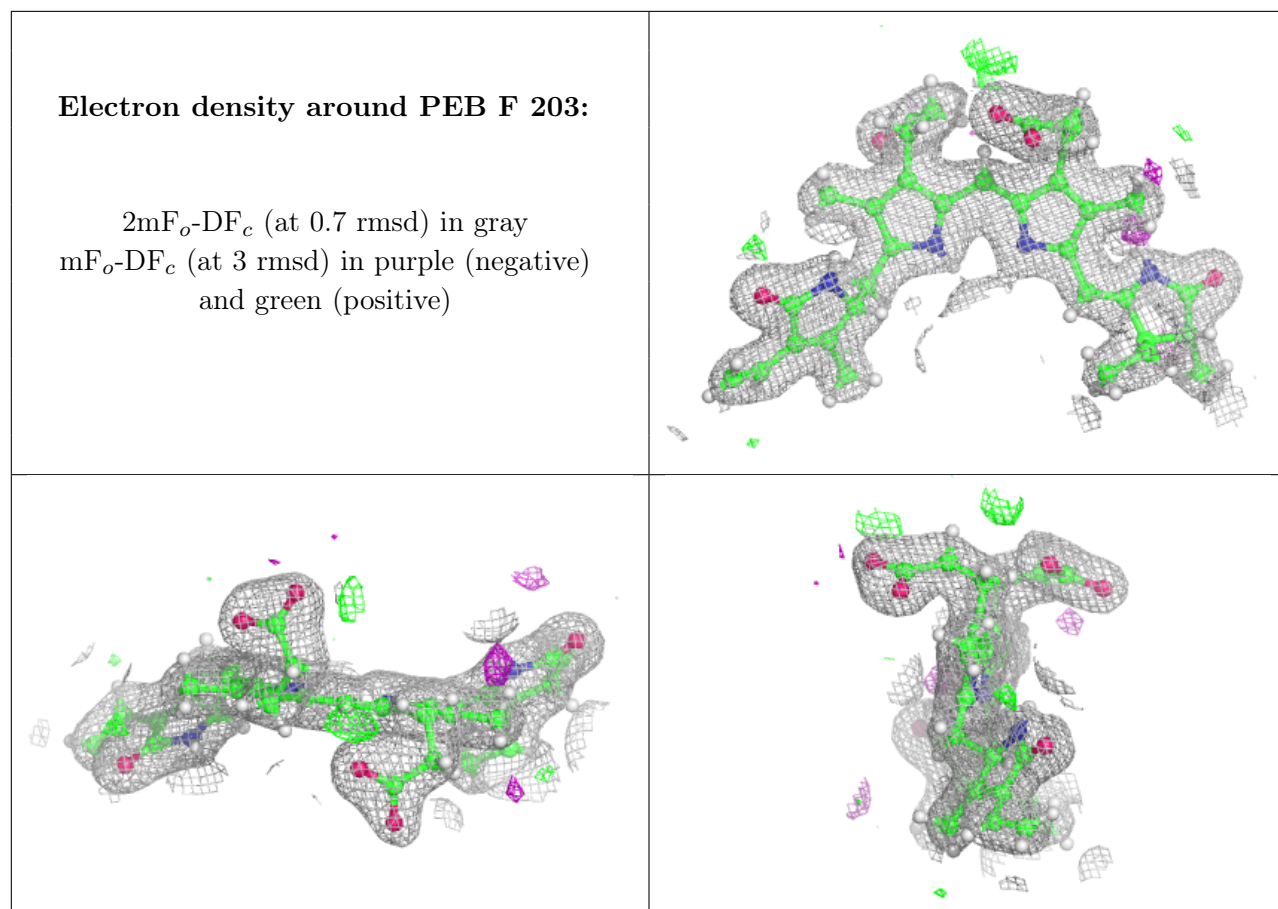and green (positive)

Electron density around PEB E 101 (A):

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

Electron density around PEB 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 PEB F 203:

$2mF_o$-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.