



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 4, 2023 – 02:44 PM EST

PDB ID : 8F97
Title : Compound 5 bound to procaspase-6
Authors : Fan, P.; Zhao, Y.; Renslo, A.R.; Arkin, M.R.
Deposited on : 2022-11-23
Resolution : 2.32 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

The following versions of software and data (see [references ⓘ](#)) 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

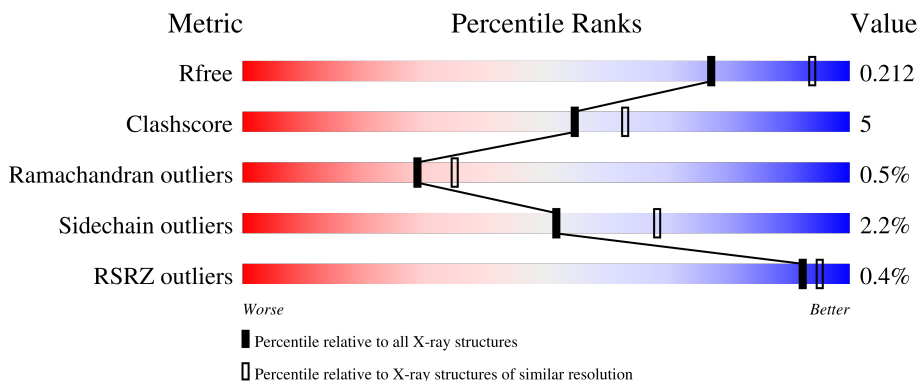
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.32 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (2.34-2.30)

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 $\leq 5\%$. 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	299	
1	B	299	
1	C	299	
1	D	299	

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	XM6	C	301[A]	-	-	-	X
2	XM6	C	301[B]	-	-	-	X

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 8603 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 Procaspase-6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	245	1975	1260	342	357	16	0	2	0
1	B	244	1967	1256	340	355	16	0	2	0
1	C	254	2054	1309	358	373	14	0	1	0
1	D	253	2042	1302	354	372	14	0	0	0

There are 28 discrepancies between the modelled and reference sequences:

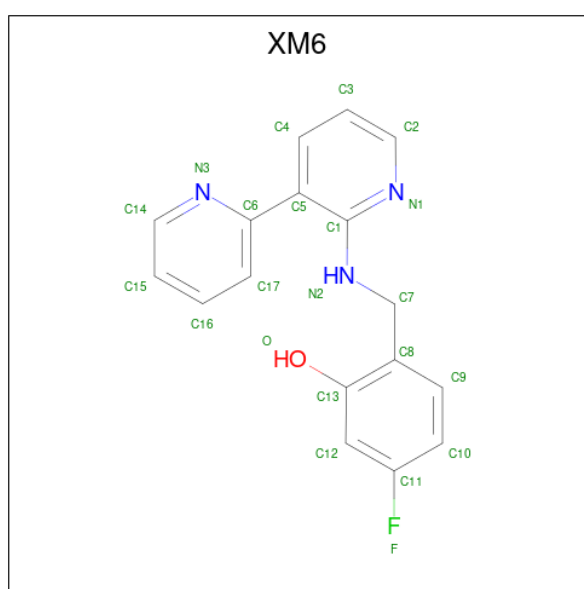
Chain	Residue	Modelled	Actual	Comment	Reference
A	163	ALA	CYS	conflict	UNP P55212
A	294	GLU	-	expression tag	UNP P55212
A	295	ASN	-	expression tag	UNP P55212
A	296	LEU	-	expression tag	UNP P55212
A	297	TYR	-	expression tag	UNP P55212
A	298	PHE	-	expression tag	UNP P55212
A	299	GLN	-	expression tag	UNP P55212
B	163	ALA	CYS	conflict	UNP P55212
B	294	GLU	-	expression tag	UNP P55212
B	295	ASN	-	expression tag	UNP P55212
B	296	LEU	-	expression tag	UNP P55212
B	297	TYR	-	expression tag	UNP P55212
B	298	PHE	-	expression tag	UNP P55212
B	299	GLN	-	expression tag	UNP P55212
C	163	ALA	CYS	conflict	UNP P55212
C	294	GLU	-	expression tag	UNP P55212
C	295	ASN	-	expression tag	UNP P55212
C	296	LEU	-	expression tag	UNP P55212
C	297	TYR	-	expression tag	UNP P55212
C	298	PHE	-	expression tag	UNP P55212
C	299	GLN	-	expression tag	UNP P55212

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Chain	Residue	Modelled	Actual	Comment	Reference
D	163	ALA	CYS	conflict	UNP P55212
D	294	GLU	-	expression tag	UNP P55212
D	295	ASN	-	expression tag	UNP P55212
D	296	LEU	-	expression tag	UNP P55212
D	297	TYR	-	expression tag	UNP P55212
D	298	PHE	-	expression tag	UNP P55212
D	299	GLN	-	expression tag	UNP P55212

- Molecule 2 is 2-({[(2M)-[2,3'-bipyridin]-2'-yl]amino}methyl)-5-fluorophenol (three-letter code: XM6) (formula: C₁₇H₁₄FN₃O) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	F	N			O
2	A	1	44	34	2	6	2	0	1
2	C	1	44	34	2	6	2	0	1

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).

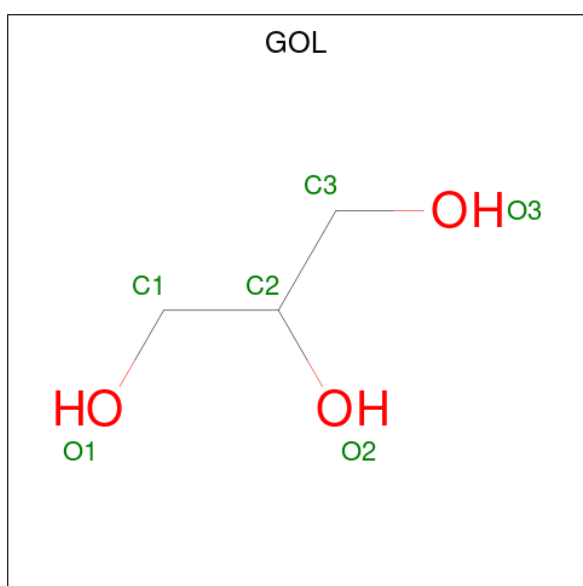


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 7 4 3	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	D	1	Total Cl 1 1	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is water.

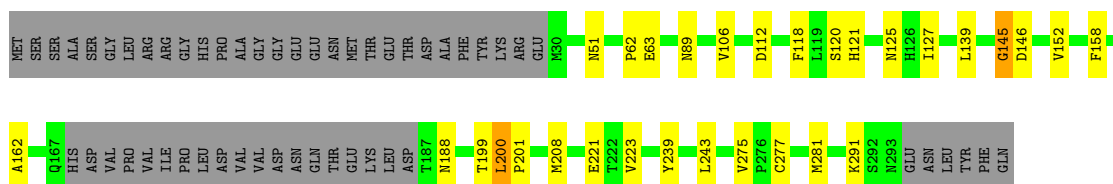
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	114	Total	O	0	0
			114	114		
7	B	109	Total	O	0	0
			109	109		
7	C	106	Total	O	0	0
			106	106		
7	D	106	Total	O	0	0
			106	106		

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.

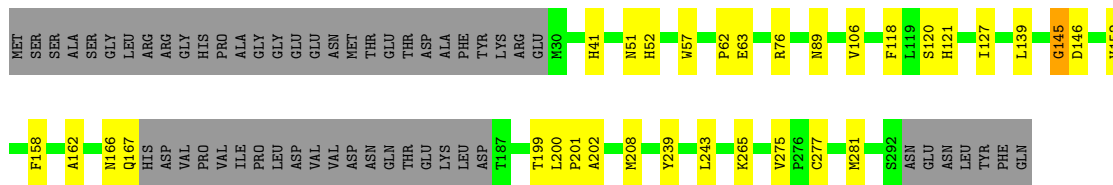
- Molecule 1: Procaspase-6

Chain A: 




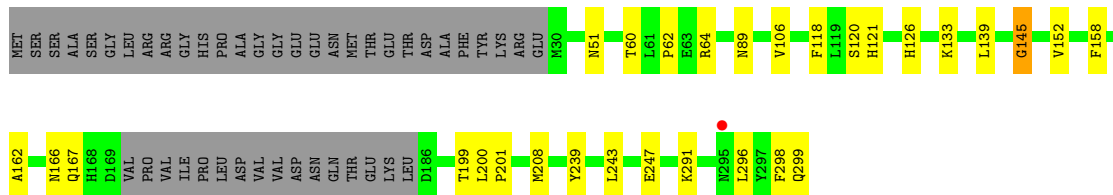
- Molecule 1: Procaspase-6

Chain B: 




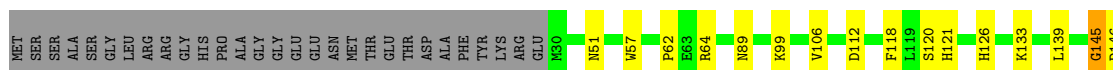
- Molecule 1: Procaspase-6

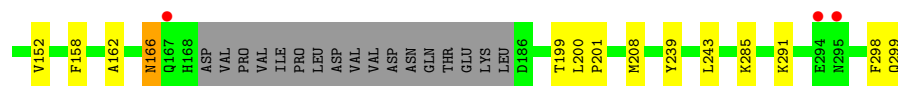
Chain C: 



- Molecule 1: Procaspase-6

Chain D: 





4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	102.66Å 102.66Å 322.77Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.96 – 2.32 48.92 – 2.32	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.96-2.32) 99.9 (48.92-2.32)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.93 (at 2.32Å)	Xtrriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.179 , 0.210 0.184 , 0.212	Depositor DCC
R_{free} test set	4033 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å ²)	49.3	Xtrriage
Anisotropy	0.717	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 41.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.489 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	8603	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: EDO, XM6, CL, GOL, PEG

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	1/2026 (0.0%)	0.85	0/2727
1	B	0.67	1/2018 (0.0%)	0.86	3/2716 (0.1%)
1	C	0.67	0/2105	0.89	2/2834 (0.1%)
1	D	0.67	0/2090	0.84	1/2815 (0.0%)
All	All	0.67	2/8239 (0.0%)	0.86	6/11092 (0.1%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	63	GLU	CD-OE2	6.00	1.32	1.25
1	B	63	GLU	CD-OE2	5.68	1.31	1.25

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	64	ARG	NE-CZ-NH1	11.42	126.01	120.30
1	C	64	ARG	NE-CZ-NH2	-10.40	115.10	120.30
1	D	64	ARG	NE-CZ-NH2	-6.06	117.27	120.30
1	B	76	ARG	NE-CZ-NH1	-5.73	117.44	120.30
1	B	76	ARG	NE-CZ-NH2	5.55	123.07	120.30
1	B	202	ALA	CB-CA-C	5.07	117.71	110.10

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	1975	0	1950	32	0
1	B	1967	0	1944	26	0
1	C	2054	0	2010	15	0
1	D	2042	0	1996	21	0
2	A	44	0	0	2	0
2	C	44	0	0	2	0
3	A	4	0	6	0	0
3	B	8	0	12	1	0
3	C	12	0	18	1	0
3	D	4	0	6	1	0
4	B	7	0	10	0	0
5	D	1	0	0	0	0
6	D	6	0	8	2	0
7	A	114	0	0	2	0
7	B	109	0	0	2	0
7	C	106	0	0	0	0
7	D	106	0	0	2	0
All	All	8603	0	7960	83	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 5.

All (83) 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:D:166:ASN:ND2	7:D:401:HOH:O	2.20	0.75
1:A:201:PRO:HB2	1:A:281[B]:MET:SD	2.29	0.72
1:B:201:PRO:HB2	1:B:281[B]:MET:SD	2.30	0.70
1:A:188:ASN:HD22	1:A:223:VAL:H	1.36	0.70
1:B:201:PRO:CB	1:B:281[B]:MET:SD	2.81	0.69
1:A:188:ASN:ND2	1:A:223:VAL:H	1.93	0.67
1:A:201:PRO:CB	1:A:281[B]:MET:SD	2.82	0.67
1:D:112:ASP:OD2	1:D:291:LYS:CE	2.44	0.66
1:A:112:ASP:OD2	1:A:291:LYS:CE	2.44	0.64
1:A:199:THR:OG1	1:B:201:PRO:HD3	1.98	0.63
1:D:145:GLY:HA2	1:D:152:VAL:HG22	1.81	0.62
1:A:112:ASP:OD2	1:A:291:LYS:HE2	1.99	0.62
1:C:145:GLY:HA2	1:C:152:VAL:HG22	1.80	0.62
1:A:201:PRO:HD3	1:B:199:THR:OG1	1.99	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:112:ASP:OD2	1:D:291:LYS:HE2	1.99	0.61
1:A:281[A]:MET:HE2	1:B:275:VAL:CG1	2.32	0.60
1:A:275:VAL:CG1	1:B:281[A]:MET:HE2	2.33	0.59
1:B:145:GLY:HA2	1:B:152:VAL:HG22	1.84	0.59
1:A:281[A]:MET:HE2	1:B:275:VAL:HG11	1.84	0.58
1:A:145:GLY:HA2	1:A:152:VAL:HG22	1.87	0.56
1:A:188:ASN:HD21	1:A:221:GLU:HB3	1.70	0.56
1:A:121:HIS:HD2	7:A:494:HOH:O	1.89	0.55
1:A:275:VAL:HG11	1:B:281[A]:MET:HE2	1.88	0.54
1:D:51:ASN:HD22	1:D:89:ASN:HD22	1.56	0.54
1:C:51:ASN:HD22	1:C:89:ASN:HD22	1.56	0.54
1:D:57:TRP:HB3	3:D:301:EDO:H12	1.90	0.53
1:C:60:THR:O	1:C:167:GLN:HG2	2.09	0.53
1:C:247:GLU:OE2	1:D:285:LYS:HE3	2.10	0.52
1:A:281[A]:MET:CE	1:B:275:VAL:CG1	2.88	0.51
1:B:41:HIS:HE1	7:B:501:HOH:O	1.93	0.51
2:C:301[B]:XM6:N2	2:C:301[B]:XM6:N3	2.58	0.51
1:D:121:HIS:HD2	7:D:477:HOH:O	1.92	0.51
1:A:51:ASN:HD22	1:A:89:ASN:HD22	1.59	0.50
1:B:51:ASN:HD22	1:B:89:ASN:HD22	1.58	0.50
1:B:201:PRO:HB3	1:B:281[B]:MET:SD	2.52	0.49
1:C:62:PRO:O	1:C:121:HIS:HE1	1.95	0.49
1:D:298:PHE:O	1:D:299:GLN:HB2	2.12	0.49
1:D:291:LYS:NZ	6:D:303:GOL:H11	2.28	0.49
1:D:62:PRO:O	1:D:121:HIS:HE1	1.95	0.49
1:D:291:LYS:HZ2	6:D:303:GOL:H11	1.77	0.49
1:C:199:THR:OG1	1:D:201:PRO:HD3	2.13	0.49
1:C:291:LYS:NZ	3:C:304:EDO:H22	2.28	0.49
1:B:62:PRO:O	1:B:121:HIS:HE1	1.96	0.48
1:C:120:SER:O	1:C:162:ALA:HA	2.13	0.48
2:A:301[B]:XM6:N2	2:A:301[B]:XM6:N3	2.61	0.48
2:A:301[A]:XM6:N2	2:A:301[A]:XM6:N3	2.61	0.48
1:C:51:ASN:HD22	1:C:89:ASN:ND2	2.11	0.48
1:A:62:PRO:O	1:A:121:HIS:HE1	1.96	0.48
1:B:158:PHE:HB2	1:B:208:MET:SD	2.54	0.48
1:C:298:PHE:O	1:C:299:GLN:HB2	2.12	0.48
1:A:120:SER:O	1:A:162:ALA:HA	2.13	0.48
1:D:120:SER:O	1:D:162:ALA:HA	2.13	0.48
1:B:120:SER:O	1:B:162:ALA:HA	2.13	0.48
1:A:158:PHE:HB2	1:A:208:MET:SD	2.54	0.47
1:C:201:PRO:HD3	1:D:199:THR:OG1	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:51:ASN:HD22	1:D:89:ASN:ND2	2.11	0.47
1:D:158:PHE:HB2	1:D:208:MET:SD	2.55	0.47
1:C:158:PHE:HB2	1:C:208:MET:SD	2.55	0.47
1:A:201:PRO:HB3	1:A:281[B]:MET:SD	2.55	0.47
1:B:51:ASN:HD22	1:B:89:ASN:ND2	2.12	0.46
1:B:57:TRP:HB3	3:B:302:EDO:H22	1.97	0.46
2:C:301[A]:XM6:N2	2:C:301[A]:XM6:N3	2.62	0.46
1:A:51:ASN:HD22	1:A:89:ASN:ND2	2.13	0.46
1:D:99:LYS:HA	1:D:99:LYS:HE3	1.97	0.45
1:D:118:PHE:CZ	1:D:139:LEU:HD13	2.51	0.45
1:C:118:PHE:CZ	1:C:139:LEU:HD13	2.51	0.45
1:A:281[B]:MET:HG3	1:B:277:CYS:HB3	1.99	0.44
1:D:239:TYR:HB3	1:D:243:LEU:HD22	1.99	0.44
1:B:52:HIS:HD2	7:B:424:HOH:O	2.00	0.44
1:A:239:TYR:HB3	1:A:243:LEU:HD22	1.99	0.44
1:A:188:ASN:HD22	1:A:223:VAL:N	2.08	0.43
1:A:281[A]:MET:HE3	1:B:275:VAL:HG12	2.00	0.43
1:B:239:TYR:HB3	1:B:243:LEU:HD22	1.99	0.43
1:C:126:HIS:HB3	1:C:133:LYS:HB2	2.00	0.43
1:C:239:TYR:HB3	1:C:243:LEU:HD22	2.00	0.43
1:A:275:VAL:CG1	1:B:281[A]:MET:CE	2.96	0.43
1:A:281[A]:MET:CE	1:B:275:VAL:HG12	2.49	0.43
1:D:126:HIS:HB3	1:D:133:LYS:HB2	2.00	0.42
1:A:277:CYS:HB3	1:B:281[B]:MET:HG3	2.00	0.42
1:B:118:PHE:CZ	1:B:139:LEU:HD13	2.55	0.41
1:A:118:PHE:CZ	1:A:139:LEU:HD13	2.56	0.41
1:A:121:HIS:CD2	7:A:494:HOH:O	2.68	0.40
1:A:200:LEU:H	1:A:200:LEU:HG	1.75	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	243/299 (81%)	233 (96%)	9 (4%)	1 (0%)	34	41
1	B	242/299 (81%)	232 (96%)	9 (4%)	1 (0%)	34	41
1	C	251/299 (84%)	240 (96%)	10 (4%)	1 (0%)	34	41
1	D	249/299 (83%)	239 (96%)	8 (3%)	2 (1%)	19	23
All	All	985/1196 (82%)	944 (96%)	36 (4%)	5 (0%)	29	35

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	145	GLY
1	C	145	GLY
1	D	145	GLY
1	A	145	GLY
1	D	166	ASN

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	215/260 (83%)	210 (98%)	5 (2%)	50	66
1	B	214/260 (82%)	207 (97%)	7 (3%)	38	52
1	C	222/260 (85%)	218 (98%)	4 (2%)	59	74
1	D	221/260 (85%)	218 (99%)	3 (1%)	67	80
All	All	872/1040 (84%)	853 (98%)	19 (2%)	52	68

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	VAL
1	A	125	ASN
1	A	127	ILE
1	A	146	ASP
1	A	200	LEU
1	B	106	VAL

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Mol	Chain	Res	Type
1	B	127	ILE
1	B	146	ASP
1	B	166	ASN
1	B	167	GLN
1	B	200	LEU
1	B	265	LYS
1	C	106	VAL
1	C	166	ASN
1	C	200	LEU
1	C	296	LEU
1	D	106	VAL
1	D	146	ASP
1	D	200	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	41	HIS
1	A	52	HIS
1	A	89	ASN
1	A	101	HIS
1	A	121	HIS
1	A	188	ASN
1	A	224	ASN
1	A	230	GLN
1	B	41	HIS
1	B	89	ASN
1	B	101	HIS
1	B	121	HIS
1	B	224	ASN
1	B	230	GLN
1	C	41	HIS
1	C	89	ASN
1	C	121	HIS
1	C	167	GLN
1	C	224	ASN
1	C	230	GLN
1	C	293	ASN
1	C	295	ASN
1	D	41	HIS
1	D	52	HIS
1	D	89	ASN

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Mol	Chain	Res	Type
1	D	121	HIS
1	D	166	ASN
1	D	230	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 1 is monoatomic - leaving 13 for Mogul analysis.

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	EDO	C	302	-	3,3,3	0.17	0	2,2,2	0.21	0
3	EDO	D	301	-	3,3,3	0.04	0	2,2,2	0.24	0
2	XM6	A	301[B]	-	24,24,24	1.35	2 (8%)	31,32,32	1.98	7 (22%)
3	EDO	B	302	-	3,3,3	0.09	0	2,2,2	0.29	0
2	XM6	C	301[B]	-	24,24,24	1.48	3 (12%)	31,32,32	1.94	6 (19%)
2	XM6	A	301[A]	-	24,24,24	1.40	2 (8%)	31,32,32	1.87	6 (19%)
2	XM6	C	301[A]	-	24,24,24	1.53	3 (12%)	31,32,32	2.05	10 (32%)
3	EDO	B	301	-	3,3,3	0.05	0	2,2,2	0.15	0
4	PEG	B	303	-	6,6,6	0.30	0	5,5,5	0.23	0
3	EDO	A	302	-	3,3,3	0.42	0	2,2,2	0.58	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	GOL	D	303	-	5,5,5	0.14	0	5,5,5	0.57	0
3	EDO	C	304	-	3,3,3	0.23	0	2,2,2	0.84	0
3	EDO	C	303	-	3,3,3	0.12	0	2,2,2	0.21	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	C	302	-	-	0/1/1/1	-
3	EDO	D	301	-	-	1/1/1/1	-
2	XM6	A	301[B]	-	-	0/9/9/9	0/3/3/3
3	EDO	B	302	-	-	1/1/1/1	-
2	XM6	C	301[B]	-	-	0/9/9/9	0/3/3/3
2	XM6	A	301[A]	-	-	0/9/9/9	0/3/3/3
2	XM6	C	301[A]	-	-	0/9/9/9	0/3/3/3
3	EDO	B	301	-	-	1/1/1/1	-
4	PEG	B	303	-	-	1/4/4/4	-
3	EDO	A	302	-	-	0/1/1/1	-
6	GOL	D	303	-	-	2/4/4/4	-
3	EDO	C	304	-	-	1/1/1/1	-
3	EDO	C	303	-	-	0/1/1/1	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301[A]	XM6	C1-N2	4.59	1.41	1.34
2	C	301[A]	XM6	C1-N2	4.42	1.41	1.34
2	C	301[B]	XM6	C1-N2	4.39	1.41	1.34
2	A	301[B]	XM6	C1-N2	4.30	1.41	1.34
2	C	301[A]	XM6	C10-C11	3.98	1.44	1.37
2	C	301[B]	XM6	C10-C11	3.59	1.44	1.37
2	A	301[B]	XM6	C10-C11	2.95	1.42	1.37
2	C	301[A]	XM6	C9-C10	2.34	1.43	1.38
2	A	301[A]	XM6	C10-C11	2.33	1.41	1.37
2	C	301[B]	XM6	C9-C10	2.06	1.42	1.38

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301[A]	XM6	C5-C1-N2	-6.40	118.76	121.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301[B]	XM6	C5-C1-N2	-6.23	118.84	121.84
2	C	301[B]	XM6	C5-C1-N2	-5.79	119.06	121.84
2	C	301[A]	XM6	C5-C1-N2	-5.38	119.25	121.84
2	C	301[A]	XM6	F-C11-C10	4.82	126.73	118.54
2	A	301[B]	XM6	C14-N3-C6	3.60	122.28	117.23
2	C	301[B]	XM6	F-C11-C10	3.48	124.45	118.54
2	C	301[A]	XM6	C10-C11-C12	-3.48	118.77	123.29
2	A	301[B]	XM6	F-C11-C12	-3.35	113.47	118.25
2	A	301[B]	XM6	F-C11-C10	3.30	124.14	118.54
2	C	301[B]	XM6	C7-N2-C1	-3.28	118.82	123.14
2	C	301[B]	XM6	C10-C11-C12	-3.10	119.26	123.29
2	A	301[A]	XM6	C14-N3-C6	3.09	121.56	117.23
2	A	301[B]	XM6	C9-C8-C13	2.78	121.12	118.16
2	C	301[A]	XM6	C4-C5-C1	2.65	119.43	117.46
2	C	301[A]	XM6	C14-N3-C6	2.64	120.93	117.23
2	C	301[A]	XM6	F-C11-C12	-2.63	114.50	118.25
2	C	301[B]	XM6	C4-C5-C1	2.60	119.39	117.46
2	C	301[B]	XM6	C14-N3-C6	2.54	120.80	117.23
2	C	301[A]	XM6	C9-C10-C11	2.49	120.94	118.36
2	A	301[B]	XM6	C10-C9-C8	-2.45	118.16	121.39
2	A	301[A]	XM6	C7-N2-C1	-2.36	120.04	123.14
2	C	301[A]	XM6	C12-C13-C8	2.23	123.34	120.70
2	A	301[B]	XM6	C15-C14-N3	-2.19	119.85	123.43
2	A	301[A]	XM6	F-C11-C12	-2.15	115.19	118.25
2	A	301[A]	XM6	C9-C8-C13	2.13	120.43	118.16
2	C	301[A]	XM6	C2-N1-C1	2.11	120.94	116.77
2	A	301[A]	XM6	C15-C16-C17	-2.07	117.03	120.19
2	C	301[A]	XM6	C7-N2-C1	-2.00	120.51	123.14

There are no chirality outliers.

All (7) torsion outliers are listed below:

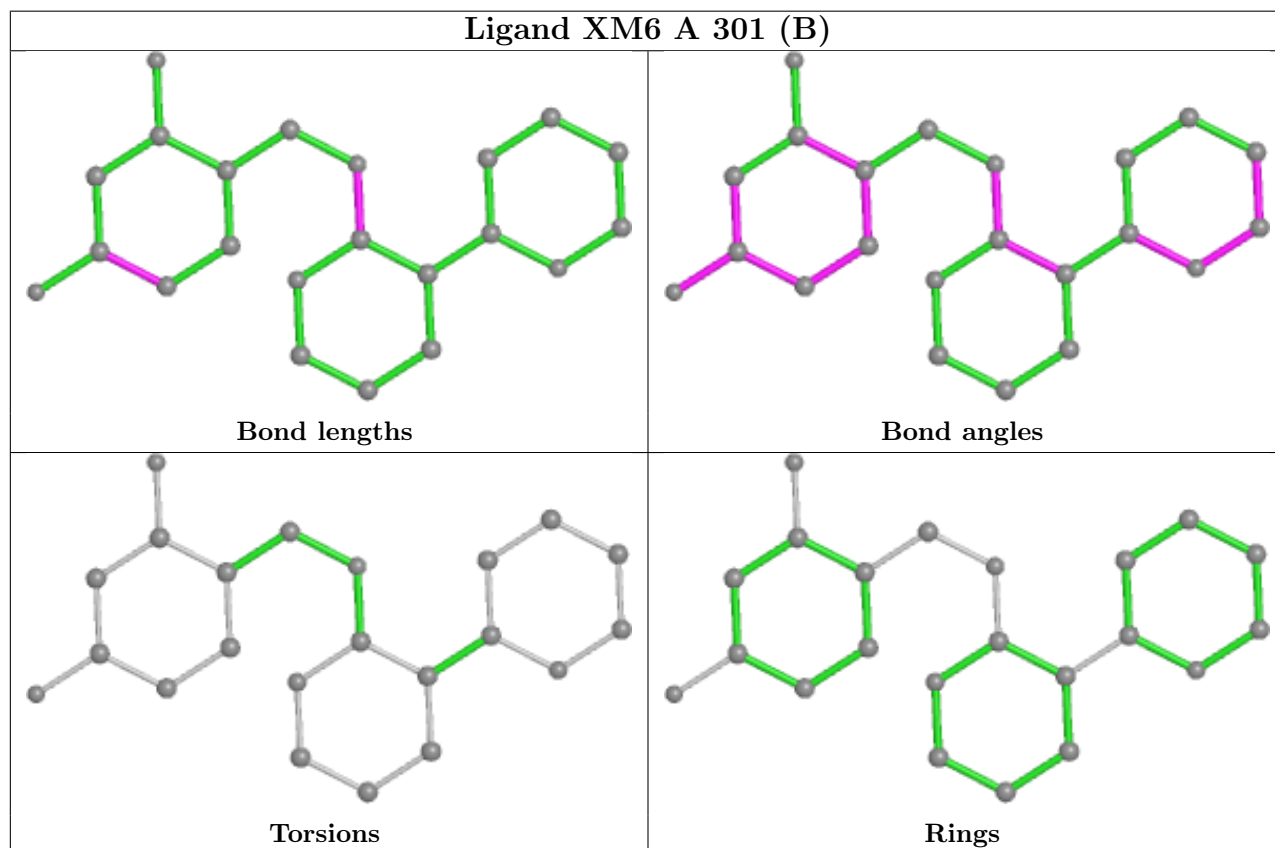
Mol	Chain	Res	Type	Atoms
6	D	303	GOL	C1-C2-C3-O3
4	B	303	PEG	O1-C1-C2-O2
6	D	303	GOL	O2-C2-C3-O3
3	B	302	EDO	O1-C1-C2-O2
3	D	301	EDO	O1-C1-C2-O2
3	C	304	EDO	O1-C1-C2-O2
3	B	301	EDO	O1-C1-C2-O2

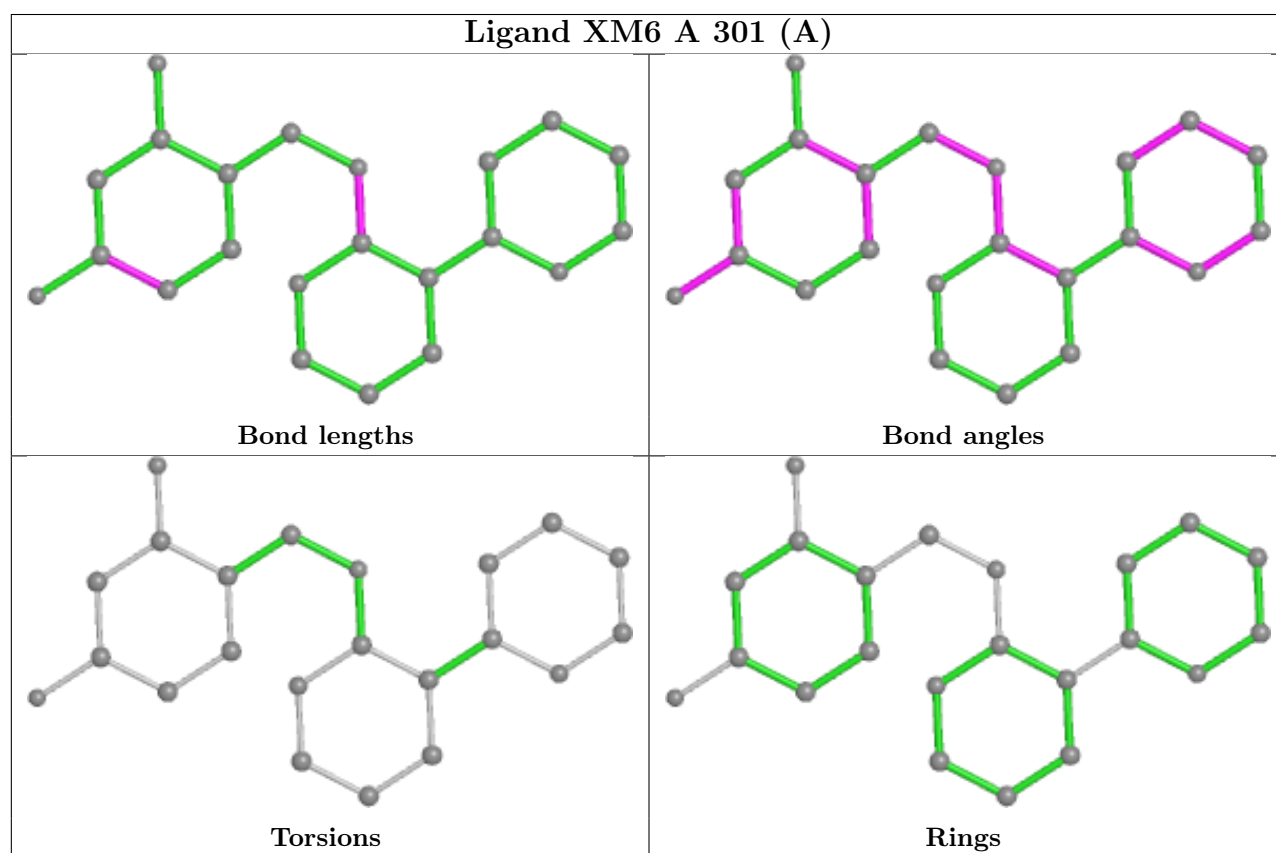
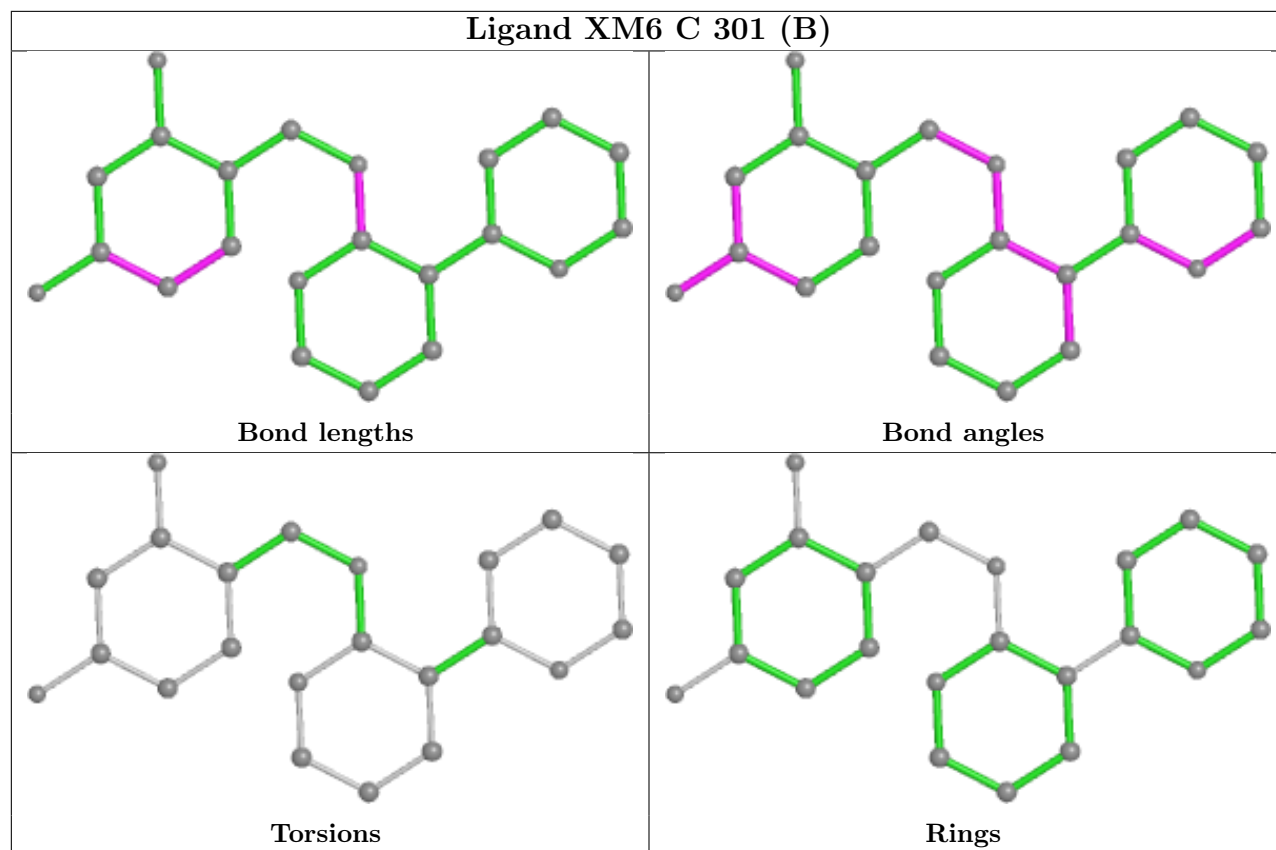
There are no ring outliers.

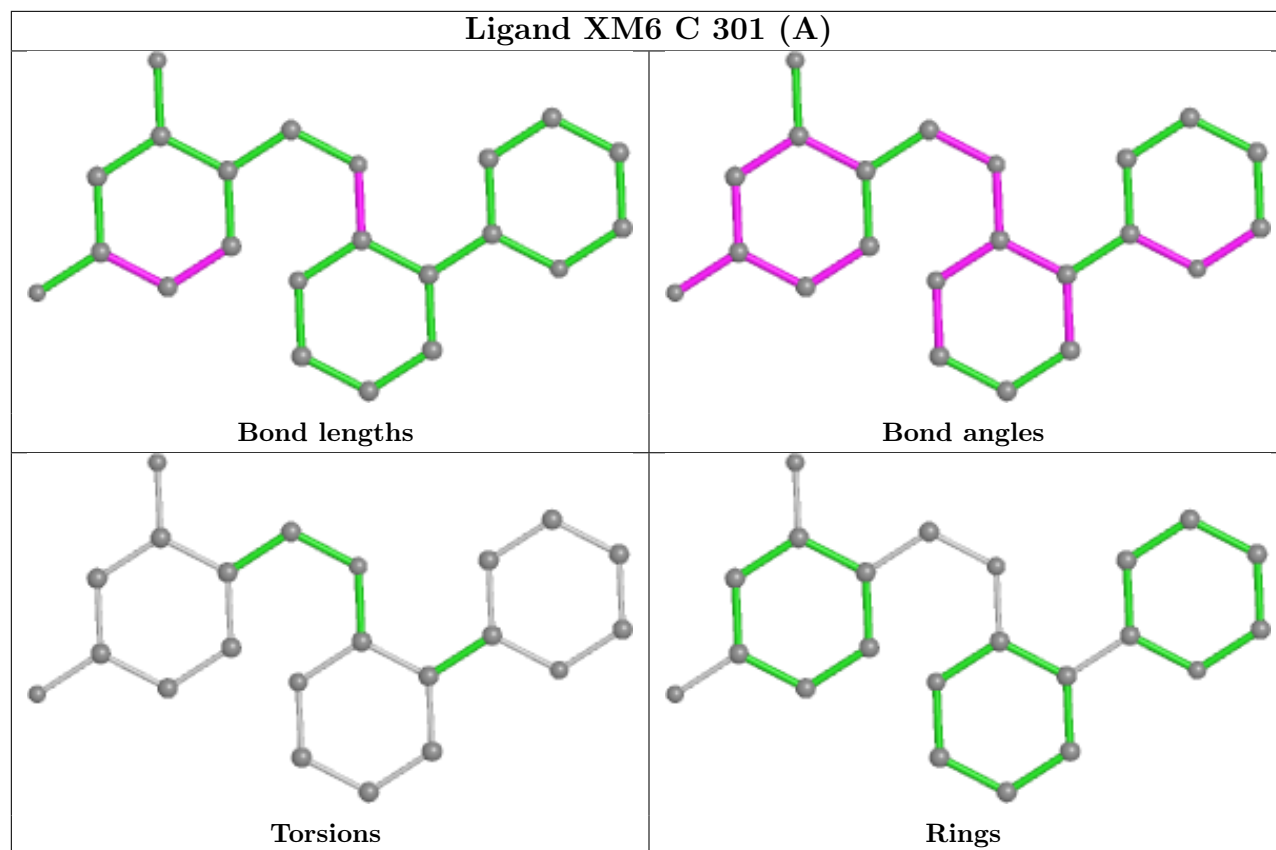
8 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	301	EDO	1	0
2	A	301[B]	XM6	1	0
3	B	302	EDO	1	0
2	C	301[B]	XM6	1	0
2	A	301[A]	XM6	1	0
2	C	301[A]	XM6	1	0
6	D	303	GOL	2	0
3	C	304	EDO	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 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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	245/299 (81%)	-0.24	0 100 100	49, 61, 104, 152	0
1	B	244/299 (81%)	-0.22	0 100 100	49, 61, 103, 140	0
1	C	254/299 (84%)	-0.25	1 (0%) 92 95	50, 62, 115, 179	0
1	D	253/299 (84%)	-0.24	3 (1%) 79 83	49, 62, 114, 172	0
All	All	996/1196 (83%)	-0.24	4 (0%) 92 95	49, 61, 111, 179	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	295	ASN	4.1
1	D	295	ASN	3.5
1	D	167	GLN	3.0
1	D	294	GLU	2.3

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](#)

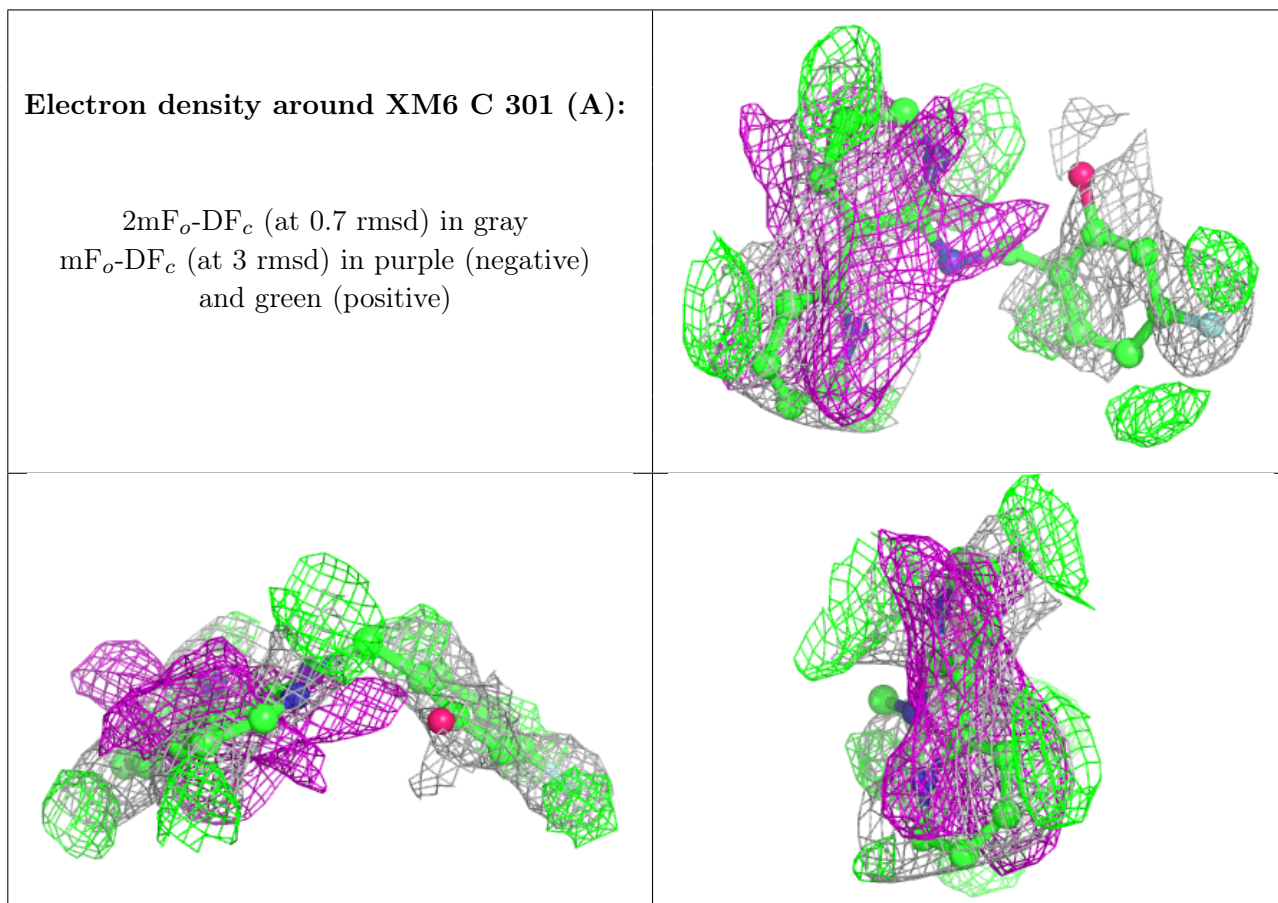
There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

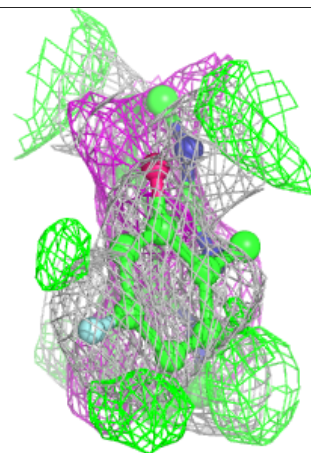
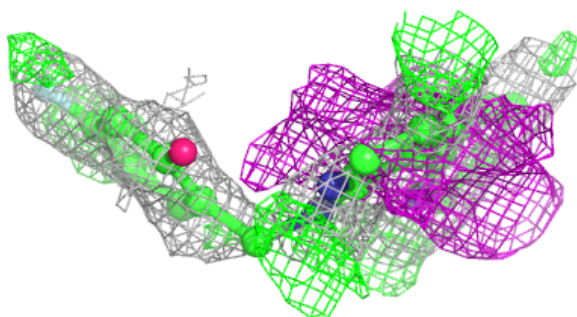
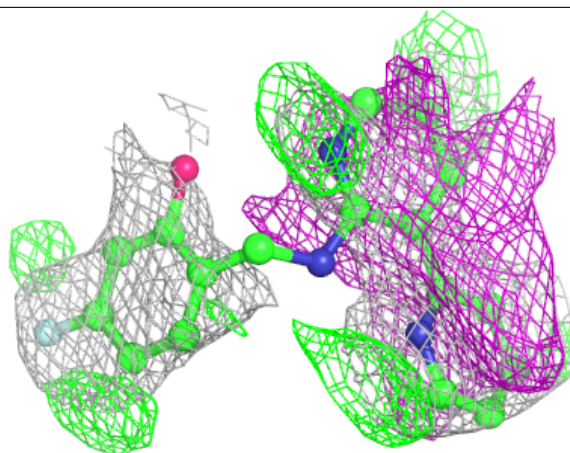
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	XM6	C	301[A]	22/22	0.60	0.42	47,96,114,119	22
2	XM6	C	301[B]	22/22	0.60	0.42	47,84,100,105	22
2	XM6	A	301[A]	22/22	0.72	0.30	45,64,73,75	22
2	XM6	A	301[B]	22/22	0.72	0.30	45,70,81,86	22
3	EDO	A	302	4/4	0.79	0.24	86,104,107,108	0
3	EDO	D	301	4/4	0.82	0.25	104,107,114,117	0
3	EDO	C	304	4/4	0.83	0.17	83,84,90,101	0
3	EDO	C	302	4/4	0.84	0.14	84,92,100,104	0
3	EDO	B	302	4/4	0.85	0.11	109,113,113,115	0
3	EDO	C	303	4/4	0.89	0.07	103,109,109,110	0
3	EDO	B	301	4/4	0.91	0.11	97,99,105,106	0
6	GOL	D	303	6/6	0.91	0.25	86,92,97,117	0
5	CL	D	302	1/1	0.94	0.08	86,86,86,86	0
4	PEG	B	303	7/7	0.94	0.25	112,120,130,136	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.

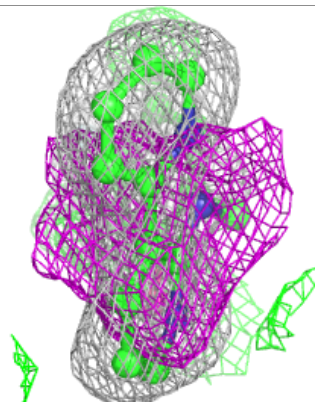
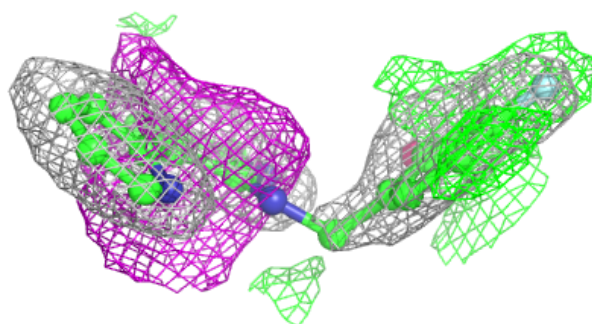
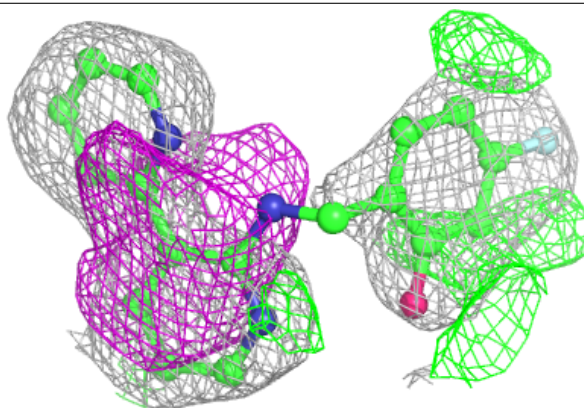


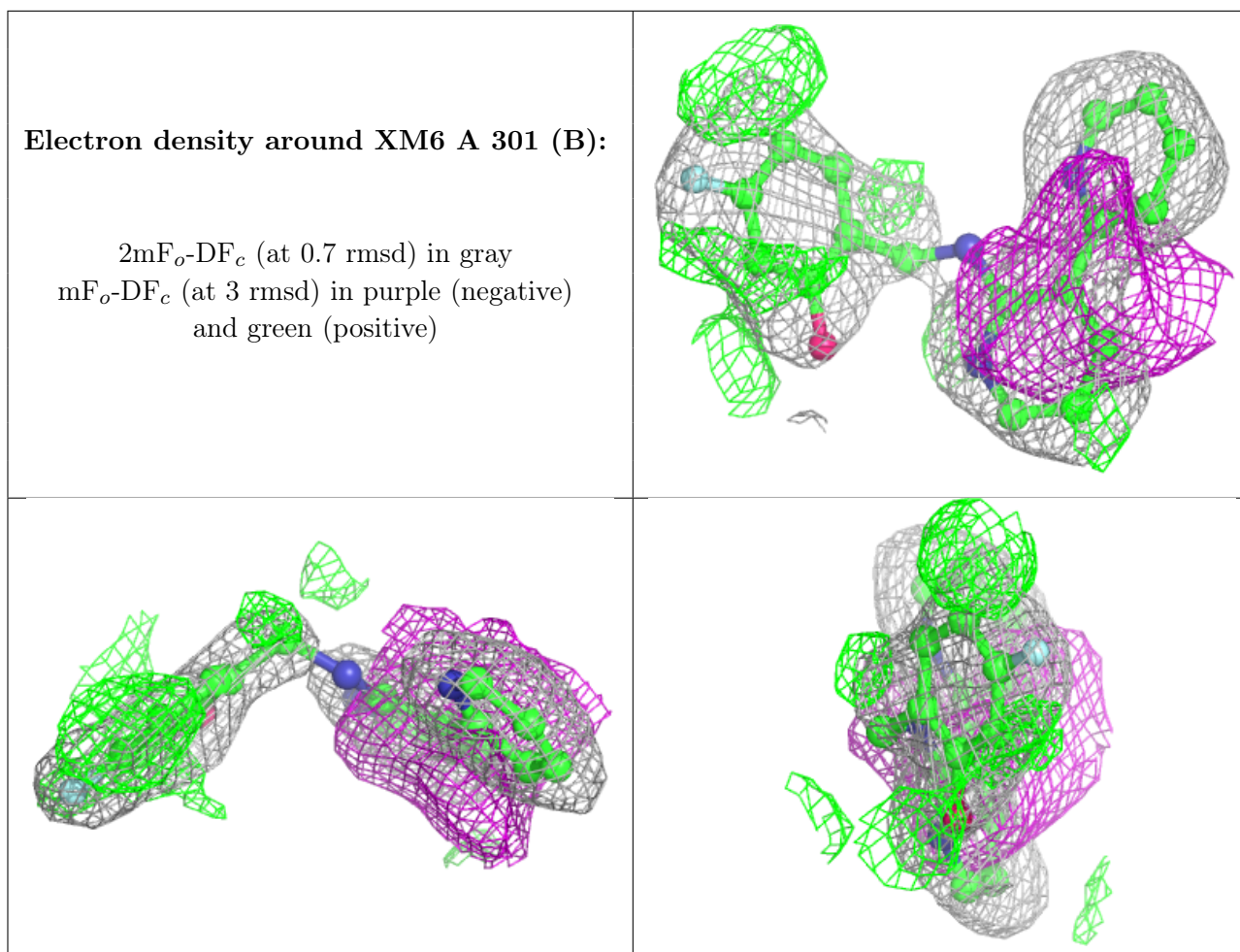
Electron density around XM6 C 301 (B):

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

**Electron density around XM6 A 301 (A):**

$2mF_o-DF_c$ (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.