



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 4, 2024 – 06:10 PM JST

PDB ID : 8X0V  
Title : Crystal structure of cupin-like fold protein StrC in complex with substrate analogue from *Stachybotrys sp.g12*  
Authors : Wang, H.; Wang, W.G.  
Deposited on : 2023-11-06  
Resolution : 2.40 Å (reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) 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 : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.002 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.38.2

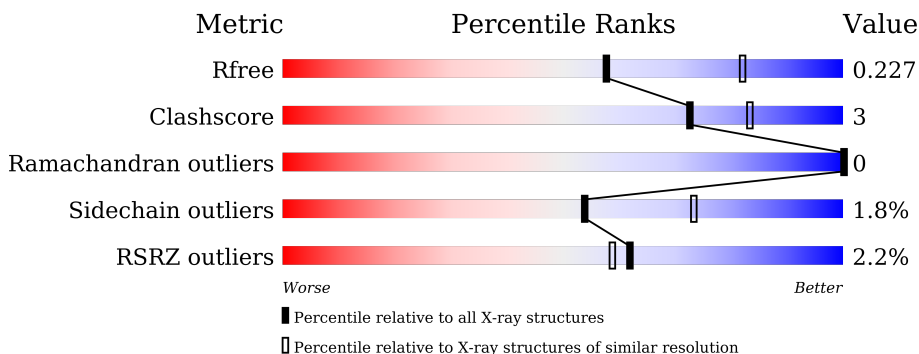
# 1 Overall quality at a glance [i](#)

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	4642 (2.40-2.40)
Clashscore	180529	5218 (2.40-2.40)
Ramachandran outliers	177936	5158 (2.40-2.40)
Sidechain outliers	177891	5159 (2.40-2.40)
RSRZ outliers	164620	4642 (2.40-2.40)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	207	 3% 83% 8% 9%
1	B	207	 % 86% 5% 10%
1	C	207	 2% 80% 8% 12%
1	D	207	 2% 79% 9% 12%
1	E	207	 2% 82% 10% 9%
1	F	207	 % 81% 6% 12%

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Mol	Chain	Length	Quality of chain
1	G	207	<p>79% 10% 12%</p>
1	H	207	<p>80% 9% 12%</p>
1	I	207	<p>80% 8% 11%</p>
1	J	207	<p>79% 10% 11%</p>
1	K	207	<p>79% 10% 11%</p>
1	L	207	<p>79% 9% 12%</p>

## 2 Entry composition i

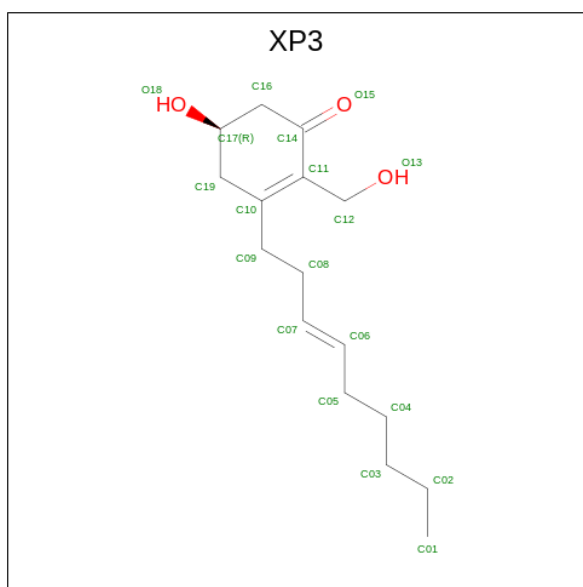
There are 3 unique types of molecules in this entry. The entry contains 18289 atoms, of which 312 are hydrogens and 0 are deuteriums.

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 Cupin conserved barrel domain protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	188	Total 1466	C 919	N 263	O 277	S 7	0	0	0
1	B	187	Total 1454	C 910	N 262	O 275	S 7	0	0	0
1	C	183	Total 1419	C 888	N 257	O 267	S 7	0	0	0
1	D	183	Total 1419	C 888	N 257	O 267	S 7	0	0	0
1	E	189	Total 1473	C 924	N 264	O 278	S 7	0	0	0
1	F	182	Total 1412	C 883	N 256	O 266	S 7	0	0	0
1	G	183	Total 1419	C 888	N 257	O 267	S 7	0	0	0
1	H	183	Total 1419	C 888	N 257	O 267	S 7	0	0	0
1	I	184	Total 1427	C 894	N 258	O 268	S 7	0	0	0
1	J	184	Total 1427	C 894	N 258	O 268	S 7	0	0	0
1	K	184	Total 1427	C 894	N 258	O 268	S 7	0	0	0
1	L	183	Total 1419	C 888	N 257	O 267	S 7	0	0	0

- Molecule 2 is (5 {R})-2-(hydroxymethyl)-3-[( {E})-non-3-enyl]-5-oxidanyl-cyclohex-2-en-1-one (three-letter code: XP3) (formula: C<sub>16</sub>H<sub>26</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			45	16	26	3		
2	B	1	Total	C	H	O	0	0
			45	16	26	3		
2	C	1	Total	C	H	O	0	0
			45	16	26	3		
2	D	1	Total	C	H	O	0	0
			45	16	26	3		
2	E	1	Total	C	H	O	0	0
			45	16	26	3		
2	F	1	Total	C	H	O	0	0
			45	16	26	3		
2	G	1	Total	C	H	O	0	0
			45	16	26	3		
2	H	1	Total	C	H	O	0	0
			45	16	26	3		
2	I	1	Total	C	H	O	0	0
			45	16	26	3		
2	J	1	Total	C	H	O	0	0
			45	16	26	3		
2	K	1	Total	C	H	O	0	0
			45	16	26	3		
2	L	1	Total	C	H	O	0	0
			45	16	26	3		

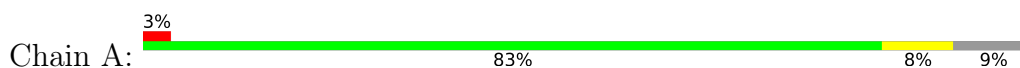
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	62	Total O 62 62	0	0
3	B	56	Total O 56 56	0	0
3	C	44	Total O 44 44	0	0
3	D	41	Total O 41 41	0	0
3	E	39	Total O 39 39	0	0
3	F	49	Total O 49 49	0	0
3	G	38	Total O 38 38	0	0
3	H	33	Total O 33 33	0	0
3	I	50	Total O 50 50	0	0
3	J	36	Total O 36 36	0	0
3	K	62	Total O 62 62	0	0
3	L	58	Total O 58 58	0	0

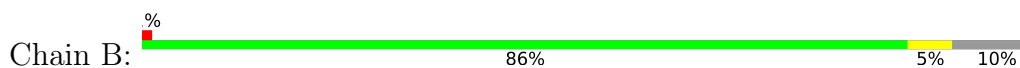
### 3 Residue-property plots [i](#)

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

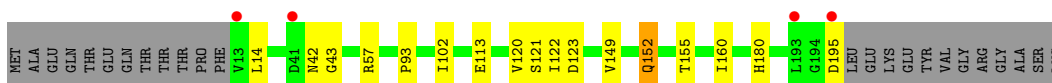
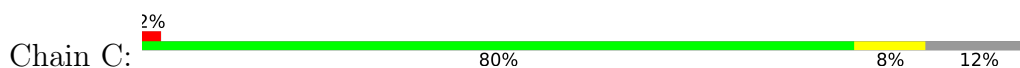
- Molecule 1: Cupin conserved barrel domain protein



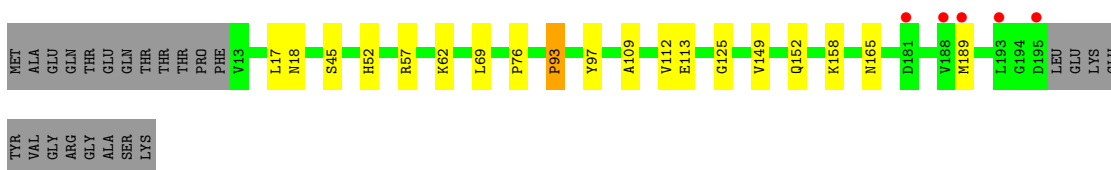
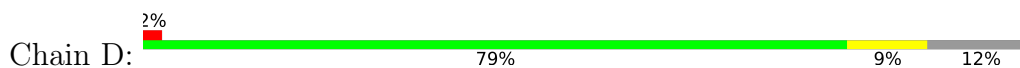
- Molecule 1: Cupin conserved barrel domain protein



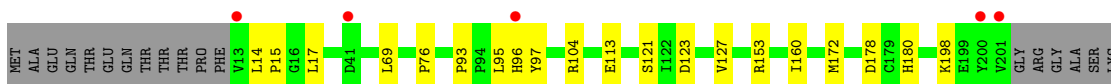
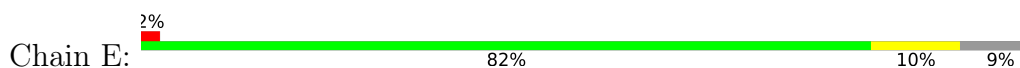
- Molecule 1: Cupin conserved barrel domain protein



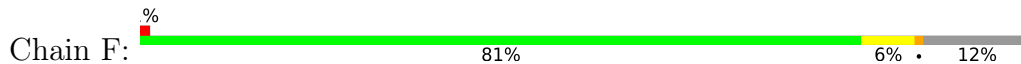
- Molecule 1: Cupin conserved barrel domain protein



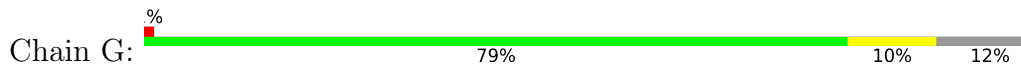
- Molecule 1: Cupin conserved barrel domain protein



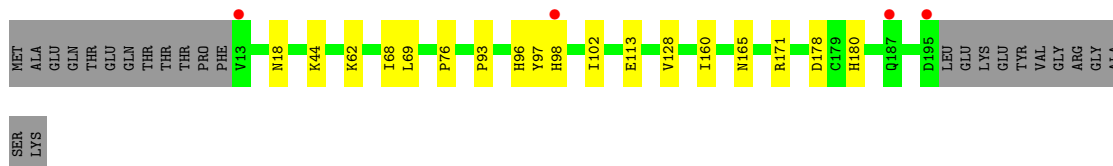
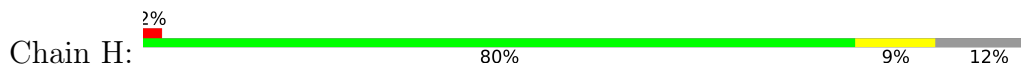
• Molecule 1: Cupin conserved barrel domain protein



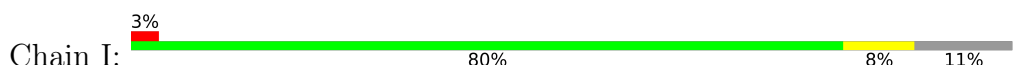
• Molecule 1: Cupin conserved barrel domain protein



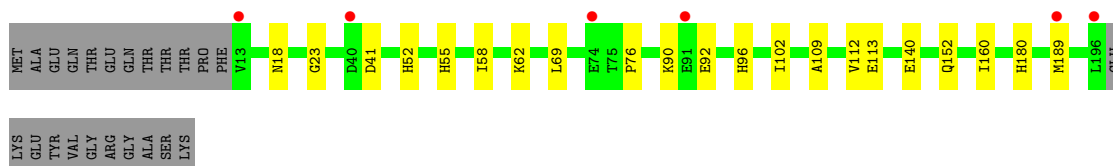
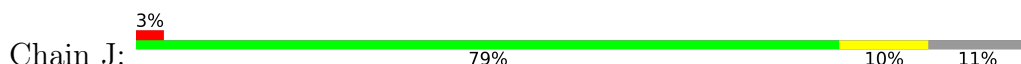
• Molecule 1: Cupin conserved barrel domain protein



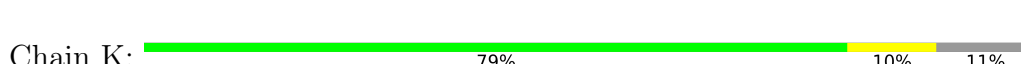
• Molecule 1: Cupin conserved barrel domain protein



• Molecule 1: Cupin conserved barrel domain protein



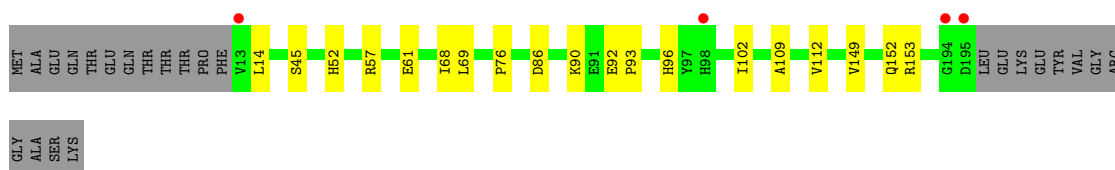
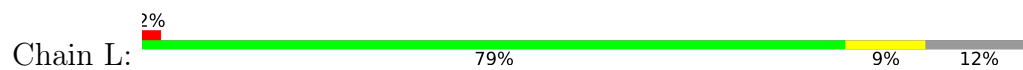
• Molecule 1: Cupin conserved barrel domain protein







- Molecule 1: Cupin conserved barrel domain protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	73.52Å 253.46Å 73.69Å 90.00° 102.50° 90.00°	Depositor
Resolution (Å)	46.07 – 2.40 46.07 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.07-2.40) 99.9 (46.07-2.40)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.73 (at 2.39Å)	Xtrriage
Refinement program	PHENIX 1.16_3549, PHENIX 1.16_3549	Depositor
R, $R_{free}$	0.189 , 0.226 0.189 , 0.227	Depositor DCC
$R_{free}$ test set	4986 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	39.1	Xtrriage
Anisotropy	0.179	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 35.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.019 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	18289	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.07% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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: XP3

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	0.26	0/1499	0.47	0/2035
1	B	0.26	0/1486	0.47	0/2017
1	C	0.25	0/1451	0.46	0/1971
1	D	0.25	0/1451	0.47	0/1971
1	E	0.25	0/1506	0.46	0/2045
1	F	0.26	0/1444	0.46	0/1961
1	G	0.26	0/1451	0.47	0/1971
1	H	0.25	0/1451	0.46	0/1971
1	I	0.26	0/1459	0.48	0/1982
1	J	0.25	0/1459	0.46	0/1982
1	K	0.26	0/1459	0.47	0/1982
1	L	0.25	0/1451	0.47	0/1971
All	All	0.26	0/17567	0.47	0/23859

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 [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	1466	0	1425	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1454	0	1416	7	0
1	C	1419	0	1380	12	0
1	D	1419	0	1380	12	0
1	E	1473	0	1434	13	0
1	F	1412	0	1371	10	0
1	G	1419	0	1380	12	0
1	H	1419	0	1380	12	0
1	I	1427	0	1391	12	0
1	J	1427	0	1391	11	0
1	K	1427	0	1391	14	0
1	L	1419	0	1380	11	0
2	A	19	26	0	0	0
2	B	19	26	0	0	0
2	C	19	26	0	0	0
2	D	19	26	0	0	0
2	E	19	26	0	0	0
2	F	19	26	0	0	0
2	G	19	26	0	0	0
2	H	19	26	0	0	0
2	I	19	26	0	0	0
2	J	19	26	0	0	0
2	K	19	26	0	0	0
2	L	19	26	0	0	0
3	A	62	0	0	0	0
3	B	56	0	0	0	0
3	C	44	0	0	1	0
3	D	41	0	0	1	0
3	E	39	0	0	0	0
3	F	49	0	0	0	0
3	G	38	0	0	0	0
3	H	33	0	0	0	0
3	I	50	0	0	0	0
3	J	36	0	0	0	0
3	K	62	0	0	0	0
3	L	58	0	0	0	0
All	All	17977	312	16719	107	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.

All (107) 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:I:115:PRO:HG2	1:I:196:LEU:HG	1.68	0.76
1:F:40:ASP:HB3	1:F:42:ASN:H	1.56	0.70
1:H:98:HIS:ND1	1:H:178:ASP:OD2	2.24	0.69
1:K:113:GLU:HG3	1:K:160:ILE:HG12	1.76	0.68
1:J:96:HIS:HA	1:J:102:ILE:HD12	1.78	0.66
1:C:43:GLY:HA3	1:D:189:MET:HE1	1.79	0.64
1:J:113:GLU:HG3	1:J:160:ILE:HG12	1.79	0.64
1:E:95:LEU:O	1:E:104:ARG:NH2	2.32	0.63
1:E:69:LEU:HD13	1:F:149:VAL:HG21	1.79	0.63
1:H:18:ASN:HA	1:H:62:LYS:HB2	1.82	0.61
1:L:96:HIS:HA	1:L:102:ILE:HD12	1.84	0.60
1:C:43:GLY:HA3	1:D:189:MET:CE	2.32	0.60
1:L:86:ASP:HB3	1:L:90:LYS:HE3	1.84	0.59
1:J:55:HIS:HB3	1:J:92:GLU:HG3	1.84	0.59
1:G:149:VAL:HG21	1:H:69:LEU:HD13	1.85	0.59
1:J:18:ASN:HA	1:J:62:LYS:HB2	1.85	0.58
1:K:149:VAL:HG21	1:L:69:LEU:HD13	1.84	0.58
1:J:23:GLY:HA2	1:J:58:ILE:HD11	1.86	0.57
1:E:76:PRO:HG2	1:F:180:HIS:CE1	2.40	0.57
1:A:18:ASN:HA	1:A:62:LYS:HB2	1.89	0.55
1:I:185:ASN:ND2	1:J:41:ASP:O	2.40	0.55
1:E:96:HIS:NE2	1:E:178:ASP:HA	2.22	0.55
1:A:76:PRO:HG2	1:B:180:HIS:CE1	2.43	0.54
1:C:123:ASP:HB2	1:C:152:GLN:HB3	1.89	0.54
1:A:96:HIS:HA	1:A:102:ILE:HD12	1.92	0.52
1:D:17:LEU:HG	1:D:18:ASN:HD22	1.74	0.51
1:D:18:ASN:HA	1:D:62:LYS:HB2	1.92	0.51
1:D:93:PRO:HB3	1:D:97:TYR:CE2	2.45	0.51
1:C:180:HIS:NE2	1:D:76:PRO:HG2	2.25	0.51
1:K:69:LEU:HD13	1:L:149:VAL:HG21	1.93	0.50
1:I:180:HIS:NE2	1:J:76:PRO:HG2	2.26	0.50
1:H:96:HIS:HA	1:H:102:ILE:HD12	1.94	0.50
1:G:90:LYS:HD3	1:G:91:GLU:HG3	1.93	0.49
1:A:180:HIS:NE2	1:B:76:PRO:HG2	2.27	0.49
1:I:76:PRO:HG2	1:J:180:HIS:NE2	2.27	0.49
1:E:121:SER:OG	1:E:123:ASP:OD1	2.21	0.48
1:K:115:PRO:HA	1:K:196:LEU:HD13	1.95	0.48
1:C:113:GLU:HB2	1:C:160:ILE:HG12	1.94	0.48
1:F:55:HIS:HB3	1:F:92:GLU:HG3	1.95	0.47
1:K:96:HIS:HA	1:K:102:ILE:HD12	1.95	0.47
1:C:42:ASN:ND2	3:C:406:HOH:O	2.44	0.47
1:K:180:HIS:CE1	1:L:76:PRO:HG2	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:57:ARG:HG3	1:F:92:GLU:OE1	2.15	0.47
1:L:57:ARG:HD2	1:L:92:GLU:OE1	2.15	0.47
1:C:155:THR:HB	1:D:45:SER:HB3	1.97	0.46
1:A:67:ASN:N	1:A:105:MET:O	2.47	0.46
1:C:120:VAL:HG23	1:C:120:VAL:O	2.15	0.46
1:G:96:HIS:HA	1:G:102:ILE:HD12	1.96	0.46
1:E:93:PRO:HB3	1:E:97:TYR:CE2	2.50	0.46
1:K:23:GLY:HA2	1:K:58:ILE:HD11	1.97	0.46
1:B:113:GLU:HG2	1:B:160:ILE:HG12	1.98	0.46
1:E:180:HIS:CE1	1:F:76:PRO:HG2	2.51	0.46
1:A:115:PRO:HD2	1:A:196:LEU:HG	1.97	0.46
1:F:96:HIS:HA	1:F:102:ILE:HD12	1.98	0.46
1:G:113:GLU:HG2	1:G:160:ILE:HG12	1.98	0.45
1:D:113:GLU:OE1	1:D:158:LYS:HE2	2.17	0.45
1:I:149:VAL:HG21	1:J:69:LEU:HD13	1.99	0.45
1:I:196:LEU:HD23	1:I:196:LEU:HA	1.81	0.45
1:G:93:PRO:HB3	1:G:97:TYR:CE2	2.53	0.44
1:I:123:ASP:HB2	1:I:152:GLN:HB3	1.99	0.44
1:H:128:VAL:HB	1:H:171:ARG:HG2	1.99	0.44
1:F:40:ASP:HB2	1:F:44:LYS:H	1.83	0.44
1:L:68:ILE:HG21	1:L:93:PRO:HG3	1.99	0.44
1:B:113:GLU:HG3	1:B:160:ILE:HG23	1.99	0.44
1:H:68:ILE:HG21	1:H:93:PRO:HG2	1.99	0.44
1:A:103:VAL:HG22	1:A:175:ILE:HG13	2.00	0.43
1:K:18:ASN:HA	1:K:62:LYS:HB2	1.99	0.43
1:G:184:VAL:O	1:G:187:GLN:HB2	2.19	0.43
1:I:13:VAL:HG12	1:I:14:LEU:H	1.82	0.43
1:B:109:ALA:HB3	1:B:112:VAL:HG21	1.99	0.43
1:C:14:LEU:HD23	1:C:14:LEU:HA	1.86	0.43
1:G:113:GLU:HG2	1:G:160:ILE:HG23	1.99	0.43
1:H:113:GLU:HB2	1:H:160:ILE:HG12	2.01	0.43
1:H:44:LYS:HA	1:H:44:LYS:HD2	1.85	0.43
1:L:14:LEU:HD12	1:L:61:GLU:HG3	2.00	0.43
1:E:113:GLU:HG3	1:E:160:ILE:HG12	2.01	0.43
1:D:109:ALA:HB3	1:D:112:VAL:HG21	2.00	0.43
1:I:115:PRO:CG	1:I:196:LEU:HG	2.44	0.43
1:J:109:ALA:HB3	1:J:112:VAL:HG21	2.01	0.42
1:E:14:LEU:HD23	1:E:17:LEU:HB2	2.01	0.42
1:G:18:ASN:HA	1:G:62:LYS:HB2	2.01	0.42
1:E:180:HIS:NE2	1:F:76:PRO:HG2	2.33	0.42
1:K:152:GLN:OE1	1:K:155:THR:OG1	2.27	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:76:PRO:HG2	1:H:180:HIS:CE1	2.54	0.42
1:L:109:ALA:HB3	1:L:112:VAL:HG21	2.02	0.42
1:C:149:VAL:HG21	1:D:69:LEU:HD13	2.01	0.42
1:A:155:THR:HB	1:B:45:SER:HB3	2.00	0.41
1:K:155:THR:HB	1:L:45:SER:HB3	2.02	0.41
1:I:68:ILE:HG21	1:I:93:PRO:HG3	2.03	0.41
1:E:153:ARG:HB3	1:F:79:LEU:HD13	2.03	0.41
1:E:14:LEU:HA	1:E:15:PRO:HD3	1.95	0.41
1:K:93:PRO:HB3	1:K:97:TYR:CE2	2.56	0.41
1:C:93:PRO:HB2	1:C:102:ILE:HD13	2.03	0.41
1:E:127:VAL:HG22	1:E:172:MET:SD	2.61	0.41
1:G:127:VAL:HG22	1:G:172:MET:SD	2.61	0.41
1:H:165:ASN:HD22	1:H:165:ASN:HA	1.72	0.41
1:K:14:LEU:HD12	1:K:14:LEU:HA	1.96	0.41
1:K:37:THR:O	1:L:153:ARG:HD3	2.20	0.41
1:D:125:GLY:O	1:D:149:VAL:HA	2.21	0.41
1:G:180:HIS:NE2	1:H:76:PRO:HG2	2.35	0.41
1:I:46:VAL:HB	1:J:140:GLU:OE1	2.20	0.41
1:I:135:VAL:HG22	1:I:141:GLU:HB3	2.02	0.41
1:C:122:ILE:HA	1:C:152:GLN:O	2.21	0.40
1:G:138:SER:HB3	1:H:44:LYS:HB3	2.02	0.40
1:B:158:LYS:HB3	1:B:158:LYS:HE2	1.91	0.40
1:D:158:LYS:NZ	3:D:405:HOH:O	2.55	0.40
1:K:105:MET:SD	1:K:171:ARG:HD3	2.62	0.40

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	186/207 (90%)	183 (98%)	3 (2%)	0	<a href="#">100</a> <a href="#">100</a>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	185/207 (89%)	183 (99%)	2 (1%)	0	100	100
1	C	181/207 (87%)	176 (97%)	5 (3%)	0	100	100
1	D	181/207 (87%)	177 (98%)	4 (2%)	0	100	100
1	E	187/207 (90%)	185 (99%)	2 (1%)	0	100	100
1	F	180/207 (87%)	176 (98%)	4 (2%)	0	100	100
1	G	181/207 (87%)	177 (98%)	4 (2%)	0	100	100
1	H	181/207 (87%)	178 (98%)	3 (2%)	0	100	100
1	I	182/207 (88%)	179 (98%)	3 (2%)	0	100	100
1	J	182/207 (88%)	180 (99%)	2 (1%)	0	100	100
1	K	182/207 (88%)	178 (98%)	4 (2%)	0	100	100
1	L	181/207 (87%)	176 (97%)	5 (3%)	0	100	100
All	All	2189/2484 (88%)	2148 (98%)	41 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	159/174 (91%)	156 (98%)	3 (2%)	52	72
1	B	158/174 (91%)	156 (99%)	2 (1%)	65	81
1	C	154/174 (88%)	150 (97%)	4 (3%)	41	62
1	D	154/174 (88%)	149 (97%)	5 (3%)	34	54
1	E	160/174 (92%)	159 (99%)	1 (1%)	84	92
1	F	153/174 (88%)	148 (97%)	5 (3%)	33	53
1	G	154/174 (88%)	152 (99%)	2 (1%)	65	81
1	H	154/174 (88%)	153 (99%)	1 (1%)	84	92
1	I	155/174 (89%)	151 (97%)	4 (3%)	41	62
1	J	155/174 (89%)	151 (97%)	4 (3%)	41	62

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	K	155/174 (89%)	154 (99%)	1 (1%)	84	92
1	L	154/174 (88%)	152 (99%)	2 (1%)	65	81
All	All	1865/2088 (89%)	1831 (98%)	34 (2%)	54	73

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	152	GLN
1	A	181	ASP
1	A	195	ASP
1	B	52	HIS
1	B	152	GLN
1	C	57	ARG
1	C	121	SER
1	C	152	GLN
1	C	195	ASP
1	D	52	HIS
1	D	57	ARG
1	D	93	PRO
1	D	152	GLN
1	D	165	ASN
1	E	198	LYS
1	F	40	ASP
1	F	52	HIS
1	F	57	ARG
1	F	97	TYR
1	F	152	GLN
1	G	57	ARG
1	G	145	ARG
1	H	97	TYR
1	I	52	HIS
1	I	152	GLN
1	I	193	LEU
1	I	195	ASP
1	J	52	HIS
1	J	90	LYS
1	J	152	GLN
1	J	189	MET
1	K	152	GLN
1	L	52	HIS
1	L	152	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	187	GLN
1	C	185	ASN
1	E	42	ASN
1	H	165	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 oligosaccharides 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	XP3	A	301	-	19,19,19	0.59	1 (5%)	17,23,23	1.13	1 (5%)
2	XP3	G	301	-	19,19,19	0.60	1 (5%)	17,23,23	1.22	1 (5%)
2	XP3	I	301	-	19,19,19	0.63	1 (5%)	17,23,23	1.37	2 (11%)
2	XP3	K	301	-	19,19,19	0.65	1 (5%)	17,23,23	1.43	1 (5%)
2	XP3	F	301	-	19,19,19	0.60	1 (5%)	17,23,23	1.51	2 (11%)
2	XP3	H	301	-	19,19,19	0.56	1 (5%)	17,23,23	1.24	1 (5%)
2	XP3	B	301	-	19,19,19	0.65	1 (5%)	17,23,23	1.04	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	XP3	D	301	-	19,19,19	0.62	1 (5%)	17,23,23	1.48	1 (5%)
2	XP3	E	301	-	19,19,19	0.49	0	17,23,23	2.14	2 (11%)
2	XP3	J	301	-	19,19,19	0.58	1 (5%)	17,23,23	1.76	2 (11%)
2	XP3	L	301	-	19,19,19	0.61	1 (5%)	17,23,23	1.07	1 (5%)
2	XP3	C	301	-	19,19,19	0.58	1 (5%)	17,23,23	1.46	2 (11%)

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	XP3	A	301	-	-	6/11/27/27	0/1/1/1
2	XP3	G	301	-	-	2/11/27/27	0/1/1/1
2	XP3	I	301	-	-	4/11/27/27	0/1/1/1
2	XP3	K	301	-	-	1/11/27/27	0/1/1/1
2	XP3	F	301	-	-	5/11/27/27	0/1/1/1
2	XP3	H	301	-	-	4/11/27/27	0/1/1/1
2	XP3	B	301	-	-	4/11/27/27	0/1/1/1
2	XP3	D	301	-	-	6/11/27/27	0/1/1/1
2	XP3	E	301	-	-	5/11/27/27	0/1/1/1
2	XP3	J	301	-	-	4/11/27/27	0/1/1/1
2	XP3	L	301	-	-	3/11/27/27	0/1/1/1
2	XP3	C	301	-	-	4/11/27/27	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	301	XP3	C10-C11	2.43	1.38	1.35
2	B	301	XP3	C10-C11	2.38	1.38	1.35
2	I	301	XP3	C10-C11	2.32	1.38	1.35
2	L	301	XP3	C10-C11	2.32	1.38	1.35
2	D	301	XP3	C10-C11	2.30	1.38	1.35
2	F	301	XP3	C10-C11	2.27	1.38	1.35
2	G	301	XP3	C10-C11	2.23	1.38	1.35
2	J	301	XP3	C10-C11	2.17	1.38	1.35
2	A	301	XP3	C10-C11	2.16	1.38	1.35
2	C	301	XP3	C10-C11	2.14	1.38	1.35
2	H	301	XP3	C10-C11	2.09	1.38	1.35

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	XP3	C10-C11-C14	-7.80	113.20	120.26
2	J	301	XP3	C10-C11-C14	-6.44	114.43	120.26
2	F	301	XP3	C10-C11-C14	-5.31	115.45	120.26
2	D	301	XP3	C10-C11-C14	-5.31	115.45	120.26
2	C	301	XP3	C10-C11-C14	-5.13	115.61	120.26
2	K	301	XP3	C10-C11-C14	-5.12	115.62	120.26
2	I	301	XP3	C10-C11-C14	-4.85	115.87	120.26
2	H	301	XP3	C10-C11-C14	-4.50	116.19	120.26
2	G	301	XP3	C10-C11-C14	-4.32	116.35	120.26
2	A	301	XP3	C10-C11-C14	-3.69	116.92	120.26
2	L	301	XP3	C10-C11-C14	-3.58	117.02	120.26
2	B	301	XP3	C10-C11-C14	-3.56	117.03	120.26
2	E	301	XP3	C17-C19-C10	3.44	118.73	111.72
2	J	301	XP3	C17-C19-C10	2.75	117.33	111.72
2	C	301	XP3	C17-C19-C10	2.53	116.86	111.72
2	F	301	XP3	C17-C19-C10	2.40	116.61	111.72
2	I	301	XP3	C17-C19-C10	2.02	115.84	111.72

There are no chirality outliers.

All (48) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	XP3	C07-C08-C09-C10
2	E	301	XP3	C08-C09-C10-C11
2	E	301	XP3	C08-C09-C10-C19
2	J	301	XP3	C10-C11-C12-O13
2	J	301	XP3	C14-C11-C12-O13
2	G	301	XP3	C07-C08-C09-C10
2	J	301	XP3	C07-C08-C09-C10
2	F	301	XP3	C07-C08-C09-C10
2	C	301	XP3	C03-C04-C05-C06
2	B	301	XP3	C03-C04-C05-C06
2	B	301	XP3	C02-C03-C04-C05
2	L	301	XP3	C02-C03-C04-C05
2	L	301	XP3	C03-C04-C05-C06
2	I	301	XP3	C02-C03-C04-C05
2	H	301	XP3	C02-C03-C04-C05
2	D	301	XP3	C02-C03-C04-C05
2	D	301	XP3	C03-C04-C05-C06
2	F	301	XP3	C10-C11-C12-O13
2	C	301	XP3	C02-C03-C04-C05

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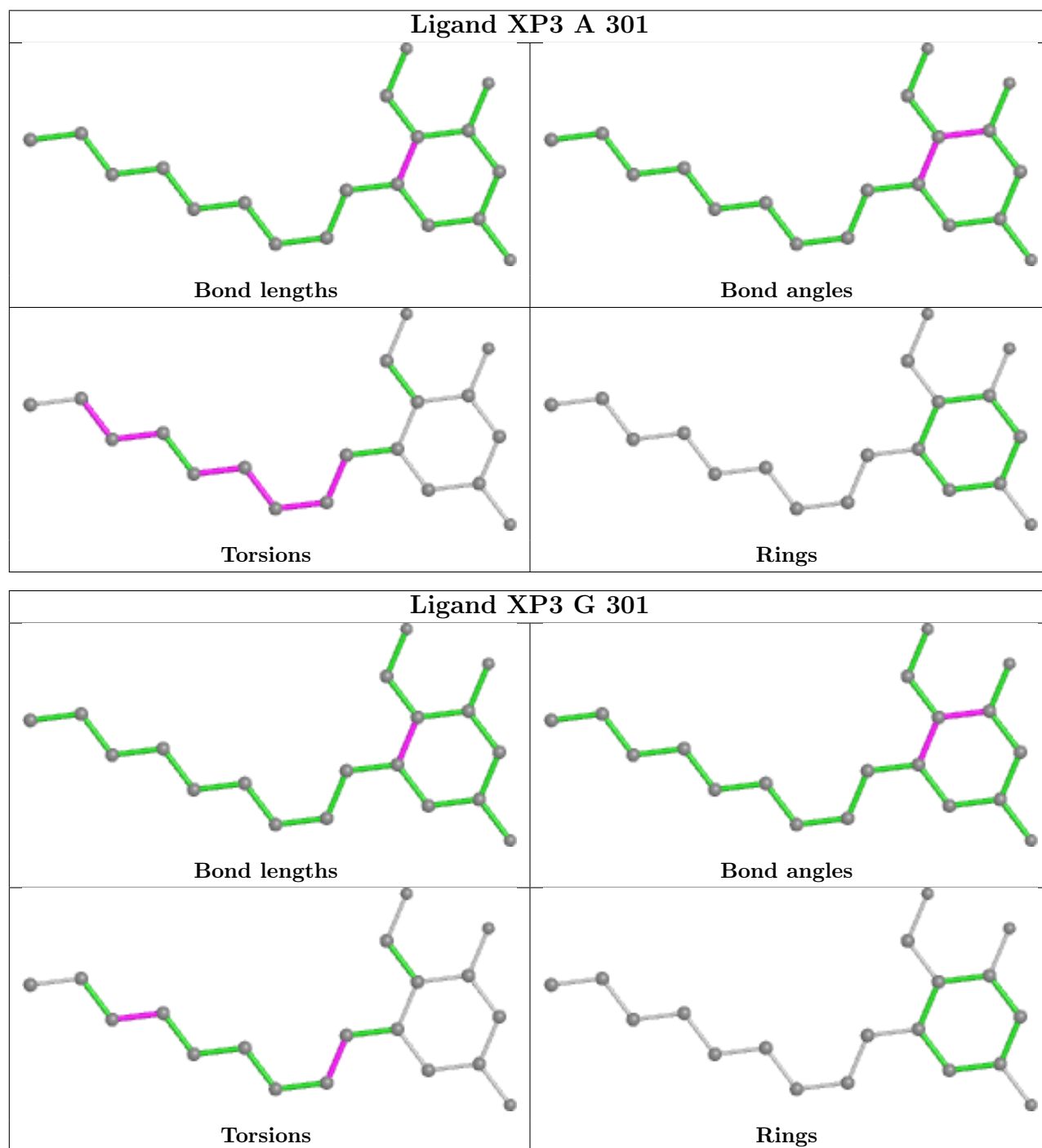
Mol	Chain	Res	Type	Atoms
2	G	301	XP3	C02-C03-C04-C05
2	B	301	XP3	C04-C05-C06-C07
2	F	301	XP3	C02-C03-C04-C05
2	C	301	XP3	C04-C05-C06-C07
2	E	301	XP3	C02-C03-C04-C05
2	E	301	XP3	C06-C07-C08-C09
2	A	301	XP3	C04-C05-C06-C07
2	J	301	XP3	C04-C05-C06-C07
2	A	301	XP3	C06-C07-C08-C09
2	A	301	XP3	C05-C06-C07-C08
2	D	301	XP3	C07-C08-C09-C10
2	E	301	XP3	C07-C08-C09-C10
2	I	301	XP3	C06-C07-C08-C09
2	A	301	XP3	C01-C02-C03-C04
2	I	301	XP3	C04-C05-C06-C07
2	I	301	XP3	C05-C06-C07-C08
2	H	301	XP3	C05-C06-C07-C08
2	F	301	XP3	C08-C09-C10-C19
2	H	301	XP3	C08-C09-C10-C19
2	H	301	XP3	C04-C05-C06-C07
2	L	301	XP3	C06-C07-C08-C09
2	A	301	XP3	C02-C03-C04-C05
2	B	301	XP3	C06-C07-C08-C09
2	D	301	XP3	C14-C11-C12-O13
2	F	301	XP3	C14-C11-C12-O13
2	K	301	XP3	C14-C11-C12-O13
2	D	301	XP3	C06-C07-C08-C09
2	C	301	XP3	C06-C07-C08-C09
2	D	301	XP3	C04-C05-C06-C07

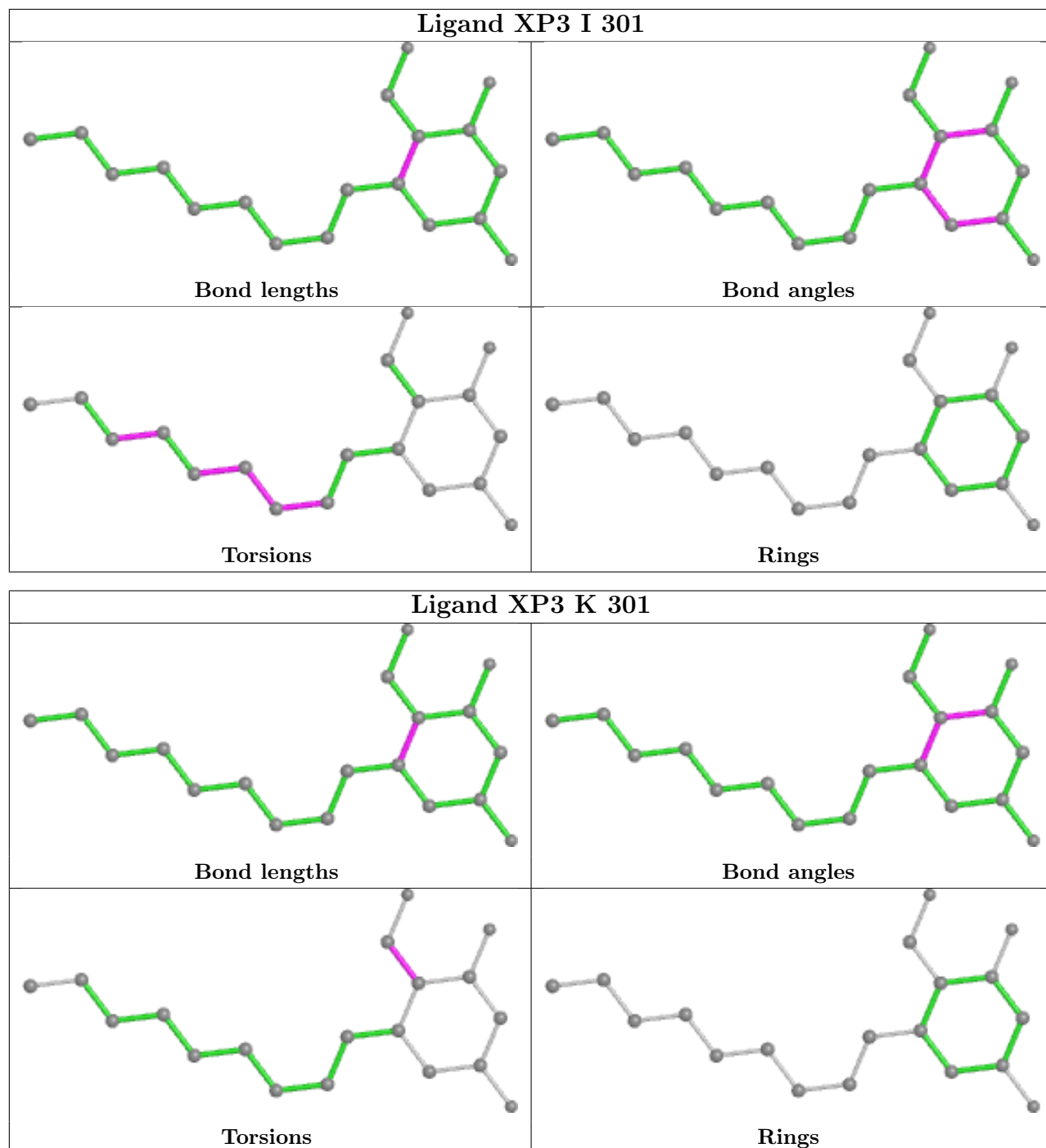
There are no ring outliers.

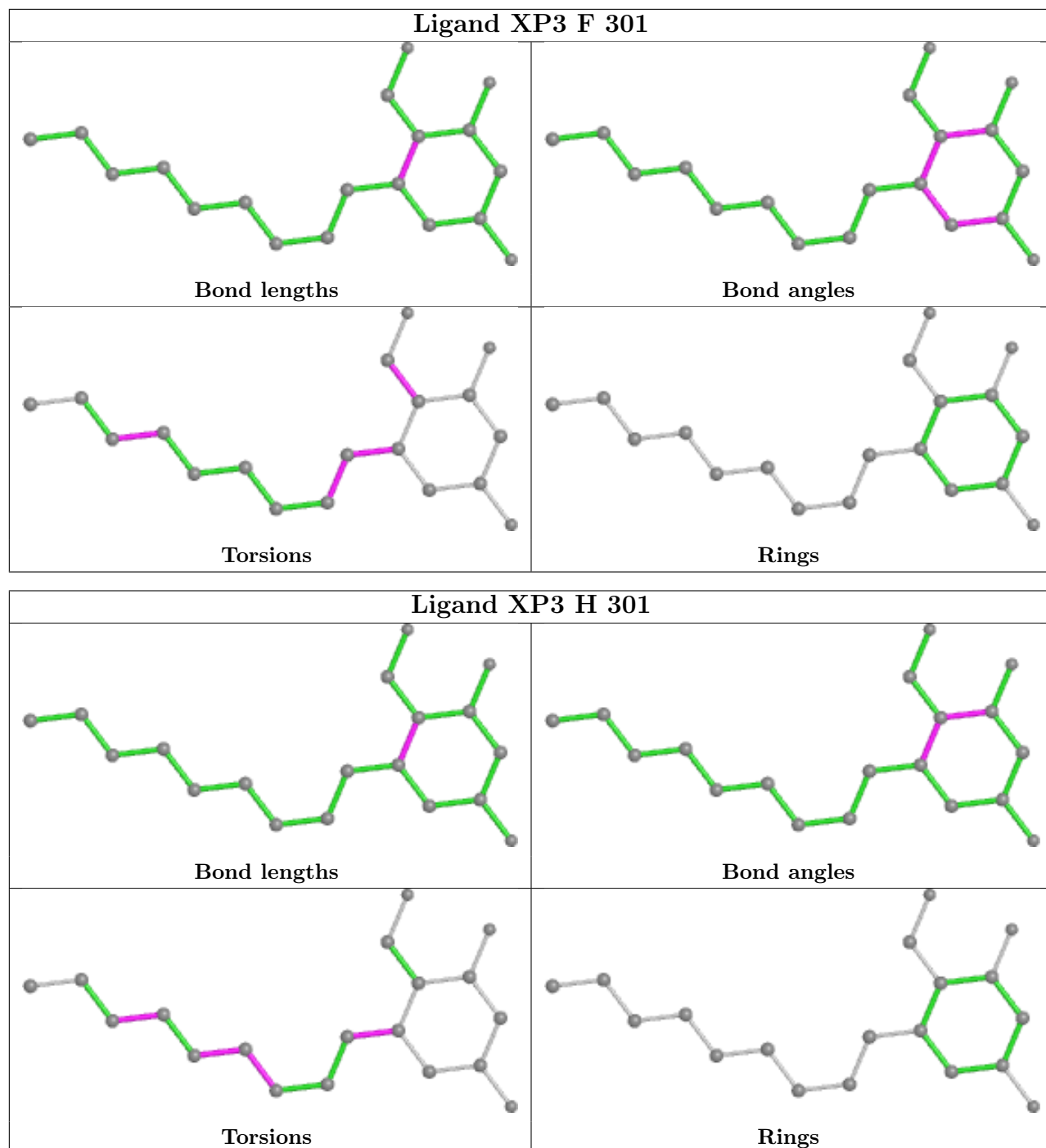
No monomer is involved in short contacts.

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 than 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.

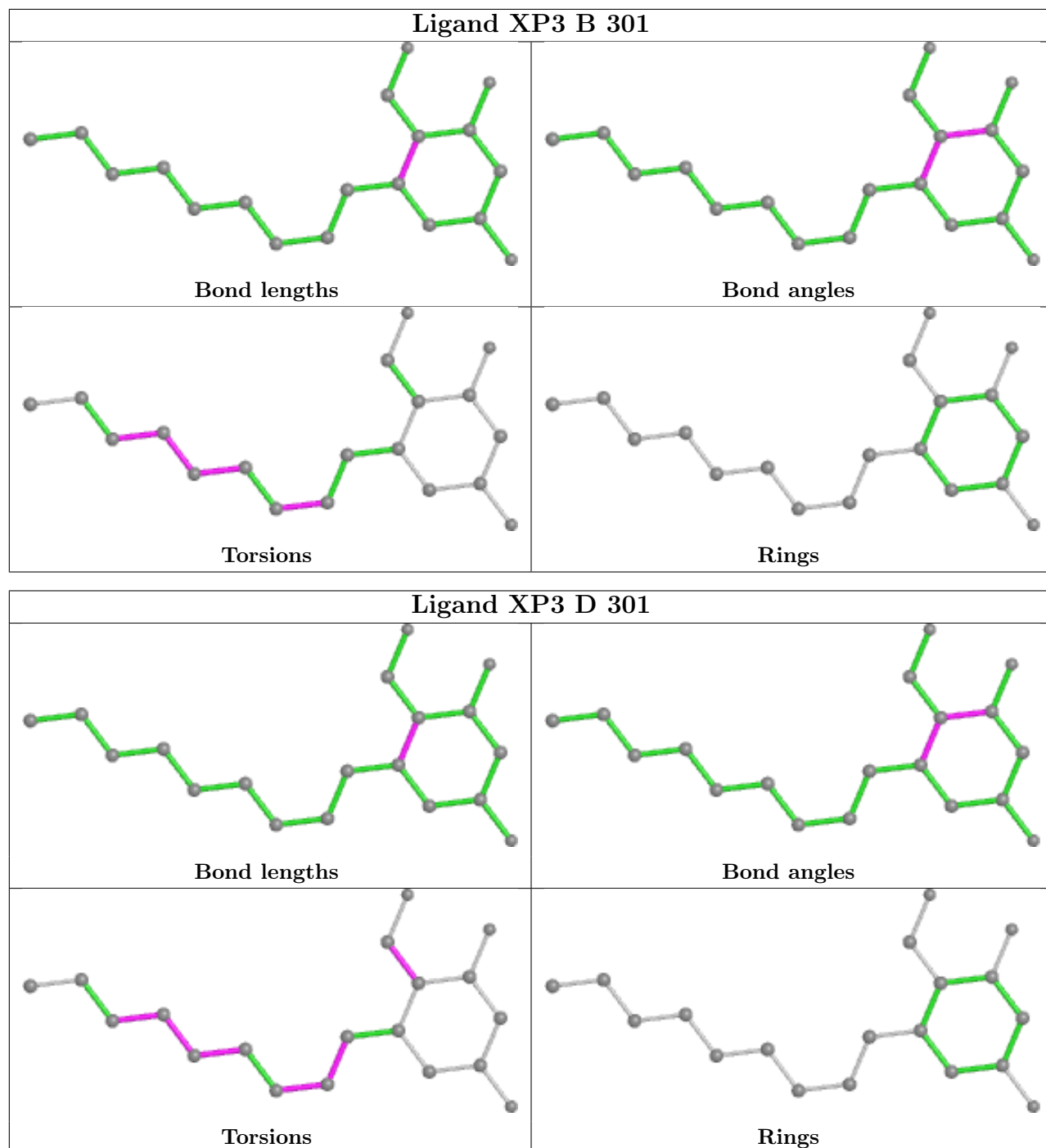
The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

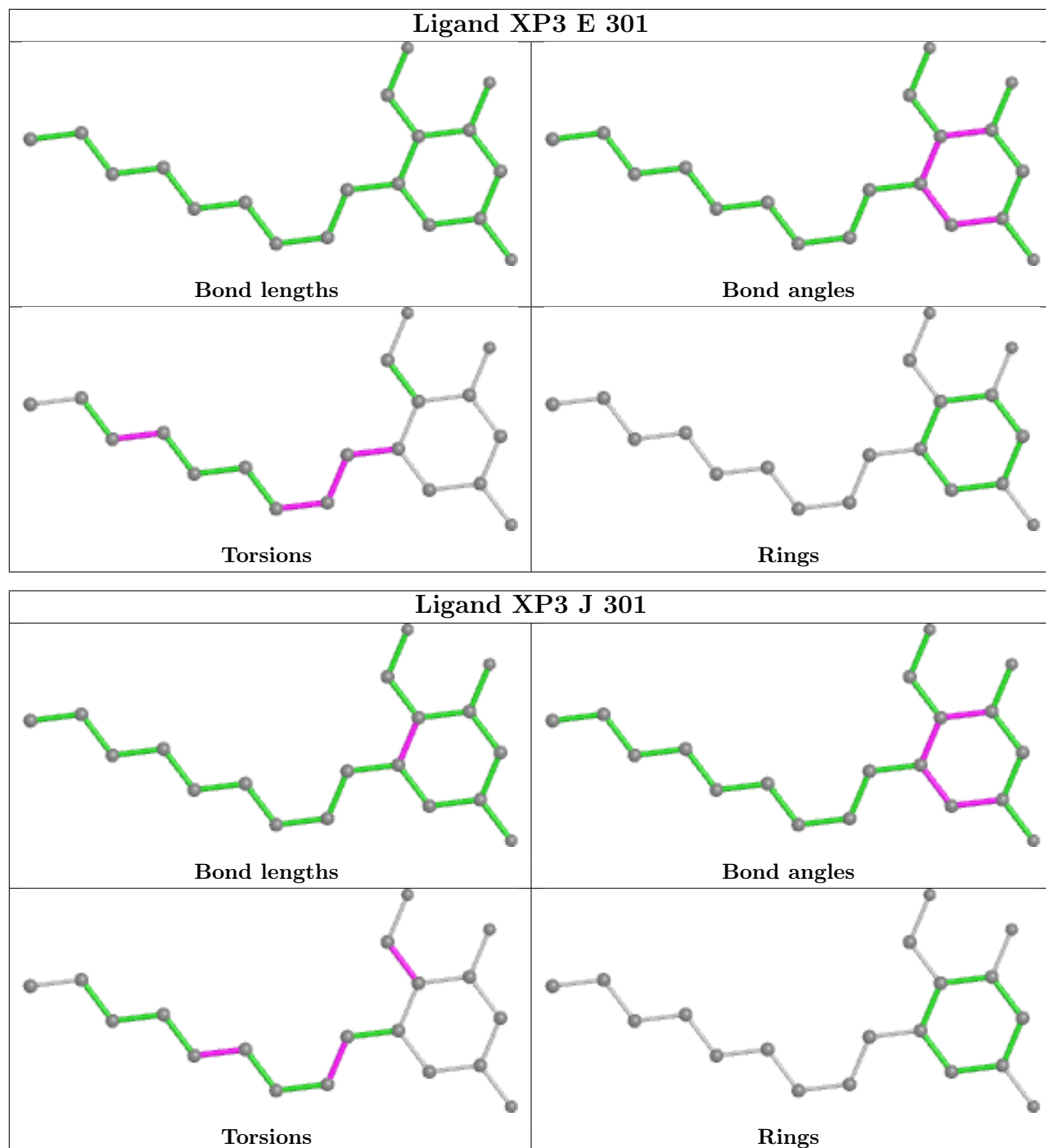


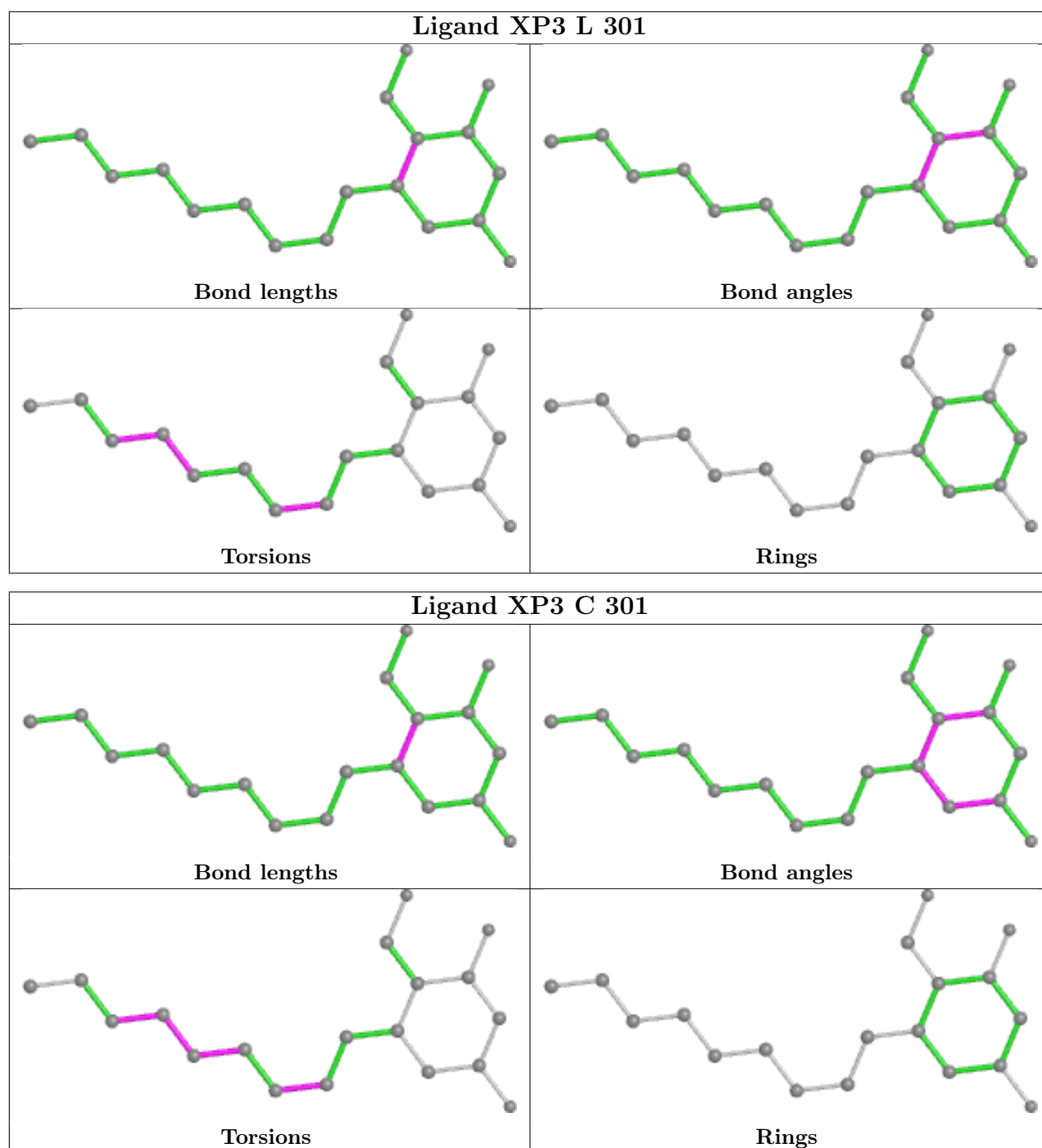












## 5.7 Other polymers [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	188/207 (90%)	-0.17	7 (3%) 45 43	26, 35, 62, 99	0
1	B	187/207 (90%)	-0.24	2 (1%) 77 75	26, 35, 54, 90	0
1	C	183/207 (88%)	-0.02	4 (2%) 62 59	26, 41, 65, 91	0
1	D	183/207 (88%)	0.20	5 (2%) 56 53	30, 43, 73, 102	0
1	E	189/207 (91%)	0.04	5 (2%) 57 54	29, 41, 77, 102	0
1	F	182/207 (87%)	-0.08	2 (1%) 77 75	29, 40, 59, 90	0
1	G	183/207 (88%)	-0.04	3 (1%) 70 67	27, 40, 62, 89	0
1	H	183/207 (88%)	0.05	4 (2%) 62 59	29, 42, 59, 87	0
1	I	184/207 (88%)	-0.05	6 (3%) 49 46	28, 38, 61, 92	0
1	J	184/207 (88%)	0.10	6 (3%) 49 46	30, 42, 68, 95	0
1	K	184/207 (88%)	-0.19	1 (0%) 87 85	26, 35, 58, 81	0
1	L	183/207 (88%)	-0.23	4 (2%) 62 59	28, 36, 51, 86	0
All	All	2213/2484 (89%)	-0.05	49 (2%) 62 59	26, 39, 65, 102	0

All (49) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	13	VAL	5.4
1	A	200	TYR	5.4
1	J	196	LEU	4.7
1	E	201	VAL	4.5
1	I	13	VAL	4.4
1	D	195	ASP	3.9
1	E	200	TYR	3.4
1	D	188	VAL	3.4
1	J	13	VAL	3.1
1	L	195	ASP	3.0
1	C	13	VAL	3.0

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Mol	Chain	Res	Type	RSRZ
1	K	41	ASP	3.0
1	B	13	VAL	3.0
1	I	14	LEU	3.0
1	E	41	ASP	2.9
1	L	194	GLY	2.9
1	A	199	GLU	2.9
1	A	13	VAL	2.8
1	J	189	MET	2.8
1	E	13	VAL	2.8
1	H	98	HIS	2.6
1	L	13	VAL	2.5
1	H	195	ASP	2.5
1	D	181	ASP	2.5
1	I	194	GLY	2.5
1	C	193	LEU	2.4
1	A	194	GLY	2.4
1	F	195	ASP	2.4
1	A	195	ASP	2.3
1	F	40	ASP	2.3
1	G	195	ASP	2.3
1	D	189	MET	2.3
1	J	40	ASP	2.2
1	G	98	HIS	2.2
1	I	195	ASP	2.2
1	E	96	HIS	2.2
1	A	196	LEU	2.2
1	B	193	LEU	2.2
1	I	196	LEU	2.2
1	J	91	GLU	2.2
1	D	193	LEU	2.1
1	C	195	ASP	2.1
1	H	187	GLN	2.1
1	C	41	ASP	2.1
1	I	193	LEU	2.0
1	J	74	GLU	2.0
1	H	13	VAL	2.0
1	A	198	LYS	2.0
1	L	98	HIS	2.0

## 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 [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

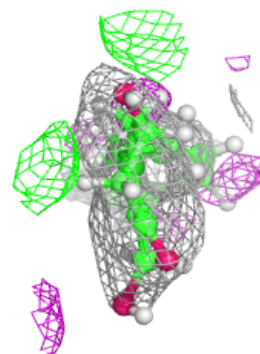
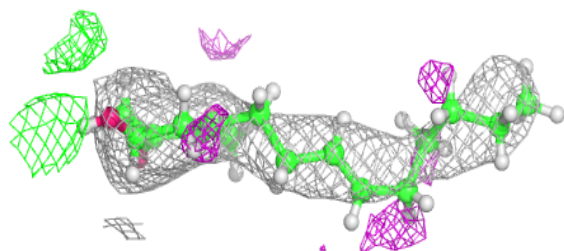
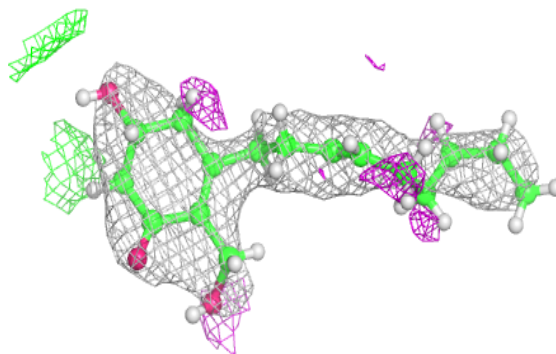
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	XP3	D	301	19/19	0.82	0.21	30,30,71,71	0
2	XP3	E	301	19/19	0.82	0.24	30,30,82,82	0
2	XP3	H	301	19/19	0.82	0.21	30,30,73,74	0
2	XP3	I	301	19/19	0.84	0.19	30,30,66,66	0
2	XP3	A	301	19/19	0.85	0.20	30,30,65,66	0
2	XP3	C	301	19/19	0.85	0.17	30,30,70,70	0
2	XP3	J	301	19/19	0.85	0.18	30,30,69,70	0
2	XP3	K	301	19/19	0.86	0.16	30,30,60,61	0
2	XP3	L	301	19/19	0.86	0.20	30,30,68,69	0
2	XP3	G	301	19/19	0.87	0.15	30,30,65,65	0
2	XP3	F	301	19/19	0.87	0.16	30,30,65,65	0
2	XP3	B	301	19/19	0.89	0.13	30,30,55,56	0

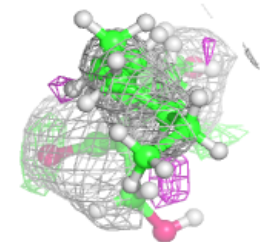
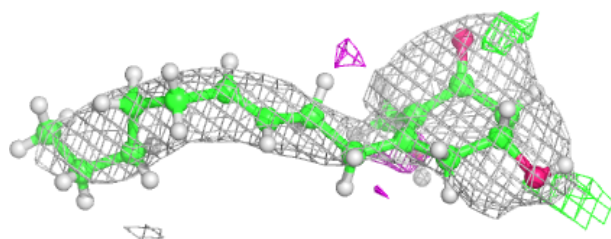
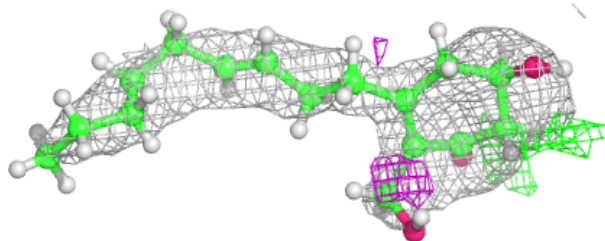
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around XP3 D 301:**

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

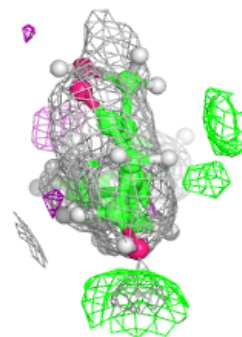
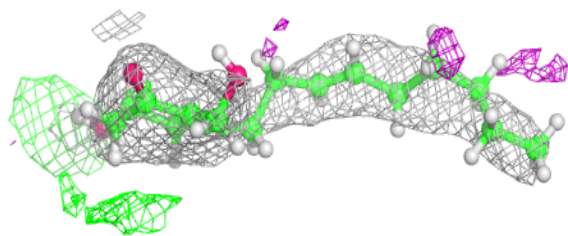
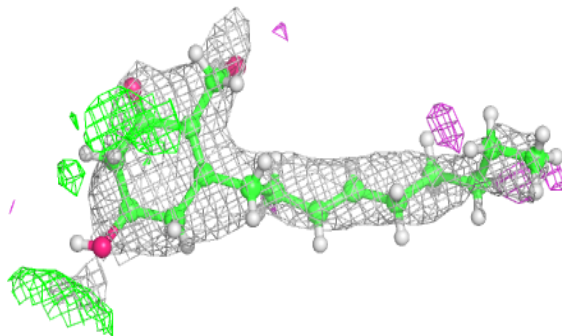
**Electron density around XP3 E 301:**

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

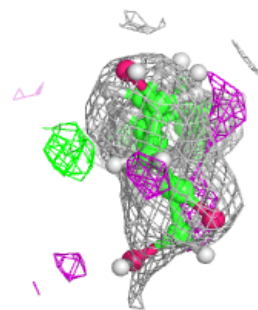
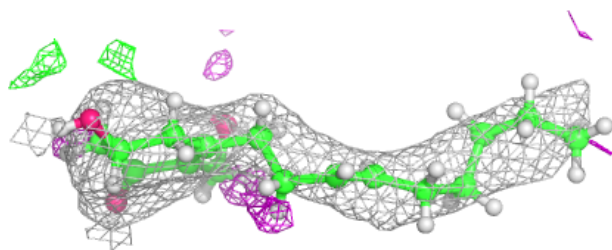
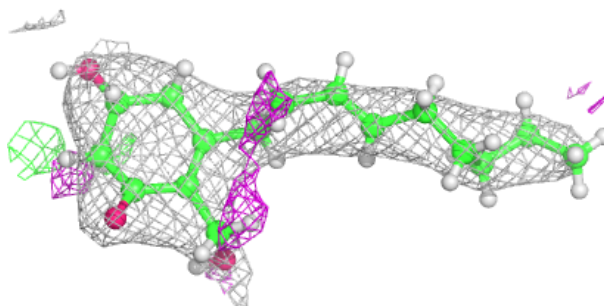


**Electron density around XP3 H 301:**

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

**Electron density around XP3 I 301:**

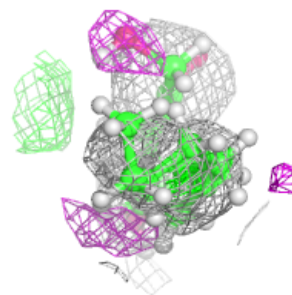
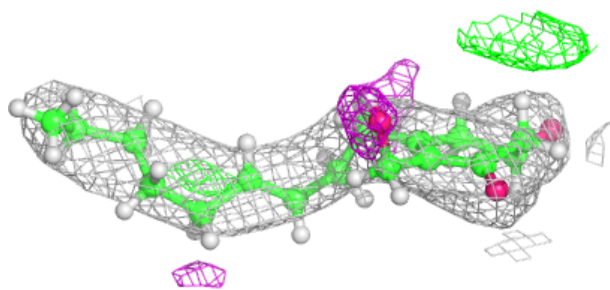
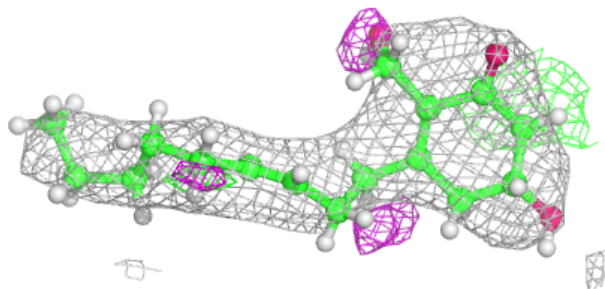
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



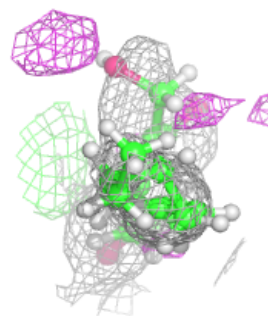
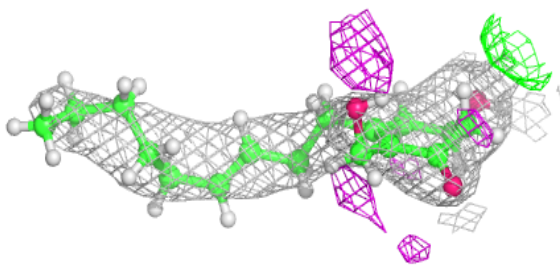
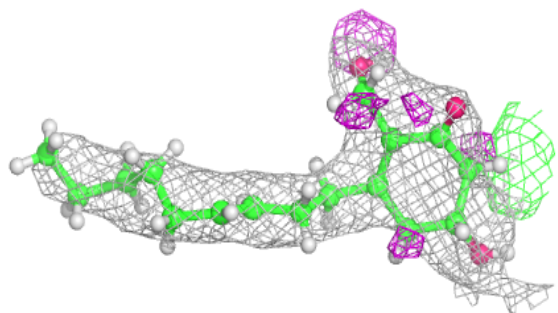


**Electron density around XP3 A 301:**

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

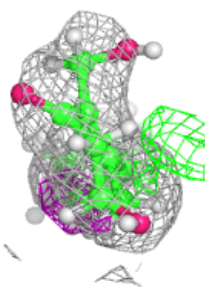
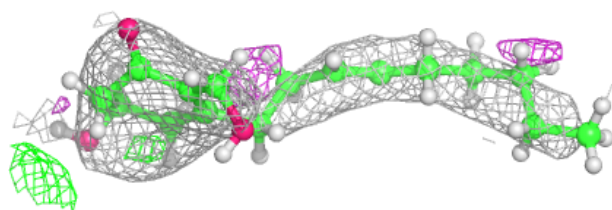
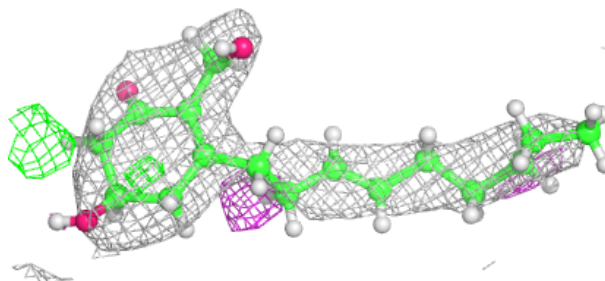
**Electron density around XP3 C 301:**

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

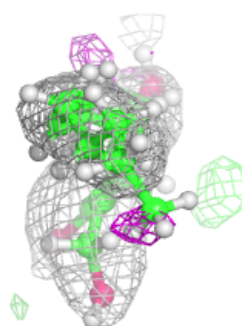
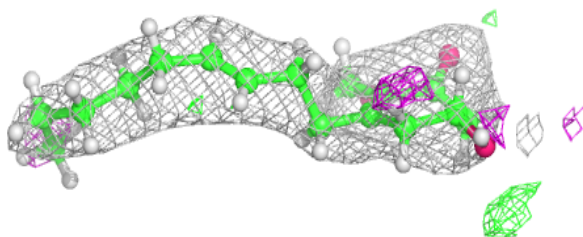
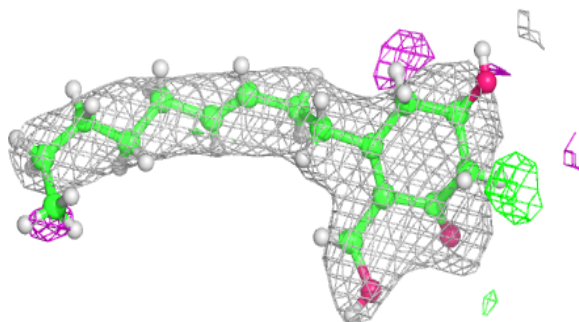


**Electron density around XP3 J 301:**

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

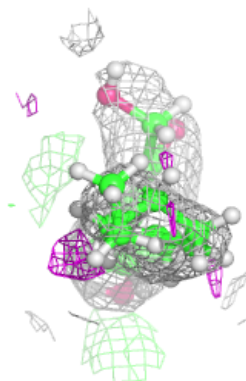
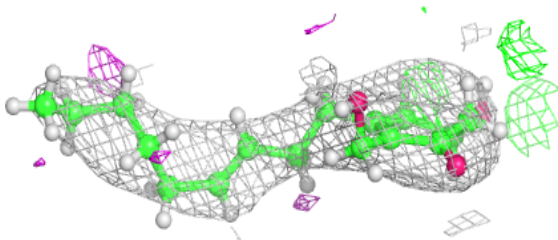
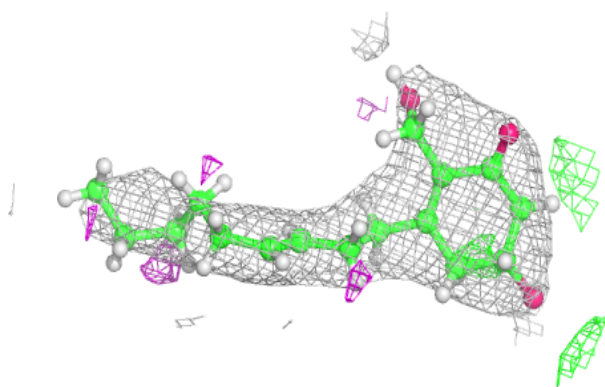
**Electron density around XP3 K 301:**

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

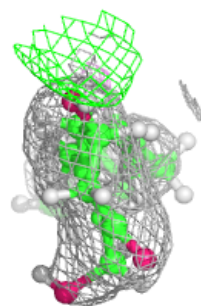
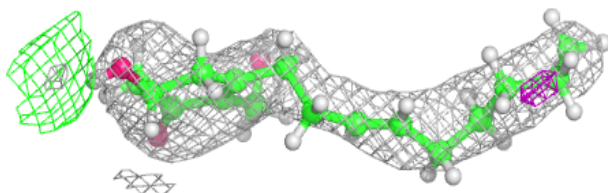
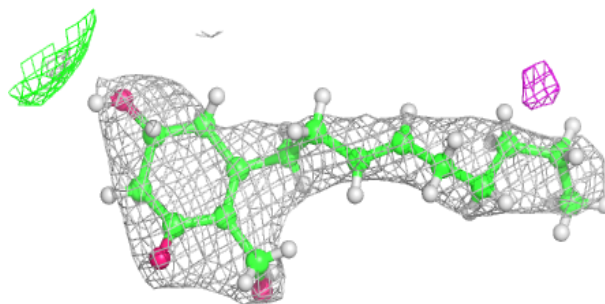


**Electron density around XP3 L 301:**

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

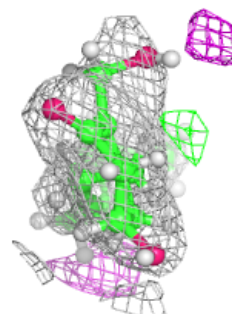
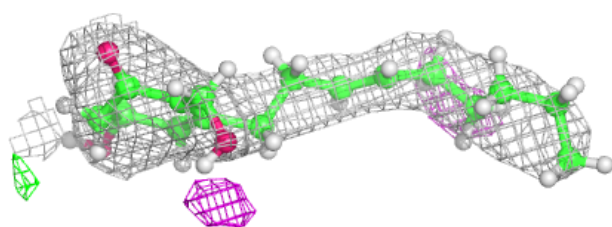
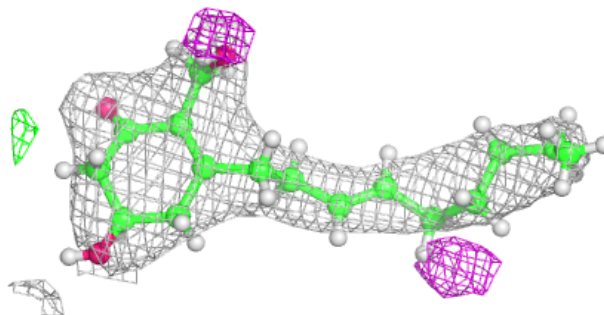
**Electron density around XP3 G 301:**

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

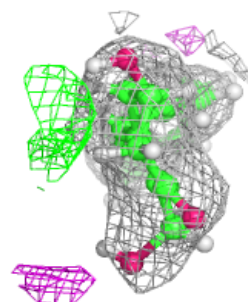
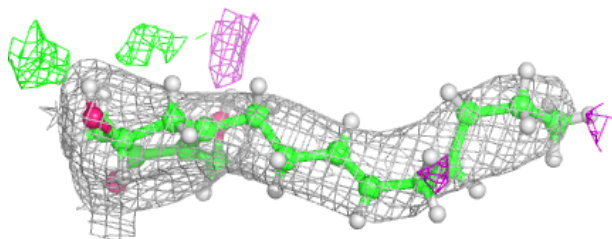
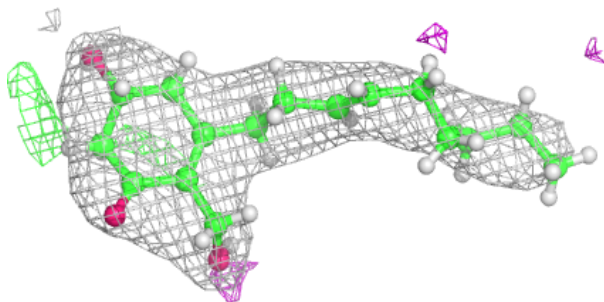


**Electron density around XP3 F 301:**

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

**Electron density around XP3 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)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.