WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

May 26, 2020 – 06:13 pm BST

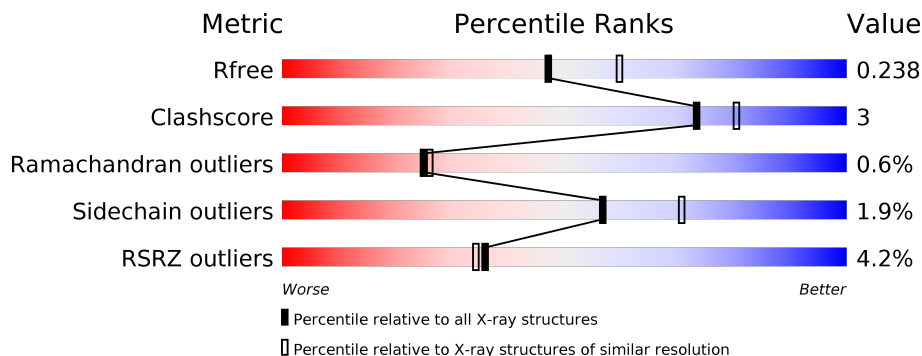|		
PDB ID	:	6RT8
Title	:	Structure of catharanthine synthase - an alpha-beta hydrolase from Catharanthus roseus with a cleaviminium intermediate bound
Authors	:	Caputi, L.; Franke, J.; Bussey, K.; Farrow, S.C.; Curcino Vieira, I.J.; Stevenson, C.E.M.; Lawson, D.M.; O'Connor, S.E.
Deposited on	:	2019-05-22
Resolution	:	2.19 Å(reported)

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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 2.19 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		0.238
Clashscore		3
Ramachandran outliers		0.6%
Sidechain outliers		1.9%
RSRZ outliers		4.2%

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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	330	88% 7% · 5%
1	B	330	% 88% 7% · 5%
1	C	330	% 88% 7% · 5%
1	D	330	% 88% 6% · 5%
1	E	330	12% 85% 6% · 8%
1	F	330	4% 86% 8% · 5%

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Mol	Chain	Length	Quality of chain
1	G	330	87% 7% · 5%
1	H	330	12% 88% 6% · 5%

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
2	KJE	A	401	X	-	-	-
2	KJE	B	401	X	-	-	-
2	KJE	C	401	X	-	-	-
2	KJE	D	401	X	-	-	-
2	KJE	E	401	X	-	-	-
2	KJE	F	401	X	-	-	-
2	KJE	G	401	X	-	-	-
2	KJE	H	401	X	-	-	-
3	P6G	E	402	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 20132 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 Catharanthine synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	314	Total	C	N	O	S	0	0	0
			2461	1605	391	456	9			
1	B	314	Total	C	N	O	S	0	0	0
			2457	1602	393	453	9			
1	C	314	Total	C	N	O	S	0	0	0
			2464	1609	391	455	9			
1	D	314	Total	C	N	O	S	0	0	0
			2461	1605	392	455	9			
1	E	305	Total	C	N	O	S	0	0	0
			2313	1506	369	429	9			
1	F	313	Total	C	N	O	S	0	0	0
			2438	1588	385	456	9			
1	G	313	Total	C	N	O	S	0	0	0
			2455	1603	389	454	9			
1	H	314	Total	C	N	O	S	0	0	0
			2419	1580	385	445	9			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP A0A2P1GIW2
A	1	PRO	-	expression tag	UNP A0A2P1GIW2
A	2	ALA	-	expression tag	UNP A0A2P1GIW2
A	3	SER	-	expression tag	UNP A0A2P1GIW2
A	4	GLN	-	expression tag	UNP A0A2P1GIW2
A	5	THR	-	expression tag	UNP A0A2P1GIW2
B	0	GLY	-	expression tag	UNP A0A2P1GIW2
B	1	PRO	-	expression tag	UNP A0A2P1GIW2
B	2	ALA	-	expression tag	UNP A0A2P1GIW2
B	3	SER	-	expression tag	UNP A0A2P1GIW2
B	4	GLN	-	expression tag	UNP A0A2P1GIW2
B	5	THR	-	expression tag	UNP A0A2P1GIW2
C	0	GLY	-	expression tag	UNP A0A2P1GIW2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1	PRO	-	expression tag	UNP A0A2P1GIW2
C	2	ALA	-	expression tag	UNP A0A2P1GIW2
C	3	SER	-	expression tag	UNP A0A2P1GIW2
C	4	GLN	-	expression tag	UNP A0A2P1GIW2
C	5	THR	-	expression tag	UNP A0A2P1GIW2
D	0	GLY	-	expression tag	UNP A0A2P1GIW2
D	1	PRO	-	expression tag	UNP A0A2P1GIW2
D	2	ALA	-	expression tag	UNP A0A2P1GIW2
D	3	SER	-	expression tag	UNP A0A2P1GIW2
D	4	GLN	-	expression tag	UNP A0A2P1GIW2
D	5	THR	-	expression tag	UNP A0A2P1GIW2
E	0	GLY	-	expression tag	UNP A0A2P1GIW2
E	1	PRO	-	expression tag	UNP A0A2P1GIW2
E	2	ALA	-	expression tag	UNP A0A2P1GIW2
E	3	SER	-	expression tag	UNP A0A2P1GIW2
E	4	GLN	-	expression tag	UNP A0A2P1GIW2
E	5	THR	-	expression tag	UNP A0A2P1GIW2
F	0	GLY	-	expression tag	UNP A0A2P1GIW2
F	1	PRO	-	expression tag	UNP A0A2P1GIW2
F	2	ALA	-	expression tag	UNP A0A2P1GIW2
F	3	SER	-	expression tag	UNP A0A2P1GIW2
F	4	GLN	-	expression tag	UNP A0A2P1GIW2
F	5	THR	-	expression tag	UNP A0A2P1GIW2
G	0	GLY	-	expression tag	UNP A0A2P1GIW2
G	1	PRO	-	expression tag	UNP A0A2P1GIW2
G	2	ALA	-	expression tag	UNP A0A2P1GIW2
G	3	SER	-	expression tag	UNP A0A2P1GIW2
G	4	GLN	-	expression tag	UNP A0A2P1GIW2
G	5	THR	-	expression tag	UNP A0A2P1GIW2
H	0	GLY	-	expression tag	UNP A0A2P1GIW2
H	1	PRO	-	expression tag	UNP A0A2P1GIW2
H	2	ALA	-	expression tag	UNP A0A2P1GIW2
H	3	SER	-	expression tag	UNP A0A2P1GIW2
H	4	GLN	-	expression tag	UNP A0A2P1GIW2
H	5	THR	-	expression tag	UNP A0A2P1GIW2

- Molecule 2 is 18-carboxymethoxy-cleaviminium (three-letter code: KJE) (formula: $C_{21}H_{25}N_2O_2$) (labeled as "Ligand of Interest" by author).

KJE

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			25	21	2	2		
2	B	1	Total	C	N	O	0	0
			25	21	2	2		
2	C	1	Total	C	N	O	0	0
			25	21	2	2		
2	D	1	Total	C	N	O	0	0
			25	21	2	2		
2	E	1	Total	C	N	O	0	0
			25	21	2	2		
2	F	1	Total	C	N	O	0	0
			25	21	2	2		
2	G	1	Total	C	N	O	0	0
			25	21	2	2		
2	H	1	Total	C	N	O	0	0
			25	21	2	2		

- Molecule 3 is HEXAETHYLENE GLYCOL (three-letter code: P6G) (formula: $C_{12}H_{26}O_7$).
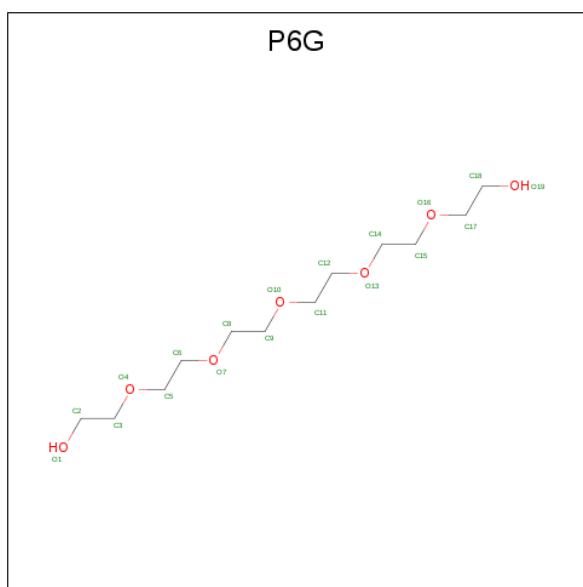
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 19	C 12	O 7	0	0
3	C	1	Total 19	C 12	O 7	0	0
3	E	1	Total 19	C 12	O 7	0	0
3	H	1	Total 19	C 12	O 7	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	65	Total 65	O 65	0	0
4	B	40	Total 40	O 40	0	0
4	C	44	Total 44	O 44	0	0
4	D	70	Total 70	O 70	0	0
4	E	33	Total 33	O 33	0	0
4	F	64	Total 64	O 64	0	0
4	G	38	Total 38	O 38	0	0
4	H	34	Total 34	O 34	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA 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: Catharanthine synthase

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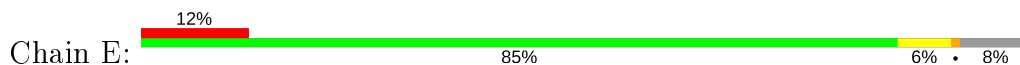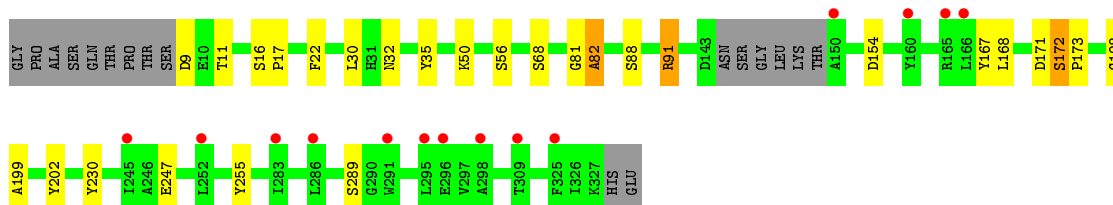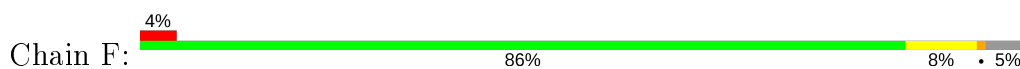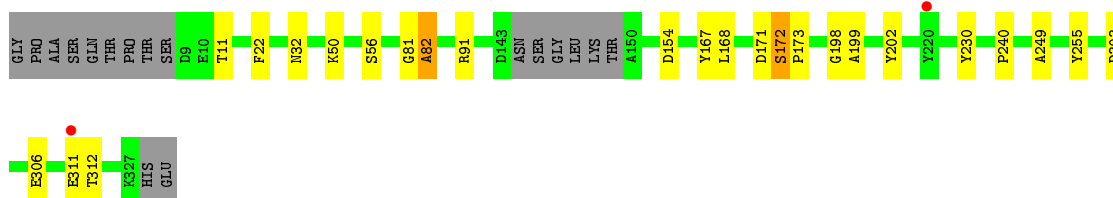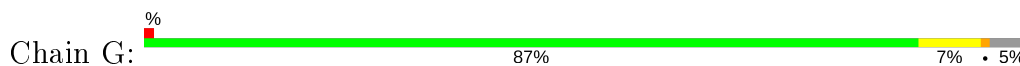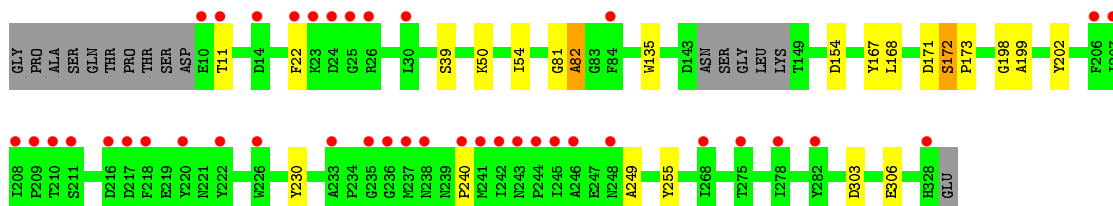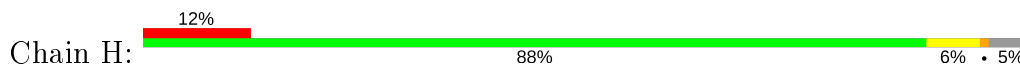

- Molecule 1: Catharanthine synthase

D303 Y304 F305 E306 K327 HIS GLU

● Molecule 1: Catharanthine synthase

Chain E:

12%

85%

6% · 8%

GLY PRO ALA SER GLN THR PRO THR SER D9 W13 D14 L15 S16 P17 Y18 I19 F22 G25 N32 Y35 S39 K50 I54 K66 ILE SER ASP HIS E71 G81 A82 L86 E87 S88 R91 F101 V107 W135 H139 L142 D143 ASN

SER GLY LEU LYS T149 A150 I151 D154 Y167 L168 D171 S172 P173 G198 A199 Y202 Y203 P204 I207 I208 PRO THR SER THR K213 Y220 T223 C224 Y225 Y230 M237 I242 Y255 G256 C257 L260 V265 S266 M267 I268 S269 T270 T271 P272 N279

I283 E287 W291 L295 E296 V297 A298 Y304 F308 I326 LYS HIS GLU

● Molecule 1: Catharanthine synthase

Chain F:

4%

86%

8% · 5%

GLY PRO ALA SER GLN THR PRO THR SER D9 E10 T11 S16 P17 F22 L30 H31 N32 Y35 K50 S56 S68 G81 A82 S88 R91 D143 ASN SER GLY LEU LYS THR A150 D154 Y160 R165 L166 Y167 L168 D171 S172 P173 G198

A199 Y202 Y230 I245 A246 E247 L252 Y255 I283 L286 S289 G290 W291 L295 E296 V297 A298 T309 F325 I326 K327 HIS GLU

● Molecule 1: Catharanthine synthase

Chain G:

%

87%

7% · 5%

GLY PRO ALA SER GLN THR PRO THR SER D9 E10 T11 F22 N32 K50 S56 G81 A82 R91 D143 ASN SER GLY LEU LYS THR A150 D154 Y167 L168 D171 S172 P173 G198 A199 Y202 Y220 Y230 P240 A249 Y255 D303

E306 E311 T312 K327 HIS GLU

● Molecule 1: Catharanthine synthase

Chain H:

12%

88%

6% · 5%

GLY PRO ALA SER GLN THR PRO THR SER ASP E10 T11 D14 F22 K23 D24 G25 R26 L30 S39 K50 I54 G81 A82 G83 F84 W135 D143 ASN SER GLY LEU LYS T149 D154 Y167 L168 D171 S172 P173 G198 A199 Y202 F206 I207

I208 P209 T210 S211 D216 D217 F218 E219 Y220 N221 Y222 W226 Y230 A233 G235 G236 M237 N238 N239 P240 M241 I242 N243 P244 I245 A246 E247 N248 A249 Y255 I268 T275 I278 Y282 D303 E306 H328 GLU

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	81.54Å 121.03Å 157.98Å 90.00° 99.02° 90.00°	Depositor
Resolution (Å)	52.01 – 2.19 52.01 – 2.19	Depositor EDS
% Data completeness (in resolution range)	98.1 (52.01-2.19) 98.1 (52.01-2.19)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	1.99 (at 2.18Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.194 , 0.234 0.202 , 0.238	Depositor DCC
R_{free} test set	7594 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å^2)	43.0	Xtriage
Anisotropy	0.258	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 41.5	EDS
L-test for twinning [2]	$<|L|> = 0.48, <L^2> = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	20132	wwPDB-VP
Average B, all atoms (Å^2)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.33% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: P6G, KJE

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	0.68	0/2534	0.82	0/3460
1	B	0.70	0/2530	0.81	0/3455
1	C	0.68	0/2537	0.81	0/3463
1	D	0.69	1/2534 (0.0%)	0.81	0/3459
1	E	0.70	0/2380	0.83	1/3256 (0.0%)
1	F	0.67	0/2511	0.80	1/3434 (0.0%)
1	G	0.68	0/2528	0.81	0/3452
1	H	0.68	0/2491	0.83	0/3406
All	All	0.69	1/20045 (0.0%)	0.81	2/27385 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	296	GLU	CD-OE2	5.36	1.31	1.25

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	E	32	ASN	N-CA-CB	-5.45	100.79	110.60
1	F	91	ARG	NE-CZ-NH2	-5.13	117.73	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2461	0	2351	13	0
1	B	2457	0	2352	12	0
1	C	2464	0	2350	17	0
1	D	2461	0	2350	14	0
1	E	2313	0	2132	16	0
1	F	2438	0	2300	21	0
1	G	2455	0	2343	14	0
1	H	2419	0	2283	15	0
2	A	25	0	0	1	0
2	B	25	0	0	1	0
2	C	25	0	0	1	0
2	D	25	0	0	0	0
2	E	25	0	0	1	0
2	F	25	0	0	4	0
2	G	25	0	0	1	0
2	H	25	0	0	1	0
3	A	19	0	26	2	0
3	C	19	0	26	7	0
3	E	19	0	26	11	0
3	H	19	0	26	1	0
4	A	65	0	0	0	0
4	B	40	0	0	0	0
4	C	44	0	0	2	0
4	D	70	0	0	0	0
4	E	33	0	0	0	0
4	F	64	0	0	0	0
4	G	38	0	0	0	0
4	H	34	0	0	1	0
All	All	20132	0	18565	127	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 127 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:C:402:P6G:H22	1:D:32:ASN:HD21	1.46	0.79
1:D:172:SER:HB2	1:D:173:PRO:HD3	1.68	0.76
1:H:172:SER:HB2	1:H:173:PRO:HD3	1.68	0.76
1:G:172:SER:HB2	1:G:173:PRO:HD3	1.69	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:172:SER:HB2	1:A:173:PRO:HD3	1.71	0.72

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	310/330 (94%)	295 (95%)	13 (4%)	2 (1%)	25	26
1	B	310/330 (94%)	291 (94%)	17 (6%)	2 (1%)	25	26
1	C	310/330 (94%)	296 (96%)	12 (4%)	2 (1%)	25	26
1	D	310/330 (94%)	296 (96%)	12 (4%)	2 (1%)	25	26
1	E	297/330 (90%)	282 (95%)	13 (4%)	2 (1%)	22	22
1	F	309/330 (94%)	295 (96%)	12 (4%)	2 (1%)	25	26
1	G	309/330 (94%)	296 (96%)	11 (4%)	2 (1%)	25	26
1	H	310/330 (94%)	296 (96%)	12 (4%)	2 (1%)	25	26
All	All	2465/2640 (93%)	2347 (95%)	102 (4%)	16 (1%)	25	26

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	172	SER
1	B	172	SER
1	C	172	SER
1	D	172	SER
1	E	172	SER

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	256/283 (90%)	250 (98%)	6 (2%)	50	63
1	B	256/283 (90%)	250 (98%)	6 (2%)	50	63
1	C	254/283 (90%)	249 (98%)	5 (2%)	55	69
1	D	255/283 (90%)	249 (98%)	6 (2%)	49	62
1	E	228/283 (81%)	225 (99%)	3 (1%)	69	81
1	F	252/283 (89%)	245 (97%)	7 (3%)	43	56
1	G	254/283 (90%)	251 (99%)	3 (1%)	71	83
1	H	245/283 (87%)	243 (99%)	2 (1%)	81	90
All	All	2000/2264 (88%)	1962 (98%)	38 (2%)	57	71

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	9	ASP
1	D	230	TYR
1	G	255	TYR
1	D	34	PRO
1	D	255	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	ASN
1	D	32	ASN
1	E	32	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry (i)

12 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	#$|Z| > 2$
2	KJE	B	401	-	23,28,28	3.49	4 (17%)	16,40,40	1.94	2 (12%)
2	KJE	E	401	-	23,28,28	3.92	4 (17%)	16,40,40	1.94	2 (12%)
2	KJE	D	401	-	23,28,28	3.51	4 (17%)	16,40,40	1.93	3 (18%)
2	KJE	G	401	-	23,28,28	3.73	4 (17%)	16,40,40	1.87	2 (12%)
2	KJE	F	401	-	23,28,28	3.53	5 (21%)	16,40,40	1.77	3 (18%)
3	P6G	E	402	-	18,18,18	0.57	0	17,17,17	0.80	1 (5%)
3	P6G	A	402	-	18,18,18	0.84	0	17,17,17	0.94	0
2	KJE	A	401	-	23,28,28	3.14	4 (17%)	16,40,40	2.00	3 (18%)
3	P6G	H	402	-	18,18,18	0.65	0	17,17,17	0.93	0
2	KJE	H	401	-	23,28,28	3.96	4 (17%)	16,40,40	1.91	2 (12%)
3	P6G	C	402	-	18,18,18	0.81	0	17,17,17	1.22	3 (17%)
2	KJE	C	401	-	23,28,28	3.27	4 (17%)	16,40,40	1.96	2 (12%)

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	KJE	B	401	-	2/2/7/9	4/11/45/45	0/2/4/4
2	KJE	E	401	-	2/2/7/9	5/11/45/45	0/2/4/4
2	KJE	D	401	-	2/2/7/9	3/11/45/45	0/2/4/4
2	KJE	G	401	-	2/2/7/9	3/11/45/45	0/2/4/4
2	KJE	F	401	-	2/2/7/9	2/11/45/45	0/2/4/4
3	P6G	E	402	-		8/16/16/16	-
3	P6G	A	402	-		4/16/16/16	-
2	KJE	A	401	-	2/2/7/9	2/11/45/45	0/2/4/4
3	P6G	H	402	-		9/16/16/16	-
2	KJE	H	401	-	2/2/7/9	1/11/45/45	0/2/4/4
3	P6G	C	402	-		8/16/16/16	-
2	KJE	C	401	-	2/2/7/9	1/11/45/45	0/2/4/4

The worst 5 of 33 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	401	KJE	C14-C15	13.36	1.44	1.33
2	E	401	KJE	C14-C15	13.19	1.44	1.33
2	H	401	KJE	C7-N1	12.47	1.38	1.29
2	D	401	KJE	C7-N1	12.38	1.38	1.29
2	G	401	KJE	C7-N1	12.13	1.38	1.29

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	401	KJE	C6-C5-N1	-5.26	106.97	111.90
2	H	401	KJE	C5-N1-C7	4.96	110.06	106.22
2	E	401	KJE	C5-N1-C7	4.95	110.05	106.22
2	E	401	KJE	C6-C5-N1	-4.89	107.32	111.90
2	B	401	KJE	C6-C5-N1	-4.85	107.36	111.90

5 of 16 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	401	KJE	C8
2	B	401	KJE	N2
2	E	401	KJE	C8
2	E	401	KJE	N2
2	D	401	KJE	C8

5 of 50 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	401	KJE	C16-C15-C18-C19
2	B	401	KJE	C14-C15-C18-C19
2	E	401	KJE	N2-C10-C9-C8
2	E	401	KJE	C16-C15-C18-C19
2	E	401	KJE	C14-C15-C18-C19

There are no ring outliers.

11 monomers are involved in 31 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	KJE	1	0
2	E	401	KJE	1	0
2	G	401	KJE	1	0
2	F	401	KJE	4	0
3	E	402	P6G	11	0
3	A	402	P6G	2	0
2	A	401	KJE	1	0
3	H	402	P6G	1	0
2	H	401	KJE	1	0
3	C	402	P6G	7	0
2	C	401	KJE	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand KJE B 401

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE E 401

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE D 401

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE G 401

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE F 401

Bond lengths

Bond angles

Torsions

Rings

Ligand P6G E 402

Bond lengths

Bond angles

Torsions

Rings

Ligand P6G A 402

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE A 401

Bond lengths

Bond angles

Torsions

Rings

Ligand P6G H 402

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE H 401

Bond lengths

Bond angles

Torsions

Rings

Ligand P6G C 402

Bond lengths

Bond angles

Torsions

Rings

Ligand KJE C 401

Bond lengths

Bond angles

Torsions

Rings

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(Å²)	Q<0.9
1	A	314/330 (95%)	0.05	0	100	100	43, 56, 86, 130	0
1	B	314/330 (95%)	0.18	4 (1%)	77	75	46, 62, 95, 128	0
1	C	314/330 (95%)	0.03	2 (0%)	89	88	45, 61, 95, 122	0
1	D	314/330 (95%)	0.21	4 (1%)	77	75	44, 61, 102, 135	0
1	E	305/330 (92%)	0.83	39 (12%)	3	3	47, 88, 124, 167	0
1	F	313/330 (94%)	0.33	14 (4%)	33	32	40, 70, 104, 128	0
1	G	313/330 (94%)	0.05	2 (0%)	89	88	46, 65, 94, 118	0
1	H	314/330 (95%)	0.64	40 (12%)	3	3	45, 66, 121, 157	0
All	All	2501/2640 (94%)	0.29	105 (4%)	36	34	40, 64, 111, 167	0

The worst 5 of 105 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	242	ILE	7.5
1	E	268	ILE	6.0
1	H	245	ILE	6.0
1	H	22	PHE	5.7
1	E	18	TYR	5.5

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

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

6.3 Carbohydrates (i)

There are no carbohydrates 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	P6G	E	402	19/19	0.91	0.36	52,78,104,119	0
2	KJE	H	401	25/25	0.91	0.19	64,88,113,168	0
3	P6G	C	402	19/19	0.92	0.15	48,64,78,88	0
3	P6G	A	402	19/19	0.94	0.20	48,67,102,107	0
3	P6G	H	402	19/19	0.96	0.20	56,82,127,135	0
2	KJE	F	401	25/25	0.96	0.14	44,54,63,76	0
2	KJE	A	401	25/25	0.96	0.13	38,45,57,81	0
2	KJE	E	401	25/25	0.97	0.24	57,80,97,102	0
2	KJE	D	401	25/25	0.97	0.11	45,52,69,74	0
2	KJE	B	401	25/25	0.97	0.11	41,52,62,65	0
2	KJE	G	401	25/25	0.98	0.15	50,65,75,94	0
2	KJE	C	401	25/25	0.98	0.13	42,58,64,69	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 P6G E 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
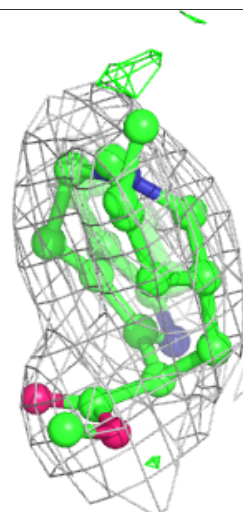mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
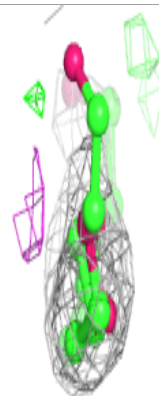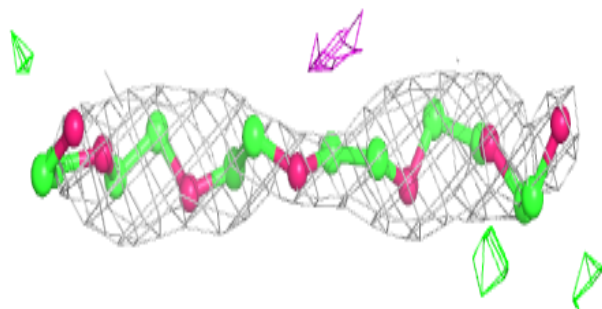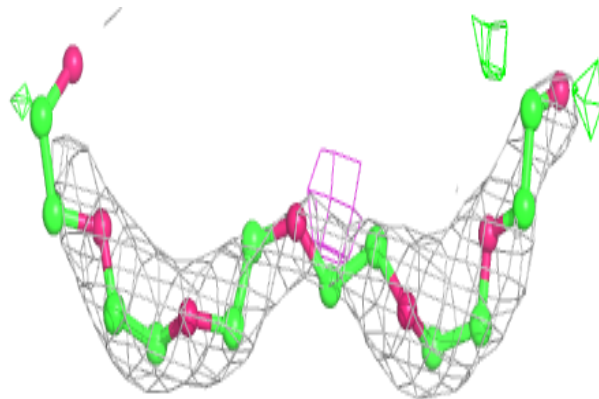
Electron density around KJE H 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
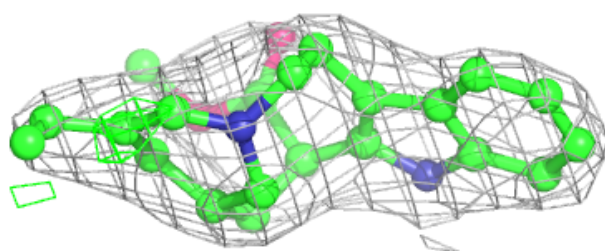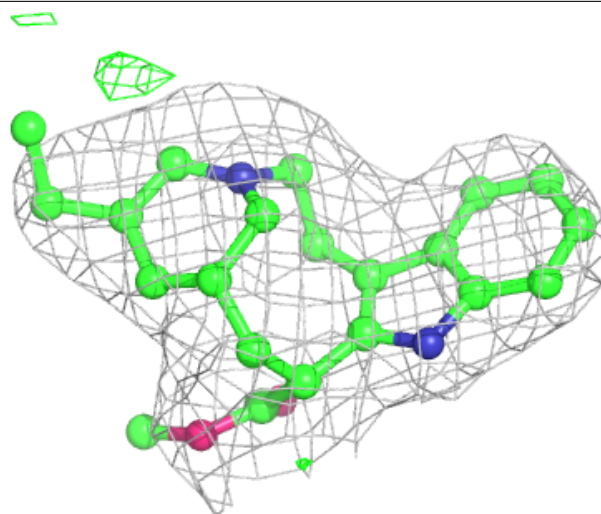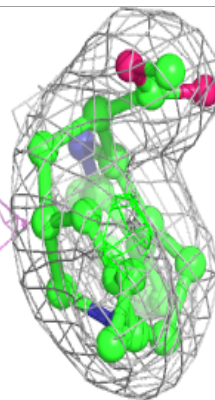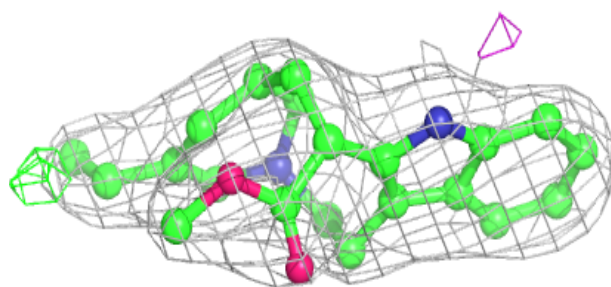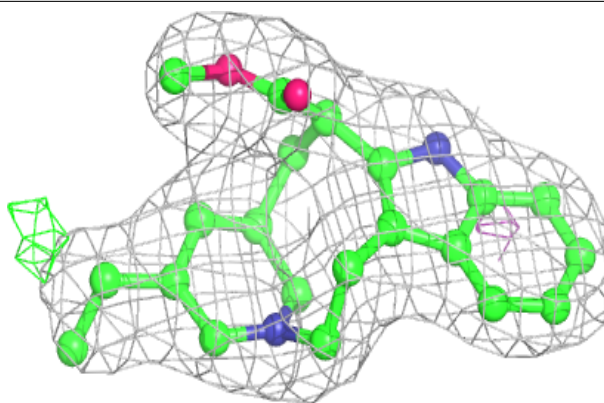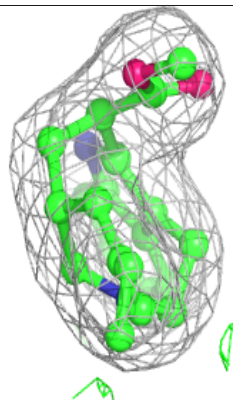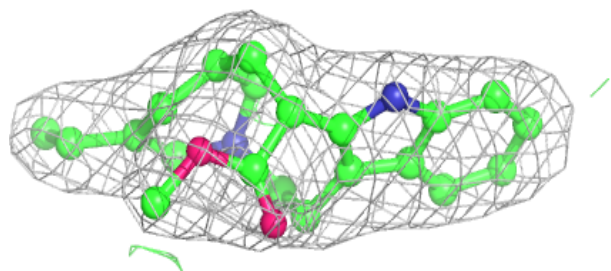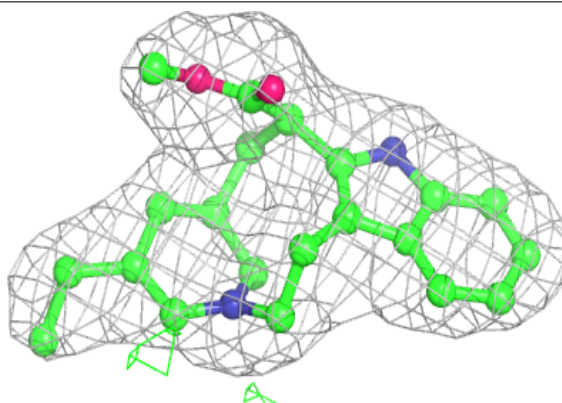mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
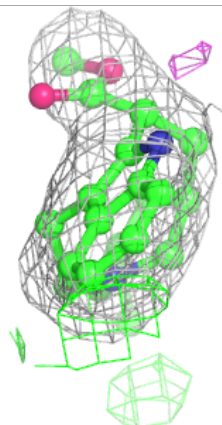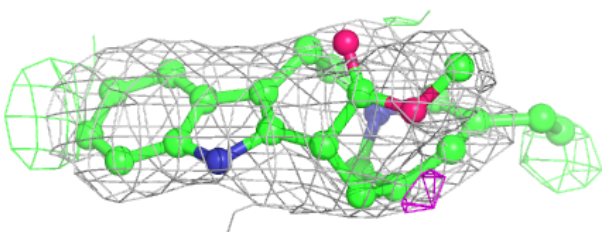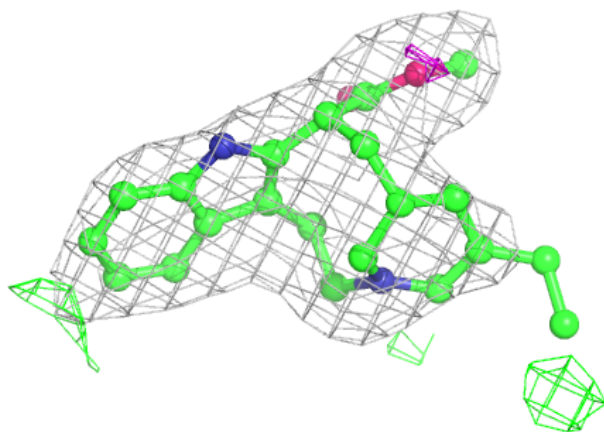
Electron density around P6G C 402:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
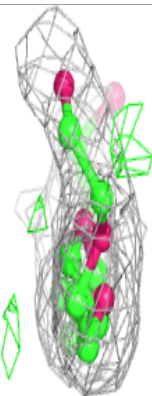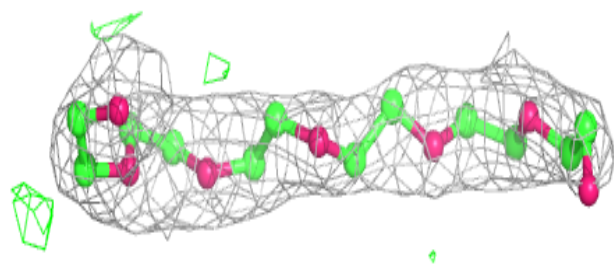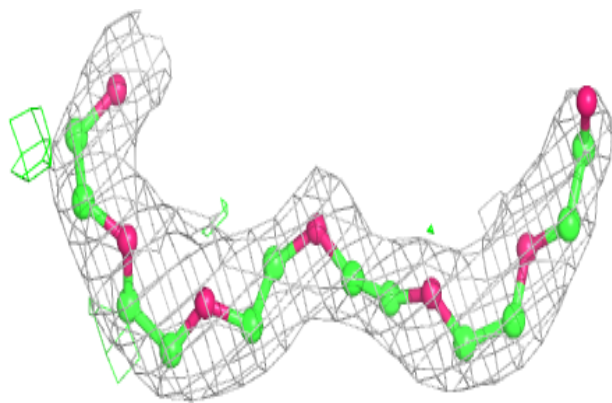
Electron density around P6G A 402:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
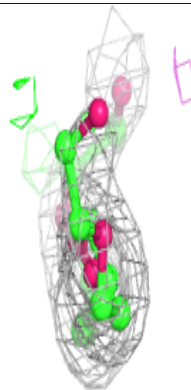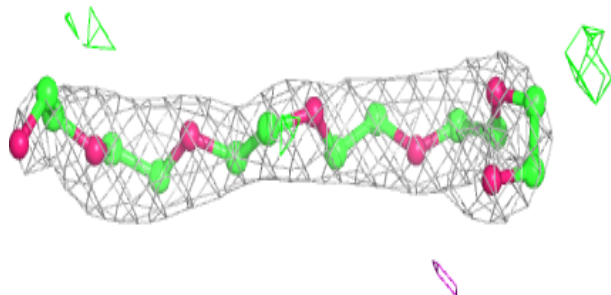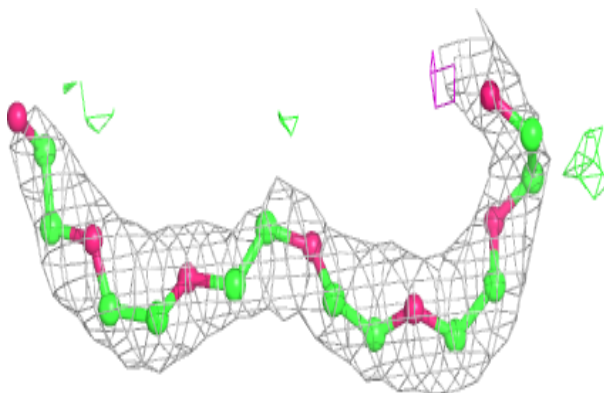
Electron density around P6G H 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
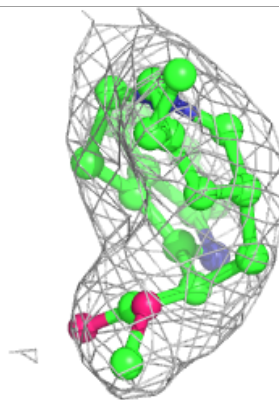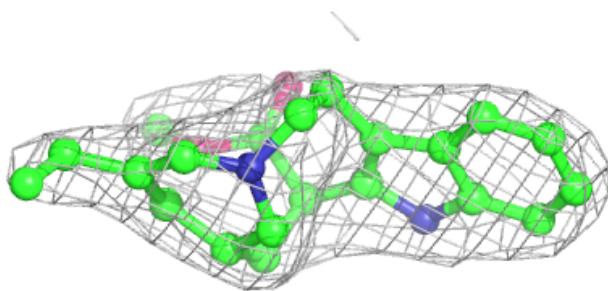mF_o-DF_c (at 3 rmsd) in purple (negative)
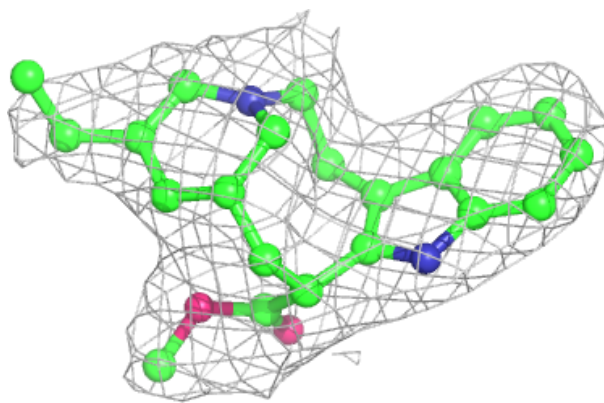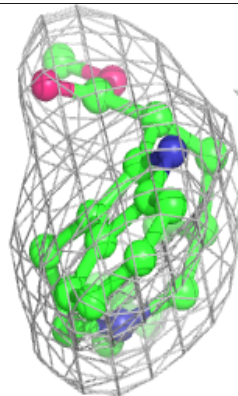and green (positive)
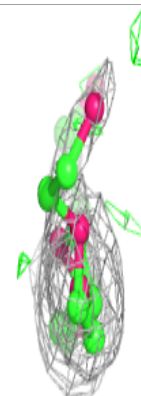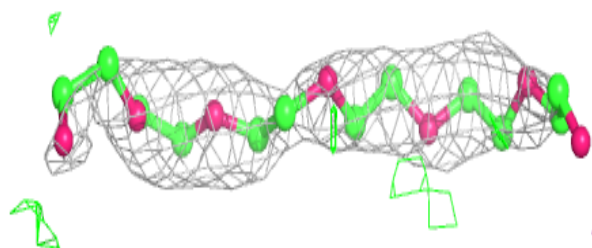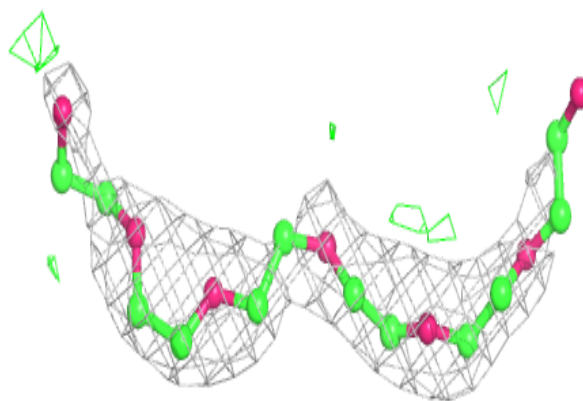
Electron density around KJE F 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
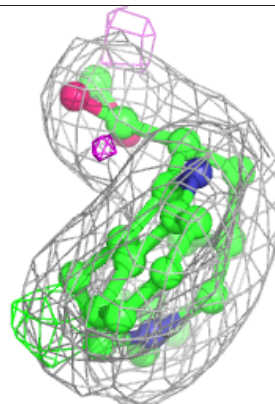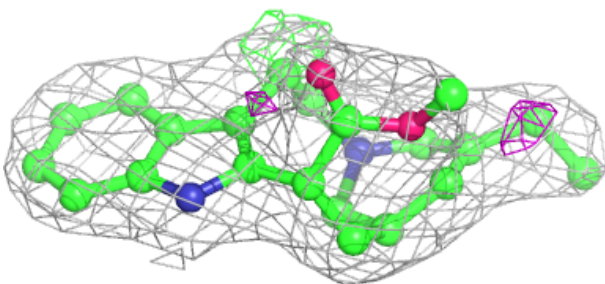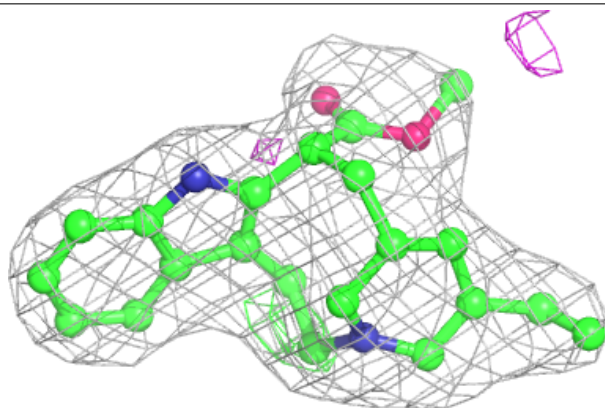
Electron density around KJE A 401:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
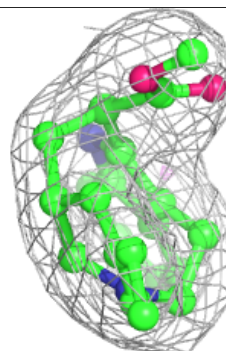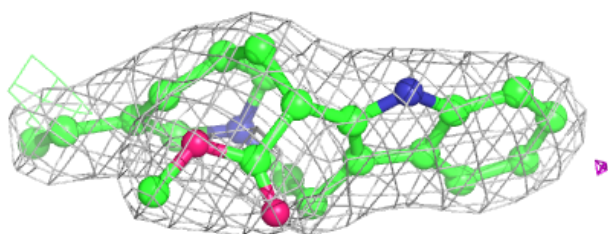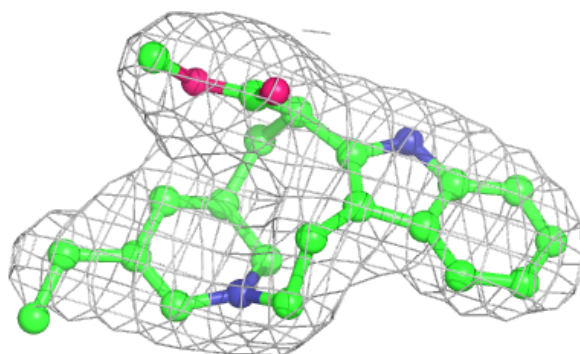
Electron density around KJE E 401:

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

Electron density around KJE D 401:

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

Electron density around KJE B 401:

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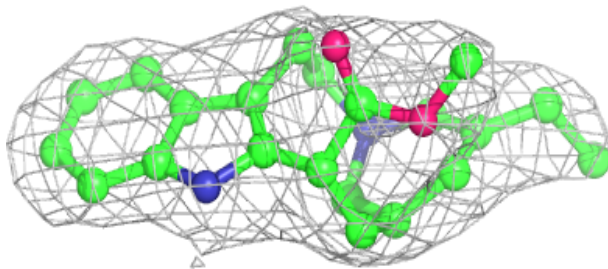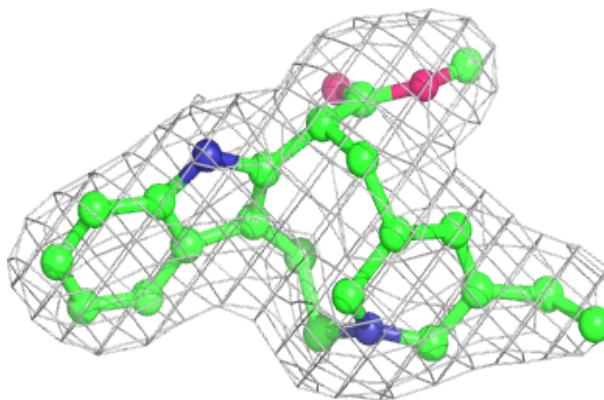$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around KJE G 401:

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

Electron density around KJE C 401:

$2mF_o$-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.