WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Nov 6, 2023 – 12:44 PM JST

PDB ID	:	8JFG
Title	:	Crystal structure of 3-oxoacyl-ACP reductase FabG in complex with NADP+ and 3-keto-octanoyl-ACP from Helicobacter pylori
Authors	:	Zhou, J.S.; Zhang, L.
Deposited on	:	2023-05-18
Resolution	:	2.83 Å(reported)

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

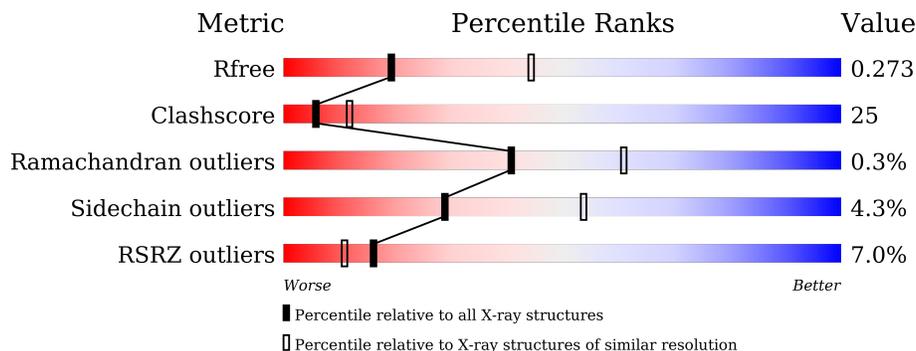|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh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

1   Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.83 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.
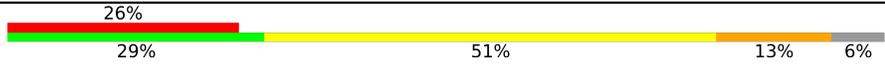
Metric	Percentile Ranks	Value
Rfree		0.273
Clashscore		25
Ramachandran outliers		0.3%
Sidechain outliers		4.3%
RSRZ outliers		7.0%

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	1031 (2.86-2.82)
Clashscore	141614	1078 (2.86-2.82)
Ramachandran outliers	138981	1050 (2.86-2.82)
Sidechain outliers	138945	1051 (2.86-2.82)
RSRZ outliers	127900	1019 (2.86-2.82)

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	248	2% — 67% / 29% / •
1	B	248	2% — 65% / 27% / • / 5%
1	C	248	6% — 59% / 33% / • / •
1	D	248	10% — 51% / 40% / • / 5%
1	E	248	6% — 57% / 38% / • / •
1	F	248	8% — 54% / 41% / • / •

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Mol	Chain	Length	Quality of chain
2	G	78	

2 Entity composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 11747 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 3-oxoacyl-[acyl-carrier-protein] reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	248	Total	C	N	O	S	0	0	0
			1875	1179	323	363	10			
1	B	236	Total	C	N	O	S	0	0	0
			1780	1122	307	342	9			
1	C	239	Total	C	N	O	S	0	0	0
			1803	1135	310	348	10			
1	D	236	Total	C	N	O	S	0	0	0
			1780	1122	307	342	9			
1	E	241	Total	C	N	O	S	0	0	0
			1821	1147	313	352	9			
1	F	239	Total	C	N	O	S	0	0	0
			1803	1135	310	348	10			

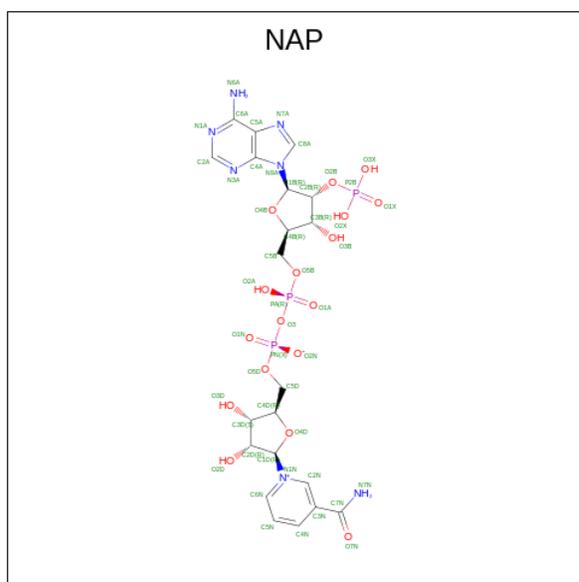There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	SER	-	expression tag	UNP G2M827
B	0	SER	-	expression tag	UNP G2M827
C	0	SER	-	expression tag	UNP G2M827
D	0	SER	-	expression tag	UNP G2M827
E	0	SER	-	expression tag	UNP G2M827
F	0	SER	-	expression tag	UNP G2M827

- Molecule 2 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	73	Total	C	N	O	S	0	0	0
			566	359	85	121	1			

- Molecule 3 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NAP) (formula: $C_{21}H_{28}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).

NAP

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	C	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	D	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	E	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
3	F	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 4 is {S}-[2-[3-[[(2 {S})-3,3-dimethyl-2-oxidanyl-4-phosphonooxy-butanoyl]amino]propanoylamino]ethyl] 3-oxidanylideneoctanethioate (three-letter code: UHC) (formula: $C_{19}H_{35}N_2O_9PS$).

UHC
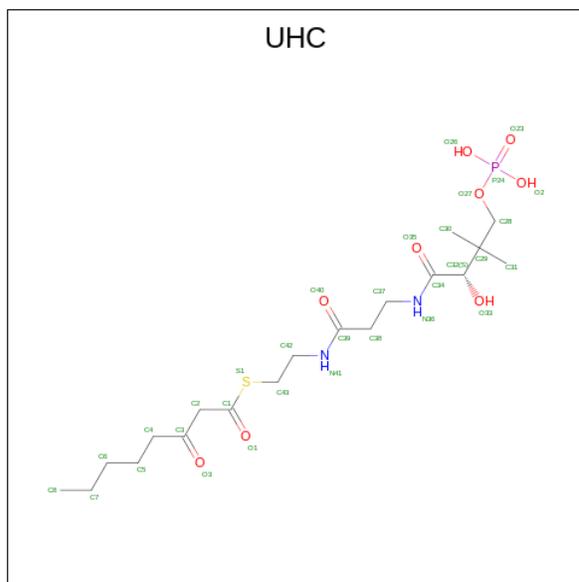
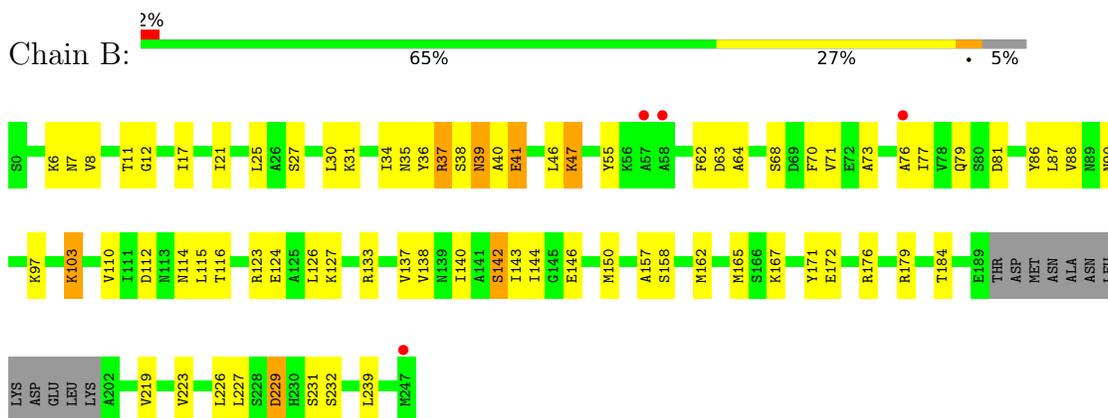| Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	N	O	P	S		
4	G	1	31	19	2	8	1	1	0	0

3 Residue-property plots ⓘ

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

- Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

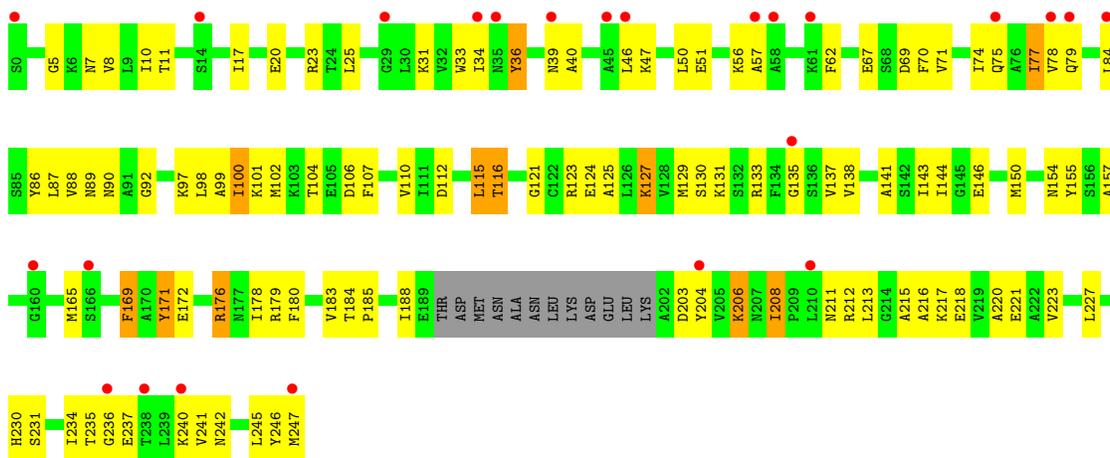- Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

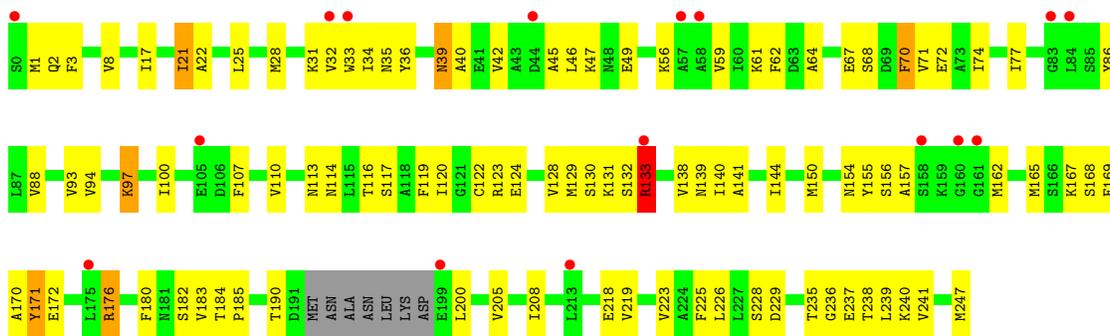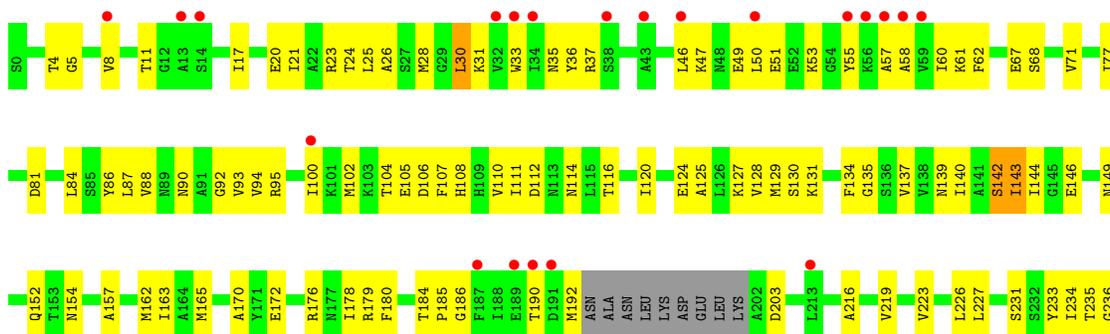- Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

T184 P185 G186 F187 I188 E189 T190 D191 M192 ASN ALA ASN LEU LYS ASP GLU LEU LYS A202 D203 Y204 A215 A216 K217 E218 E221 F225 L226 L227 H230 Y233 I234 T235 G236 E237 T238 L239 K240 V241 N242 M247

• Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

Chain D:

S0 G5 K6 N7 V8 L9 I10 T11 S14 I17 E20 R23 T24 L25 G29 L30 K31 W33 I34 N35 Y36 N39 A40 A45 L46 K47 L50 E51 K56 A57 A58 K61 F62 E67 S68 D69 F70 V71 I74 Q75 A76 I77 V78 Q79 L84

S85 Y86 L87 V88 N89 N90 A91 G92 K97 L98 A99 I100 K101 M102 K103 T104 E105 D106 F107 V110 I111 D112 L115 T116 G121 C122 R123 E124 A125 L126 K127 V128 M129 S130 K131 S132 R133 F134 G135 S136 V137 V138 A141 S142 I143 I144 G145 E146 M150 N154 Y155 S156 A157

G160 M165 S166 F169 A170 Y171 E172 R176 N177 I178 R179 F180 V183 T184 P185 I188 E189 THR ASP MET ASN ALA ASN LEU LYS ASP GLU LEU LYS A202 D203 Y204 V205 K206 N207 I208 P209 L210 N211 R212 L213 G214 A215 A216 K217 E218 V219 A220 E221 A222 V223 L227

H230 S231 I234 T235 G236 E237 T238 L239 K240 V241 N242 L245 Y246 M247

• Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

Chain E:

S0 M1 Q2 F3 V8 I17 I21 A22 L25 M28 K31 V32 W33 I34 N35 Y36 M39 A40 E41 V42 A43 D44 A45 L46 K47 N48 E49 K56 A57 A58 V59 I60 K61 F62 D63 A64 E67 S68 D69 F70 V71 E72 A73 I74 I77 G83 L84 S85 Y86

L87 V88 V93 V94 K97 I100 E105 D106 F107 V110 N113 N114 L115 T116 S117 A118 F119 I120 G121 C122 R123 E124 V128 M129 S130 K131 S132 R133 V138 N139 I140 A141 I144 M150 N154 Y155 S156 A157 S158 K159 G160 G161 M162 M165 S166 K167 S168 F169

A170 Y171 E172 L175 R176 F180 N181 S182 V183 T184 P185 T190 D191 MET ASN ALA ASN LEU LYS ASP E199 L200 V205 I208 L213 E218 V219 V223 A224 F225 L226 L227 S228 D229 T235 G236 E237 T238 L239 K240 V241 M247

• Molecule 1: 3-oxoacyl-[acyl-carrier-protein] reductase

Chain F:

S0 T4 G5 V8 T11 G12 A13 S14 I17 E20 I21 A22 R23 T24 L25 A26 S27 M28 G29 L30 K31 V32 W33 I34 N35 Y36 R37 S38 A43 L46 K47 N48 E49 L50 E51 E52 K53 G54 Y55 K56 A57 A58 V59 I60 K61 F62 E67 S68 V71 I77

D81 L84 S85 Y86 L87 V88 N89 N90 A91 G92 V93 V94 R95 I100 K101 M102 K103 T104 E105 D106 F107 H108 H109 V110 I111 D112 N113 N114 L115 T116 I120 E124 A125 L126 K127 V128 M129 S130 K131 F134 G135 V137 V138 N139 I140 A141 I143 I144 E146 N149

Q152 T153 N154 A157 M162 I163 A164 M165 A170 Y171 E172 R176 N177 I178 R179 F180 T184 P185 G186 F187 I188 E189 T190 D191 M192 ASN ALA ASN LEU LYS ASP GLU LEU LYS A202 D203 L213 A216 V219 V223 L226 L227 S231 S232 Y233 I234 T235 G236

E237 T238 L245 Y246 M247

• Molecule 2: Acyl carrier protein

Chain G:

26%

29%　　　　　　　　51%　　　　13%　　6%

MET ALA LEU F4 E5 D6 I7 Q8 A9 V10 I11 A12 E13 Q14 L15 N16 V17 D18 A19 A20 Q21 V22 T23 P24 E25 A26 E27 F28 V29 K30 D31 L32 G33 A34 D35 S36 L37 D38 V39 L42 I43 M44 A45 L46 E47 E48 K49 F50 G51 I52 E53 I54 P55 D56 E57 Q58 A59 E60 K61

I62 V63 N64 V65 G66 D67 V68 Y71 I72 K76 LEU ALA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	85.42Å 246.93Å 166.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.56 – 2.83 41.56 – 2.83	Depositor EDS
% Data completeness (in resolution range)	98.8 (41.56-2.83) 86.7 (41.56-2.83)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.29 (at 2.81Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.256 , 0.279 0.257 , 0.273	Depositor DCC
R_{free} test set	1973 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å^2)	61.6	Xtriage
Anisotropy	0.765	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 54.8	EDS
L-test for twinning[2]	$< |L| > = 0.47, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	11747	wwPDB-VP
Average B, all atoms (Å^2)	82.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% 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: NAP, UHC

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	#$\lvert Z \rvert$ >5	RMSZ	#$\lvert Z \rvert$ >5
1	A	0.52	0/1899	0.73	6/2553 (0.2%)
1	B	0.62	1/1803 (0.1%)	0.76	2/2423 (0.1%)
1	C	0.54	2/1826 (0.1%)	0.77	4/2454 (0.2%)
1	D	0.50	0/1803	0.79	5/2423 (0.2%)
1	E	0.50	0/1844	0.80	7/2478 (0.3%)
1	F	0.43	0/1826	0.71	3/2454 (0.1%)
2	G	0.59	0/571	1.00	1/774 (0.1%)
All	All	0.52	3/11572 (0.0%)	0.77	28/15559 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	41	GLU	CD-OE1	-5.82	1.19	1.25
1	B	142	SER	CA-CB	-5.54	1.44	1.52
1	C	68	SER	C-O	-5.05	1.13	1.23

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	E	176	ARG	NE-CZ-NH1	-13.60	113.50	120.30
1	E	176	ARG	NE-CZ-NH2	8.47	124.53	120.30
1	D	206	LYS	CD-CE-NZ	-8.37	92.45	111.70
1	C	37	ARG	CB-CA-C	-8.02	94.35	110.40
1	B	126	LEU	CB-CG-CD2	-6.86	99.34	111.00

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	1875	0	1894	76	0
1	B	1780	0	1798	75	0
1	C	1803	0	1818	98	0
1	D	1780	0	1798	135	0
1	E	1821	0	1839	115	0
1	F	1803	0	1818	99	0
2	G	566	0	553	55	0
3	A	48	0	24	6	0
3	B	48	0	25	7	0
3	C	48	0	25	3	0
3	D	48	0	25	4	0
3	E	48	0	25	3	0
3	F	48	0	25	7	0
4	G	31	0	0	2	0
All	All	11747	0	11667	593	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 25.

The worst 5 of 593 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:36:TYR:CE2	1:A:40:ALA:HB2	1.57	1.39
1:E:34:ILE:HD13	1:E:46:LEU:HD23	1.24	1.18
1:E:167:LYS:HG2	1:F:247:MET:CE	1.77	1.12
1:E:236:GLY:HA3	1:F:247:MET:SD	1.88	1.12
1:D:138:VAL:HG11	1:D:223:VAL:HG13	1.12	1.09

There are no symmetry-related clashes.

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	246/248 (99%)	237 (96%)	9 (4%)	0	100	100
1	B	232/248 (94%)	219 (94%)	13 (6%)	0	100	100
1	C	235/248 (95%)	218 (93%)	17 (7%)	0	100	100
1	D	232/248 (94%)	210 (90%)	19 (8%)	3 (1%)	12	26
1	E	237/248 (96%)	221 (93%)	16 (7%)	0	100	100
1	F	235/248 (95%)	219 (93%)	15 (6%)	1 (0%)	34	56
2	G	71/78 (91%)	58 (82%)	12 (17%)	1 (1%)	11	24
All	All	1488/1566 (95%)	1382 (93%)	101 (7%)	5 (0%)	41	61

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	100	ILE
1	D	77	ILE
1	D	99	ALA
1	F	68	SER
2	G	35	ASP

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	197/197 (100%)	190 (96%)	7 (4%)	35	60
1	B	186/197 (94%)	177 (95%)	9 (5%)	25	49

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	189/197 (96%)	179 (95%)	10 (5%)	22	43
1	D	186/197 (94%)	181 (97%)	5 (3%)	44	69
1	E	191/197 (97%)	184 (96%)	7 (4%)	34	59
1	F	189/197 (96%)	185 (98%)	4 (2%)	53	75
2	G	62/65 (95%)	52 (84%)	10 (16%)	2	4
All	All	1200/1247 (96%)	1148 (96%)	52 (4%)	29	54

5 of 52 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	116	THR
1	E	133	ARG
2	G	54	ILE
1	D	127	LYS
1	E	70	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	154	ASN
2	G	14	GLN
1	D	79	GLN
2	G	16	ASN
1	E	139	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

7 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	NAP	D	301	-	45,52,52	0.70	1 (2%)	56,80,80	0.71	2 (3%)
4	UHC	G	101	-	23,30,31	0.67	0	29,38,41	2.25	8 (27%)
3	NAP	C	301	-	45,52,52	1.15	5 (11%)	56,80,80	2.26	14 (25%)
3	NAP	B	301	-	45,52,52	1.31	6 (13%)	56,80,80	1.60	7 (12%)
3	NAP	E	301	-	45,52,52	0.69	1 (2%)	56,80,80	0.72	1 (1%)
3	NAP	F	301	-	45,52,52	0.69	1 (2%)	56,80,80	0.68	1 (1%)
3	NAP	A	301	-	45,52,52	1.16	3 (6%)	56,80,80	1.94	12 (21%)

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	NAP	D	301	-	-	11/31/67/67	0/5/5/5
4	UHC	G	101	-	-	18/35/38/39	-
3	NAP	C	301	-	-	4/31/67/67	0/5/5/5
3	NAP	B	301	-	-	7/31/67/67	0/5/5/5
3	NAP	E	301	-	-	8/31/67/67	0/5/5/5
3	NAP	F	301	-	-	11/31/67/67	0/5/5/5
3	NAP	A	301	-	-	11/31/67/67	0/5/5/5

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	301	NAP	P2B-O2B	-4.87	1.50	1.59
3	C	301	NAP	C6N-N1N	-3.94	1.25	1.35
3	A	301	NAP	C6N-N1N	-3.50	1.26	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	301	NAP	C2N-N1N	3.02	1.38	1.35
3	B	301	NAP	C4N-C3N	-2.65	1.34	1.39

The worst 5 of 45 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	301	NAP	C3N-C2N-N1N	-7.50	113.10	120.43
3	C	301	NAP	C3D-C2D-C1D	-7.24	90.08	100.98
3	A	301	NAP	O2B-C2B-C3B	6.35	134.69	111.68
3	B	301	NAP	PN-O3-PA	-6.13	111.81	132.83
3	C	301	NAP	C6N-N1N-C2N	-5.56	116.90	121.97

There are no chirality outliers.

5 of 70 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	301	NAP	C3B-C2B-O2B-P2B
3	A	301	NAP	C5D-O5D-PN-O3
3	A	301	NAP	O4D-C4D-C5D-O5D
3	A	301	NAP	C3D-C4D-C5D-O5D
3	B	301	NAP	C2B-O2B-P2B-O1X

There are no ring outliers.

7 monomers are involved in 32 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	301	NAP	4	0
4	G	101	UHC	2	0
3	C	301	NAP	3	0
3	B	301	NAP	7	0
3	E	301	NAP	3	0
3	F	301	NAP	7	0
3	A	301	NAP	6	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
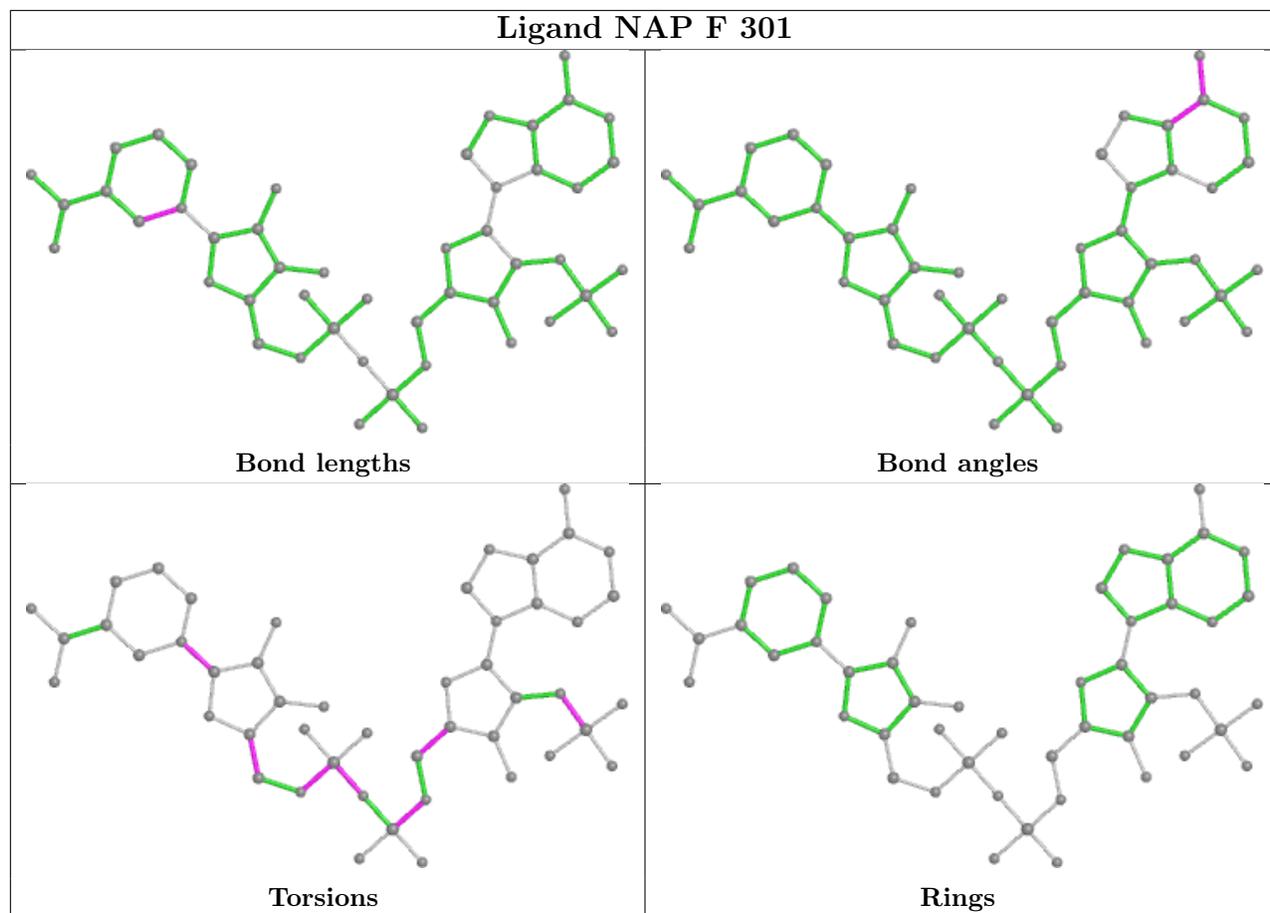
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.
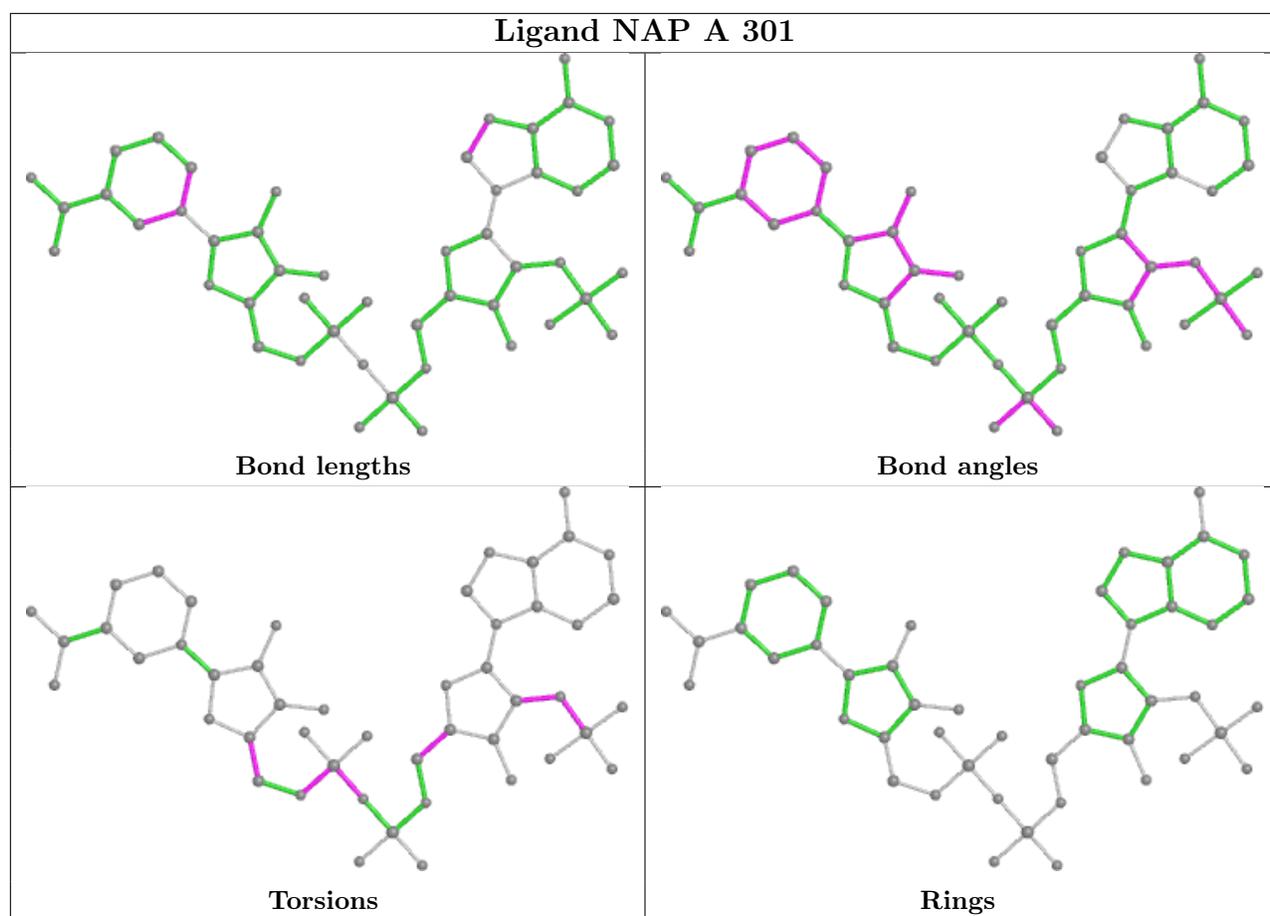

Ligand NAP D 301

Bond lengths   Bond angles

Torsions   Rings

Ligand UHC G 101

Bond lengths   Bond angles

Torsions   Rings

Ligand NAP C 301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAP B 301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAP E 301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAP F 301

Bond lengths

Bond angles

Torsions

Rings

Ligand NAP A 301

Bond lengths

Bond angles

Torsions

Rings
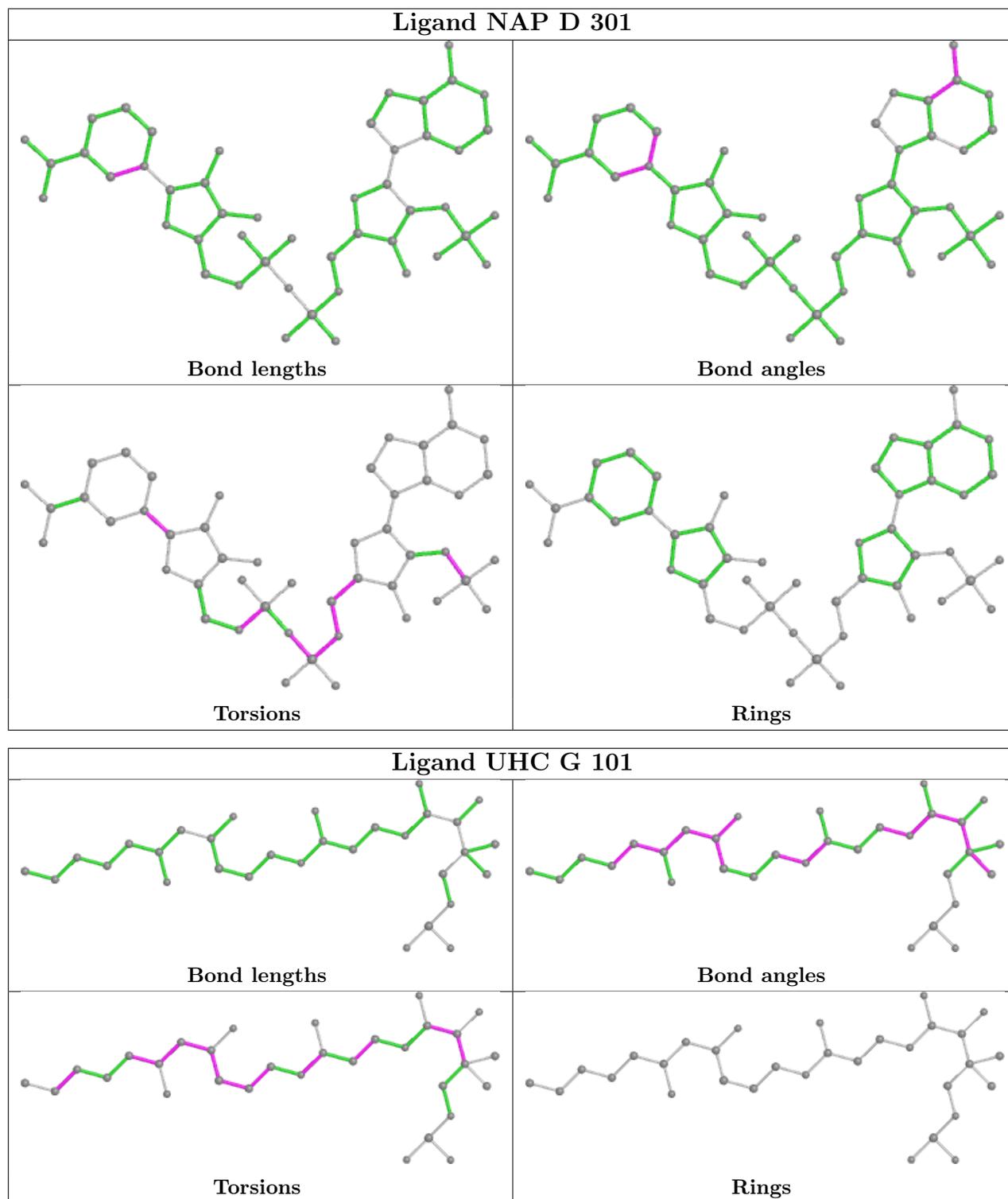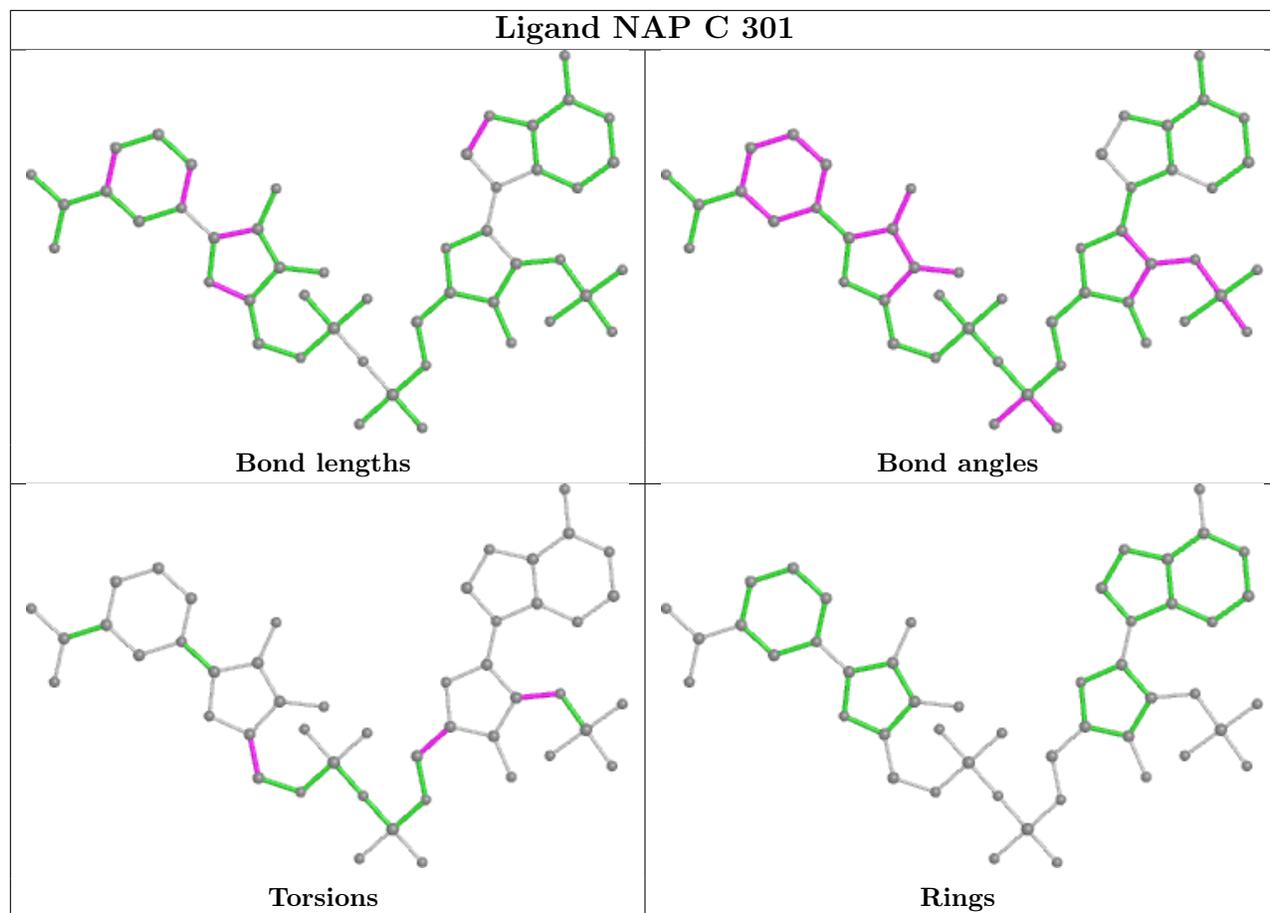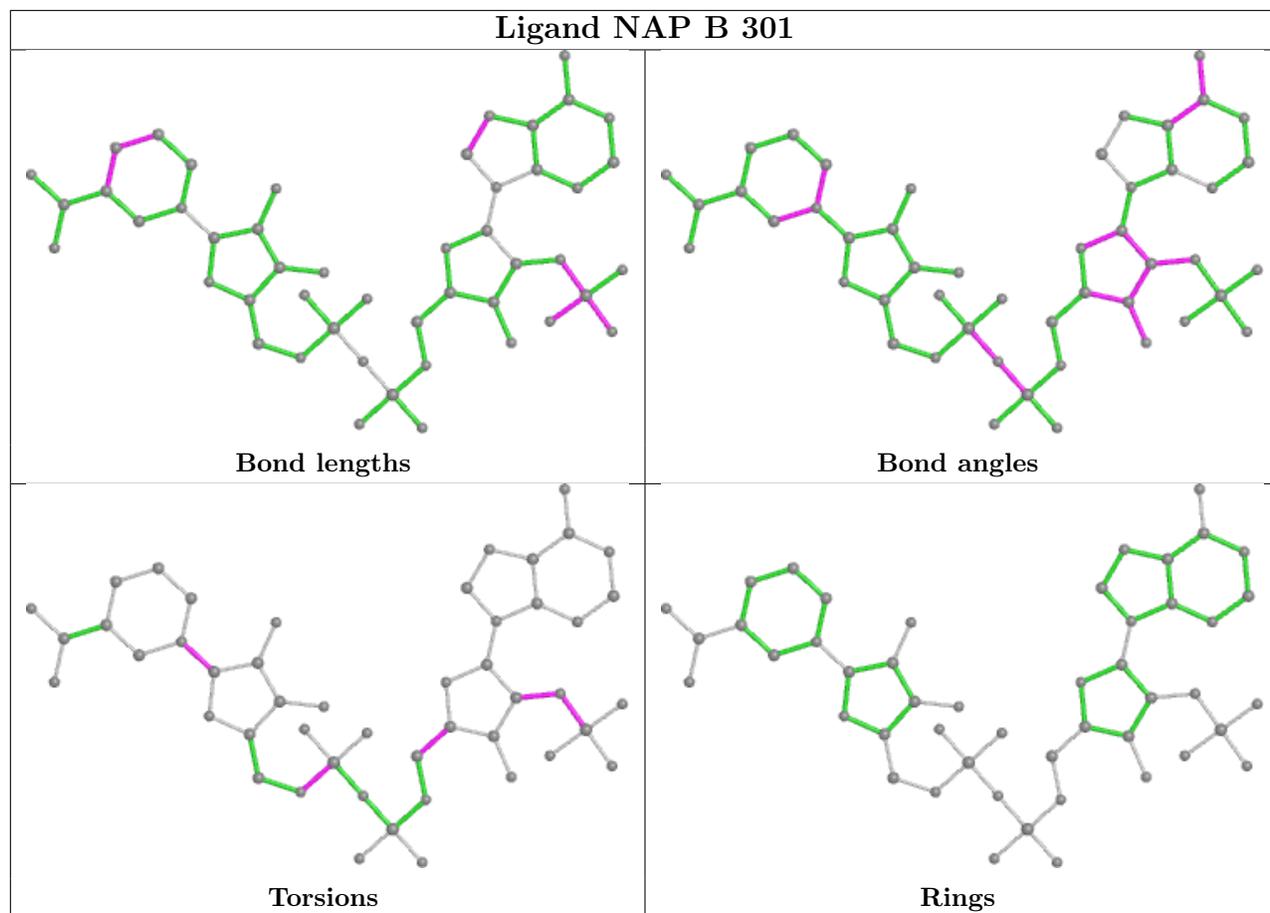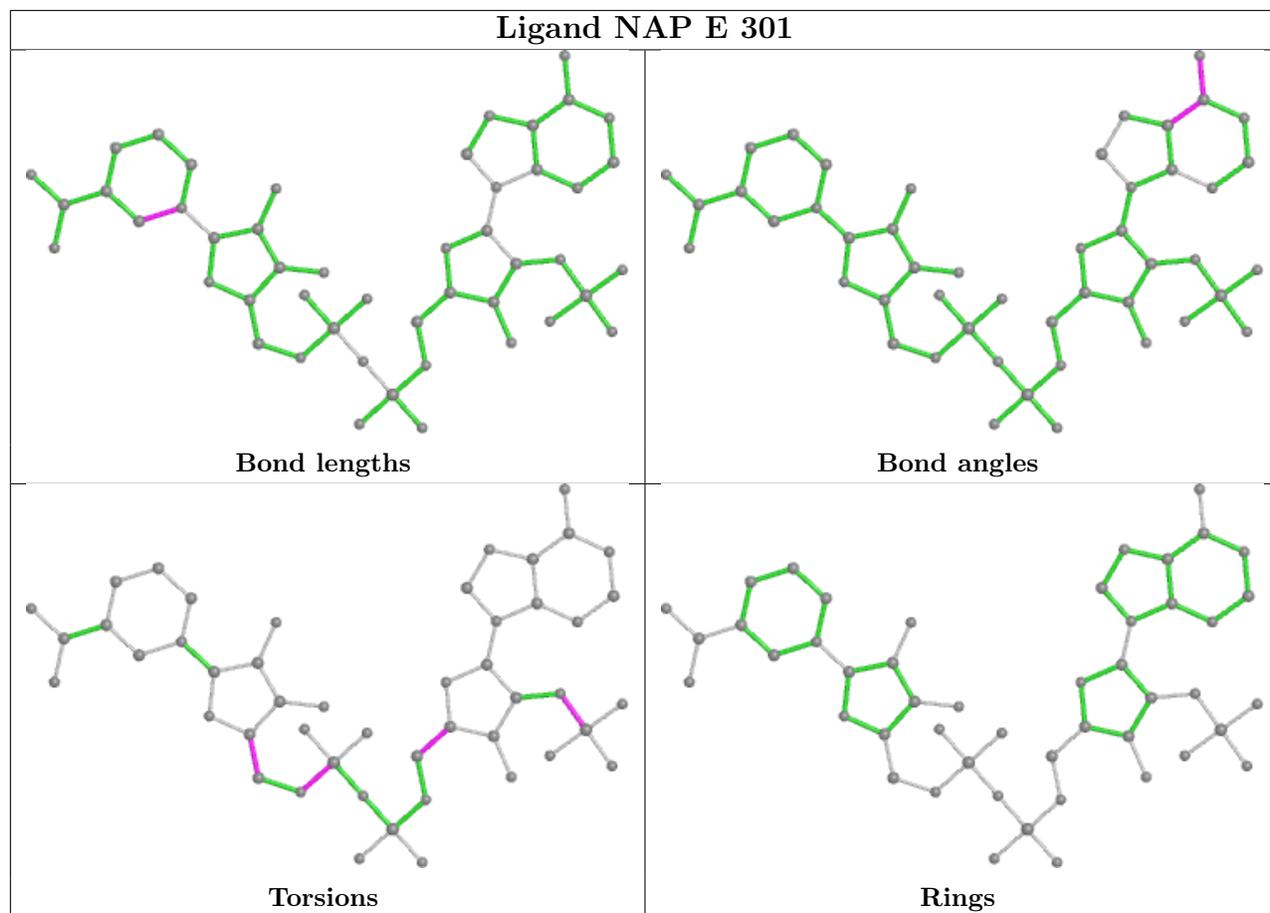
5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	248/248 (100%)	0.23	5 (2%)	65	60	48, 64, 87, 116	0
1	B	236/248 (95%)	0.30	4 (1%)	70	66	50, 67, 88, 109	0
1	C	239/248 (96%)	0.66	16 (6%)	17	12	64, 83, 102, 121	0
1	D	236/248 (95%)	0.78	24 (10%)	6	4	62, 86, 112, 127	0
1	E	241/248 (97%)	0.63	16 (6%)	18	12	59, 80, 107, 131	0
1	F	239/248 (96%)	0.64	21 (8%)	10	5	66, 89, 107, 125	0
2	G	73/78 (93%)	1.22	20 (27%)	0	0	75, 114, 122, 128	0
All	All	1512/1566 (96%)	0.57	106 (7%)	16	11	48, 80, 111, 131	0

The worst 5 of 106 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	0	SER	7.3
1	D	57	ALA	5.9
1	F	57	ALA	5.9
1	B	57	ALA	5.7
1	E	175	LEU	4.9

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

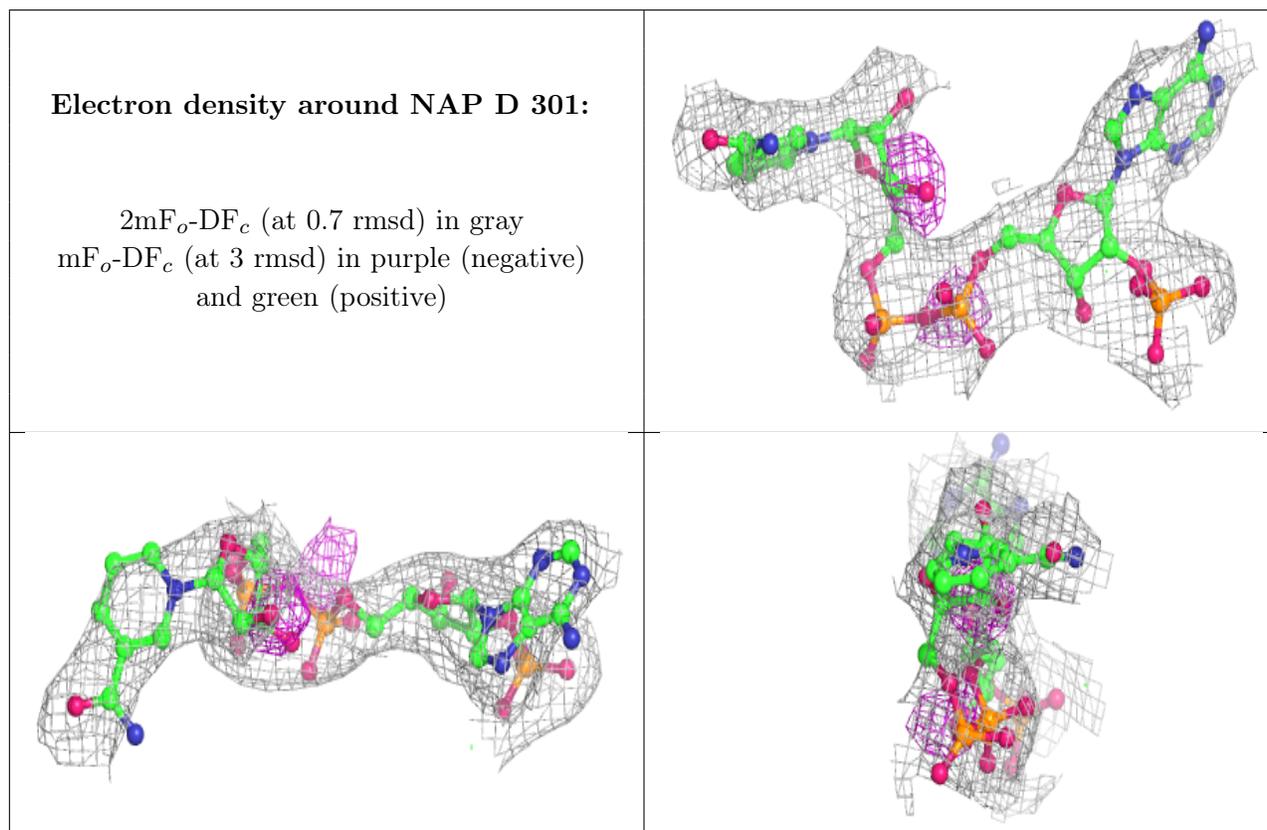There are no non-standard protein/DNA/RNA residues in this entry.

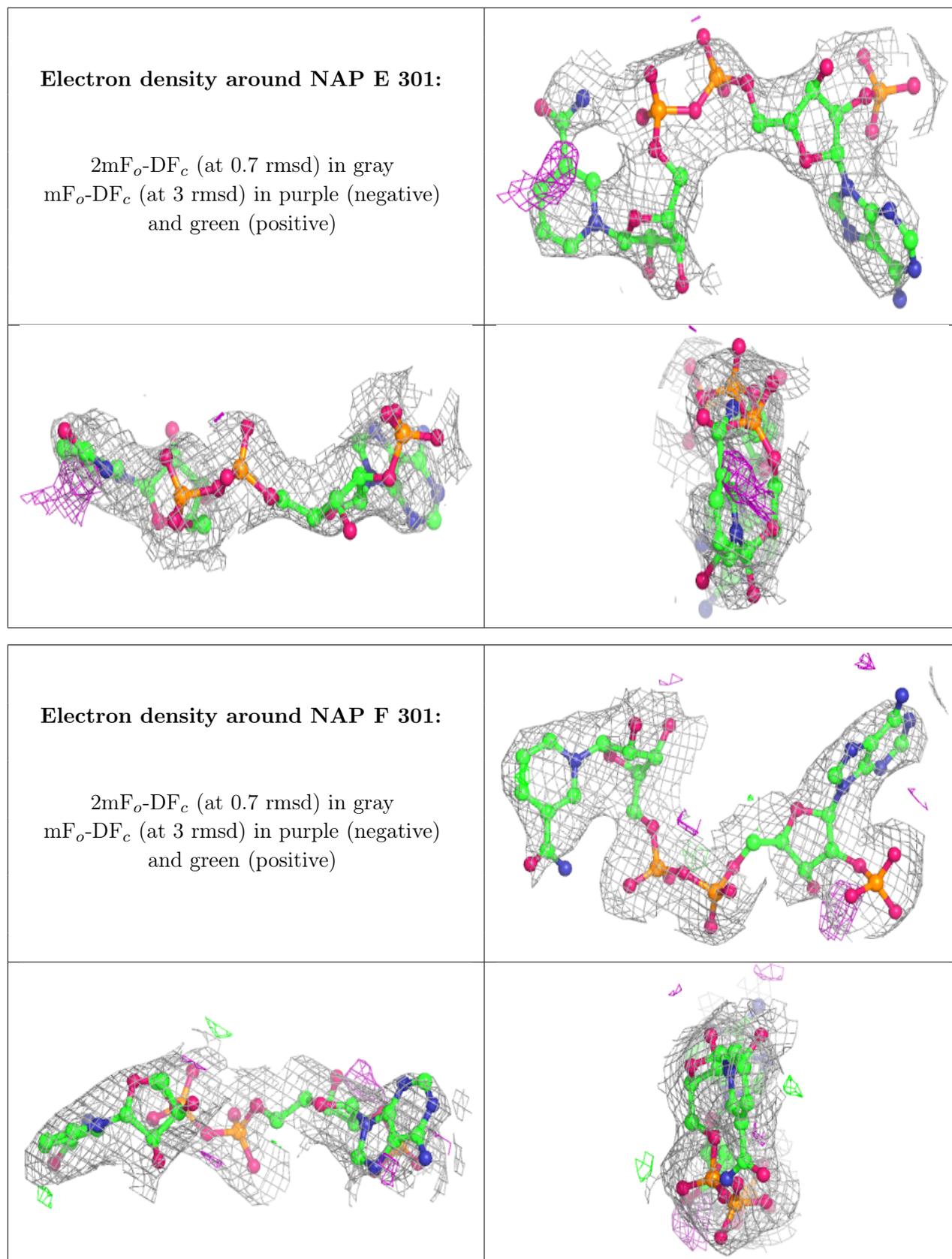## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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	NAP	D	301	48/48	0.82	0.23	85,98,120,125	0
3	NAP	E	301	48/48	0.83	0.28	80,102,119,130	0
3	NAP	F	301	48/48	0.85	0.24	77,96,109,113	0
4	UHC	G	101	31/32	0.88	0.24	58,77,103,120	0
3	NAP	B	301	48/48	0.91	0.17	67,81,97,99	0
3	NAP	C	301	48/48	0.91	0.17	76,83,97,99	0
3	NAP	A	301	48/48	0.93	0.17	51,66,79,87	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 NAP D 301:

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

Electron density around NAP E 301:

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

Electron density around NAP F 301:

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

Electron density around UHC G 101:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
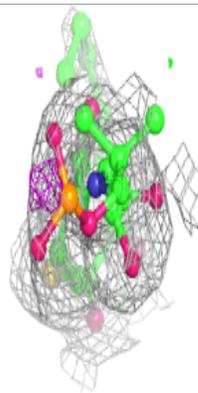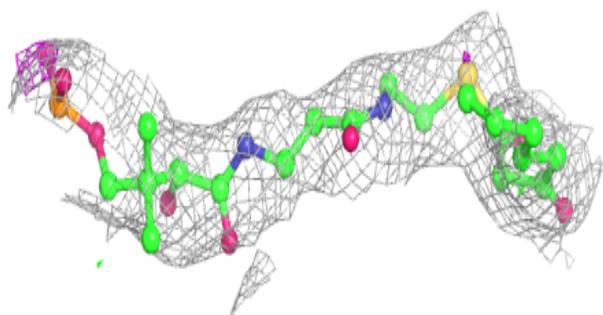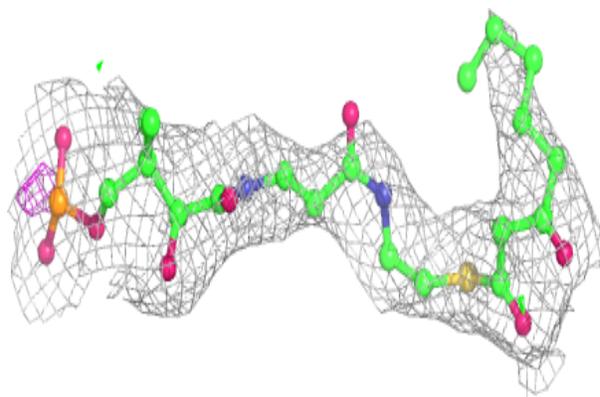
Electron density around NAP B 301:

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 NAP C 301:

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

Electron density around NAP A 301:

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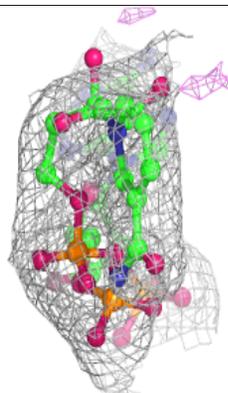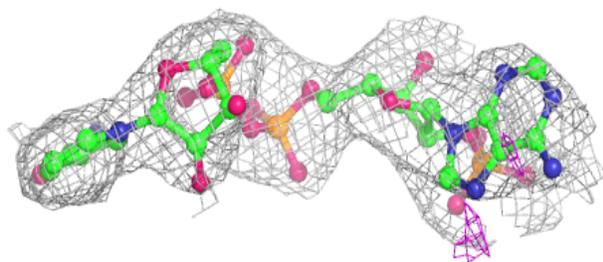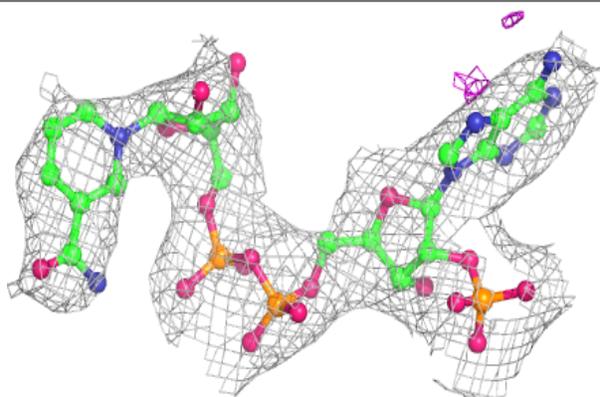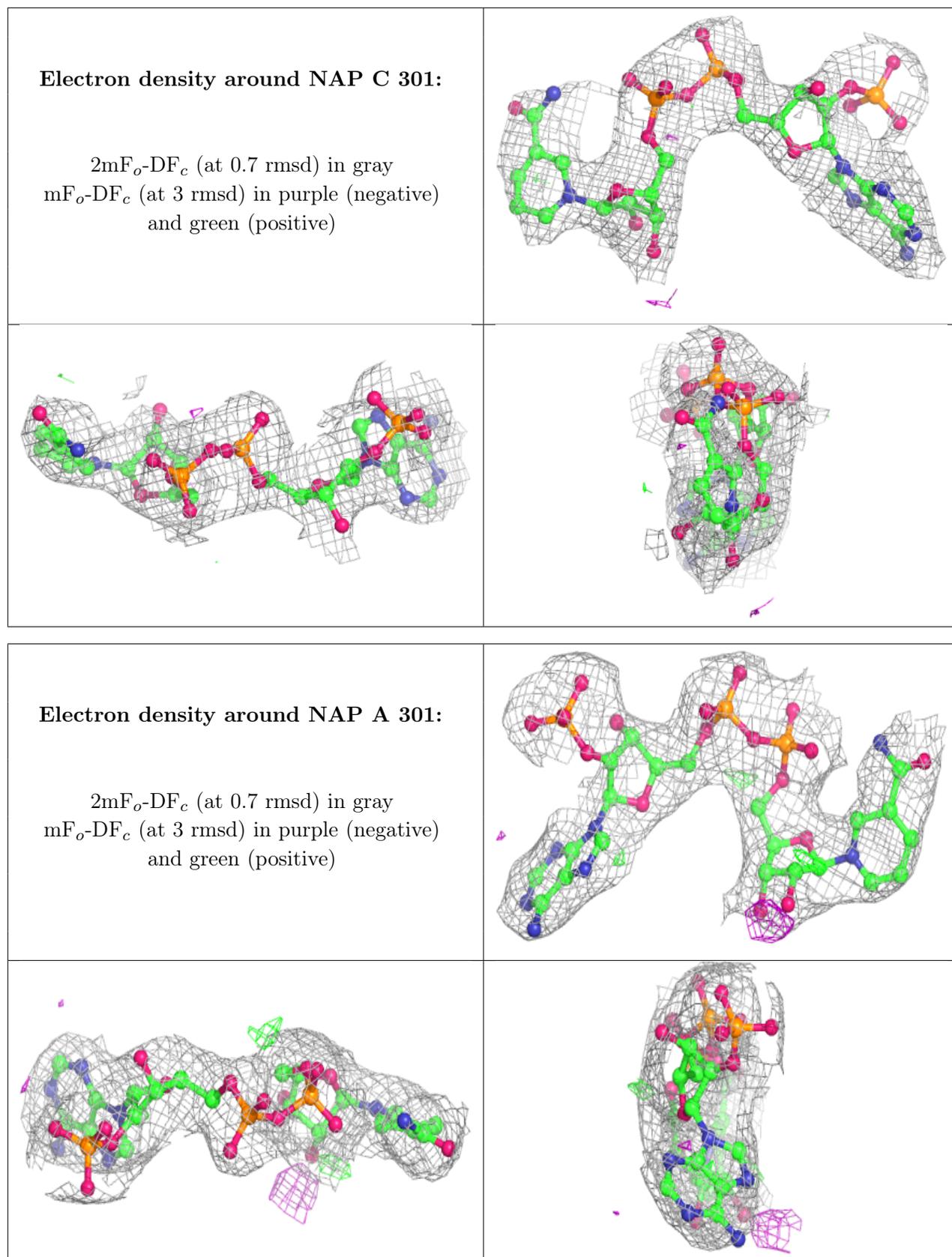
6.5 Other polymers (i)

There are no such residues in this entry.