



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 20, 2024 – 04:11 AM EST

PDB ID : 4MMD  
Title : Crystal structure of LeuBAT (delta6 mutant) in complex with (S)-duloxetine  
Authors : Wang, H.; Gouaux, E.  
Deposited on : 2013-09-08  
Resolution : 2.30 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 : 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

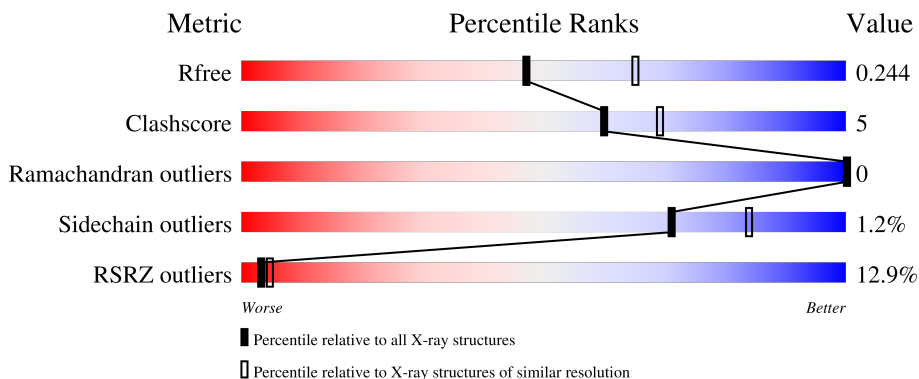
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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  $\geq 3$ , 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	519	 13% 85% 12%
1	B	519	 13% 87% 10%

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8247 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 Transporter.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	504	4011	2719	627	653	12	0	0	0
1	B	504	4011	2719	627	653	12	0	0	0

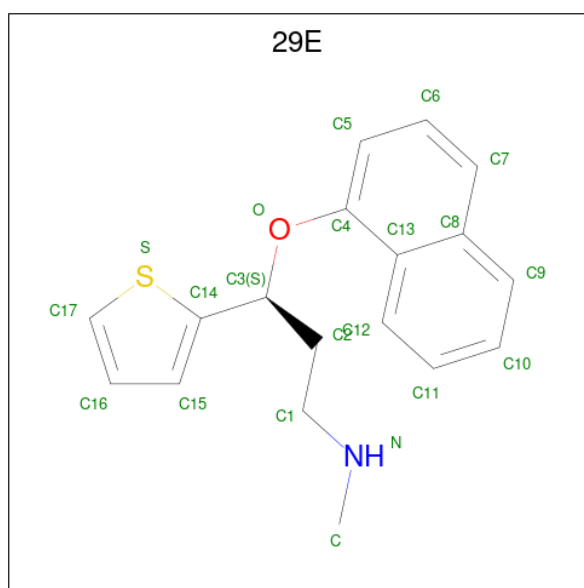
There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	21	TYR	ASN	engineered mutation	UNP O67854
A	24	ASP	GLY	engineered mutation	UNP O67854
A	254	SER	THR	engineered mutation	UNP O67854
A	256	GLY	SER	engineered mutation	UNP O67854
A	265	PHE	TYR	engineered mutation	UNP O67854
A	359	GLY	ILE	engineered mutation	UNP O67854
A	514	GLY	-	expression tag	UNP O67854
A	515	THR	-	expression tag	UNP O67854
A	516	LEU	-	expression tag	UNP O67854
A	517	VAL	-	expression tag	UNP O67854
A	518	PRO	-	expression tag	UNP O67854
A	519	ARG	-	expression tag	UNP O67854
B	21	TYR	ASN	engineered mutation	UNP O67854
B	24	ASP	GLY	engineered mutation	UNP O67854
B	254	SER	THR	engineered mutation	UNP O67854
B	256	GLY	SER	engineered mutation	UNP O67854
B	265	PHE	TYR	engineered mutation	UNP O67854
B	359	GLY	ILE	engineered mutation	UNP O67854
B	514	GLY	-	expression tag	UNP O67854
B	515	THR	-	expression tag	UNP O67854
B	516	LEU	-	expression tag	UNP O67854
B	517	VAL	-	expression tag	UNP O67854
B	518	PRO	-	expression tag	UNP O67854
B	519	ARG	-	expression tag	UNP O67854

- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	2	Total Na 2 2	0	0
2	B	2	Total Na 2 2	0	0

- Molecule 3 is (3S)-N-methyl-3-(naphthalen-1-yloxy)-3-(thiophen-2-yl)propan-1-amine (three-letter code: 29E) (formula: C<sub>18</sub>H<sub>19</sub>NOS).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C N O S 21 18 1 1 1	0	0
3	B	1	Total C N O S 21 18 1 1 1	0	0

- Molecule 4 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: C<sub>14</sub>H<sub>28</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0
4	A	1	Total C O 20 14 6	0	0

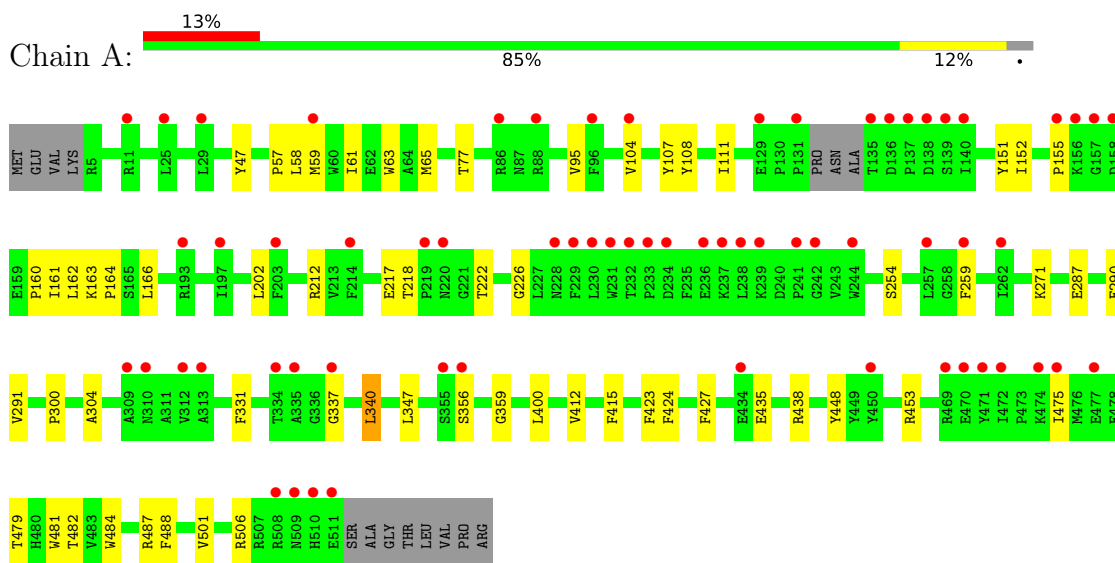
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	61	Total O 61 61	0	0
5	B	58	Total O 58 58	0	0

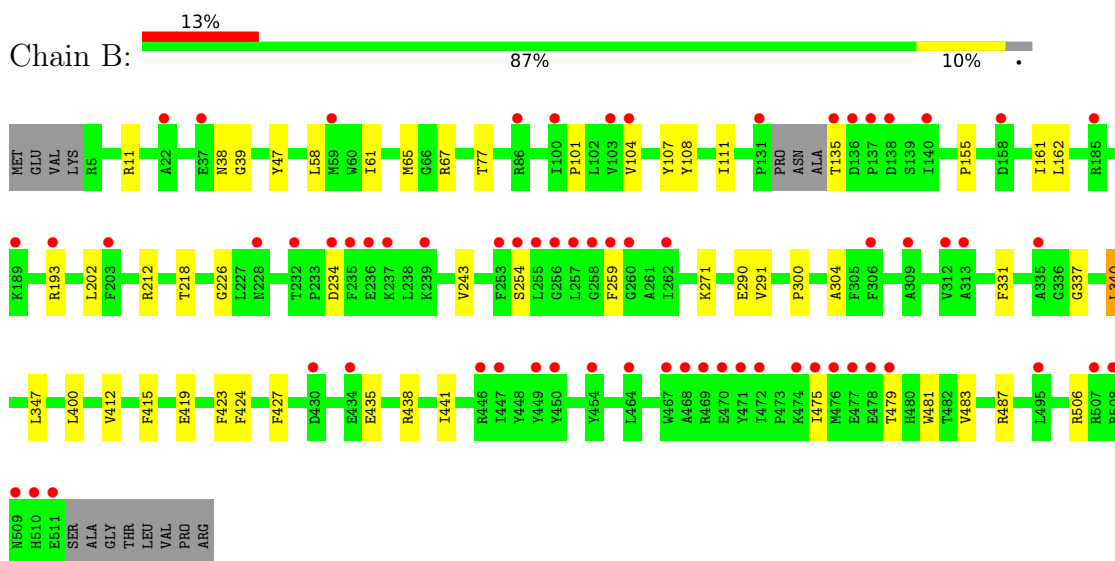
### 3 Residue-property plots [i](#)

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: Transporter



- Molecule 1: Transporter



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	84.41Å 92.21Å 88.31Å 90.00° 94.09° 90.00°	Depositor
Resolution (Å)	35.98 – 2.30 35.98 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.6 (35.98-2.30) 99.7 (35.98-2.30)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.46 (at 2.29Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: dev_1402)	Depositor
R, $R_{free}$	0.213 , 0.244 0.213 , 0.244	Depositor DCC
$R_{free}$ test set	3026 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	45.0	Xtrriage
Anisotropy	0.530	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 60.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.023 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	8247	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 20.13 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.3060e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 29E, NA, BOG

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	0/4138	0.43	0/5635
1	B	0.26	0/4138	0.42	0/5635
All	All	0.26	0/8276	0.43	0/11270

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4011	0	4085	42	0
1	B	4011	0	4085	35	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	21	0	19	4	0
3	B	21	0	19	5	0
4	A	60	0	84	9	0
5	A	61	0	0	2	0
5	B	58	0	0	2	0
All	All	8247	0	8292	76	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 (76) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:604:BOG:H6'1	1:B:161:ILE:HD12	1.68	0.74
1:A:163:LYS:HD2	4:A:605:BOG:O6	1.88	0.73
1:B:479:THR:HB	1:B:483:VAL:HG11	1.76	0.67
1:B:435:GLU:OE2	1:B:438:ARG:NH2	2.27	0.67
1:B:226:GLY:HA3	1:B:300:PRO:HA	1.78	0.64
1:A:155:PRO:HD3	1:A:162:LEU:HD23	1.81	0.63
1:B:271:LYS:O	1:B:438:ARG:NH1	2.32	0.62
1:B:108:TYR:CD2	3:B:603:29E:H19	2.35	0.62
1:B:135:THR:N	5:B:728:HOH:O	2.35	0.59
1:A:226:GLY:HA3	1:A:300:PRO:HA	1.84	0.59
1:B:155:PRO:HD3	1:B:162:LEU:HD23	1.85	0.59
1:A:108:TYR:CD1	3:A:603:29E:H12	2.40	0.57
1:A:161:ILE:HD11	1:B:481:TRP:CE3	2.40	0.57
1:A:271:LYS:O	1:A:438:ARG:NH1	2.37	0.56
1:A:218:THR:OG1	1:A:304:ALA:O	2.19	0.56
1:A:481:TRP:CE3	1:B:161:ILE:HD11	2.41	0.56
1:A:61:ILE:HG22	1:A:65:MET:HE2	1.86	0.56
1:A:479:THR:OG1	4:A:604:BOG:H61	2.07	0.55
1:B:475:ILE:HG22	1:B:487:ARG:HH21	1.72	0.53
1:B:61:ILE:HG22	1:B:65:MET:HE2	1.91	0.53
1:A:164:PRO:HG3	5:A:707:HOH:O	2.09	0.52
1:B:259:PHE:CE1	1:B:412:VAL:HG11	2.45	0.52
1:B:331:PHE:O	1:B:337:GLY:HA3	2.09	0.52
1:A:166:LEU:HA	4:A:605:BOG:O4	2.09	0.52
1:B:111:ILE:HD11	1:B:400:LEU:HD11	1.91	0.51
3:B:603:29E:H10	3:B:603:29E:H14	1.93	0.51
1:A:435:GLU:OE2	1:A:438:ARG:NH2	2.43	0.51
1:B:65:MET:HE1	1:B:419:GLU:HB3	1.93	0.51
1:A:217:GLU:HG2	1:A:222:THR:HG22	1.93	0.50
1:B:254:SER:OG	1:B:290:GLU:OE1	2.24	0.50
1:A:331:PHE:O	1:A:337:GLY:HA3	2.13	0.48
1:B:423:PHE:O	1:B:427:PHE:HB3	2.14	0.48
1:A:202:LEU:HD12	1:A:347:LEU:HD12	1.95	0.48
1:B:218:THR:OG1	1:B:304:ALA:O	2.28	0.48
1:B:77:THR:HG21	1:B:415:PHE:HZ	1.78	0.47
1:A:259:PHE:CZ	1:A:412:VAL:HG11	2.49	0.47
1:A:359:GLY:HA3	3:A:603:29E:C8	2.45	0.47
1:A:488:PHE:HB2	4:A:606:BOG:H8'2	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:202:LEU:HD12	1:B:347:LEU:HD12	1.97	0.46
1:A:259:PHE:HB3	3:A:603:29E:H19	1.98	0.46
1:A:111:ILE:HD11	1:A:400:LEU:HD11	1.98	0.46
1:B:67:ARG:NH2	1:B:435:GLU:O	2.48	0.46
1:B:101:PRO:CA	3:B:603:29E:H16	2.46	0.46
1:B:47:TYR:OH	1:B:290:GLU:OE2	2.20	0.45
1:B:506:ARG:HD3	1:B:506:ARG:HA	1.76	0.45
1:A:151:TYR:HD2	1:A:152:ILE:HD13	1.81	0.45
1:B:337:GLY:HA2	1:B:340:LEU:HB2	1.97	0.45
1:B:475:ILE:HG22	1:B:487:ARG:NH2	2.31	0.45
1:A:331:PHE:CE1	1:A:340:LEU:HD12	2.52	0.44
1:B:104:VAL:HA	1:B:107:TYR:CE2	2.52	0.44
1:A:254:SER:OG	1:A:290:GLU:OE1	2.28	0.44
1:A:47:TYR:OH	1:A:287:GLU:OE1	2.36	0.43
1:A:104:VAL:HA	1:A:107:TYR:CE2	2.54	0.43
1:A:57:PRO:HG3	1:A:448:TYR:CE2	2.53	0.43
1:A:160:PRO:HG2	1:A:482:THR:HG21	1.98	0.43
1:A:95:VAL:HG22	1:A:501:VAL:HG21	2.01	0.43
1:A:453:ARG:NH1	5:A:740:HOH:O	2.50	0.42
1:A:481:TRP:CZ3	1:B:161:ILE:HD11	2.53	0.42
1:B:108:TYR:CD2	3:B:603:29E:C6	3.00	0.42
1:A:155:PRO:HD3	1:A:162:LEU:CD2	2.49	0.42
1:A:259:PHE:CE1	1:A:412:VAL:HG11	2.54	0.42
1:A:356:SER:HA	3:A:603:29E:C11	2.50	0.42
1:A:164:PRO:O	4:A:605:BOG:H5	2.20	0.42
1:A:423:PHE:O	1:A:427:PHE:HB3	2.19	0.42
1:B:193:ARG:NH1	5:B:712:HOH:O	2.51	0.42
1:B:38:ASN:HB3	1:B:243:VAL:HG13	2.02	0.41
1:B:101:PRO:CB	3:B:603:29E:H16	2.50	0.41
1:A:484:TRP:CD1	4:A:604:BOG:H1'1	2.55	0.41
1:A:475:ILE:HG22	1:A:487:ARG:NH2	2.35	0.41
1:B:11:ARG:NH1	1:B:441:ILE:HD11	2.35	0.41
4:A:606:BOG:H1'2	4:A:606:BOG:H2	1.37	0.41
1:A:506:ARG:HD3	1:A:506:ARG:HA	1.66	0.41
1:B:39:GLY:HA2	1:B:234:ASP:HB3	2.01	0.41
1:A:59:MET:O	1:A:63:TRP:HD1	2.03	0.41
1:A:484:TRP:NE1	4:A:604:BOG:H1'1	2.36	0.40
1:A:77:THR:HG21	1:A:415:PHE:HZ	1.85	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	500/519 (96%)	488 (98%)	12 (2%)	0	100	100
1	B	500/519 (96%)	487 (97%)	13 (3%)	0	100	100
All	All	1000/1038 (96%)	975 (98%)	25 (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	406/419 (97%)	401 (99%)	5 (1%)	71	84
1	B	406/419 (97%)	401 (99%)	5 (1%)	71	84
All	All	812/838 (97%)	802 (99%)	10 (1%)	71	84

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	58	LEU
1	A	212	ARG
1	A	291	VAL
1	A	340	LEU
1	A	424	PHE
1	B	58	LEU
1	B	212	ARG
1	B	291	VAL

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Mol	Chain	Res	Type
1	B	340	LEU
1	B	424	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	361	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 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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
4	BOG	A	605	-	20,20,20	0.85	1 (5%)	25,25,25	2.50	10 (40%)
3	29E	B	603	-	23,23,23	1.33	3 (13%)	25,30,30	2.87	11 (44%)
4	BOG	A	606	-	20,20,20	1.16	2 (10%)	25,25,25	2.42	8 (32%)
4	BOG	A	604	-	20,20,20	0.59	0	25,25,25	1.49	2 (8%)
3	29E	A	603	-	23,23,23	1.46	4 (17%)	25,30,30	2.42	8 (32%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	BOG	A	605	-	-	9/11/31/31	0/1/1/1
3	29E	B	603	-	-	5/8/12/12	0/3/3/3
4	BOG	A	606	-	-	7/11/31/31	0/1/1/1
4	BOG	A	604	-	-	5/11/31/31	0/1/1/1
3	29E	A	603	-	-	1/8/12/12	0/3/3/3

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	603	29E	C14-C3	-3.75	1.48	1.51
3	B	603	29E	C13-C8	3.41	1.49	1.43
4	A	606	BOG	C4-C5	-3.08	1.46	1.53
3	A	603	29E	C13-C8	3.01	1.48	1.43
3	B	603	29E	C14-C3	-2.80	1.49	1.51
4	A	606	BOG	O3-C3	-2.34	1.37	1.43
4	A	605	BOG	O5-C5	-2.32	1.38	1.44
3	A	603	29E	C4-C13	2.25	1.48	1.42
3	A	603	29E	O-C3	-2.17	1.42	1.44
3	B	603	29E	C4-C13	2.05	1.48	1.42

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	603	29E	C16-C17-S	-8.04	106.46	112.98
3	A	603	29E	C16-C17-S	-6.82	107.44	112.98
3	B	603	29E	O-C4-C13	6.61	122.91	114.22
4	A	606	BOG	O3-C3-C4	-6.12	96.19	110.35
3	A	603	29E	O-C4-C13	4.89	120.65	114.22
4	A	605	BOG	O4-C4-C5	-4.88	97.19	109.30
4	A	605	BOG	O4-C4-C3	-4.77	99.32	110.35
3	A	603	29E	C15-C14-C3	-4.71	123.33	129.05
4	A	606	BOG	C1-O5-C5	-4.61	104.64	113.69
3	A	603	29E	C2-C3-C14	-4.53	104.00	112.48
4	A	606	BOG	C4-C3-C2	4.40	118.51	110.82
4	A	605	BOG	O2-C2-C3	-4.33	100.34	110.35
4	A	605	BOG	O5-C1-C2	4.27	119.39	110.35
4	A	606	BOG	O5-C5-C6	4.14	116.72	106.44
4	A	604	BOG	C1-O5-C5	-4.13	105.58	113.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	605	BOG	O5-C1-O1	-3.88	100.78	109.97
3	B	603	29E	C15-C14-C3	-3.85	124.37	129.05
3	B	603	29E	O-C3-C14	3.85	113.88	108.88
4	A	606	BOG	O3-C3-C2	-3.74	101.70	110.35
4	A	605	BOG	O5-C5-C6	3.67	115.56	106.44
4	A	606	BOG	C6-C5-C4	-3.43	104.97	113.00
3	B	603	29E	C11-C10-C9	3.16	124.86	120.44
4	A	605	BOG	O2-C2-C1	-2.78	103.28	110.05
3	B	603	29E	C2-C3-C14	-2.70	107.43	112.48
3	B	603	29E	C-N-C1	2.58	119.41	111.95
4	A	604	BOG	C3-C4-C5	-2.56	105.67	110.24
3	B	603	29E	C5-C4-C13	-2.50	116.77	121.15
3	B	603	29E	C10-C9-C8	-2.43	116.64	120.44
3	A	603	29E	C-N-C1	2.42	118.95	111.95
4	A	606	BOG	O1-C1-C2	2.40	112.05	108.30
4	A	605	BOG	O3-C3-C2	2.38	115.86	110.35
3	B	603	29E	O-C4-C5	-2.37	120.30	124.59
4	A	605	BOG	C1-C2-C3	2.32	114.83	110.00
4	A	605	BOG	C6-C5-C4	2.20	118.17	113.00
3	A	603	29E	O-C4-C5	-2.17	120.66	124.59
3	B	603	29E	C7-C6-C5	2.12	124.37	120.99
3	A	603	29E	C2-C1-N	-2.12	108.28	111.79
4	A	606	BOG	O4-C4-C5	2.04	114.36	109.30
3	A	603	29E	O-C3-C2	2.03	108.43	105.18

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	603	29E	C1-C2-C3-C14
3	B	603	29E	C1-C2-C3-O
3	B	603	29E	C13-C4-O-C3
3	B	603	29E	C5-C4-O-C3
4	A	605	BOG	C2-C1-O1-C1'
4	A	605	BOG	O5-C1-O1-C1'
4	A	606	BOG	C2-C1-O1-C1'
4	A	606	BOG	O5-C1-O1-C1'
4	A	605	BOG	O5-C5-C6-O6
4	A	605	BOG	C4-C5-C6-O6
4	A	605	BOG	O1-C1'-C2'-C3'
4	A	604	BOG	C3'-C4'-C5'-C6'
4	A	606	BOG	C3'-C4'-C5'-C6'

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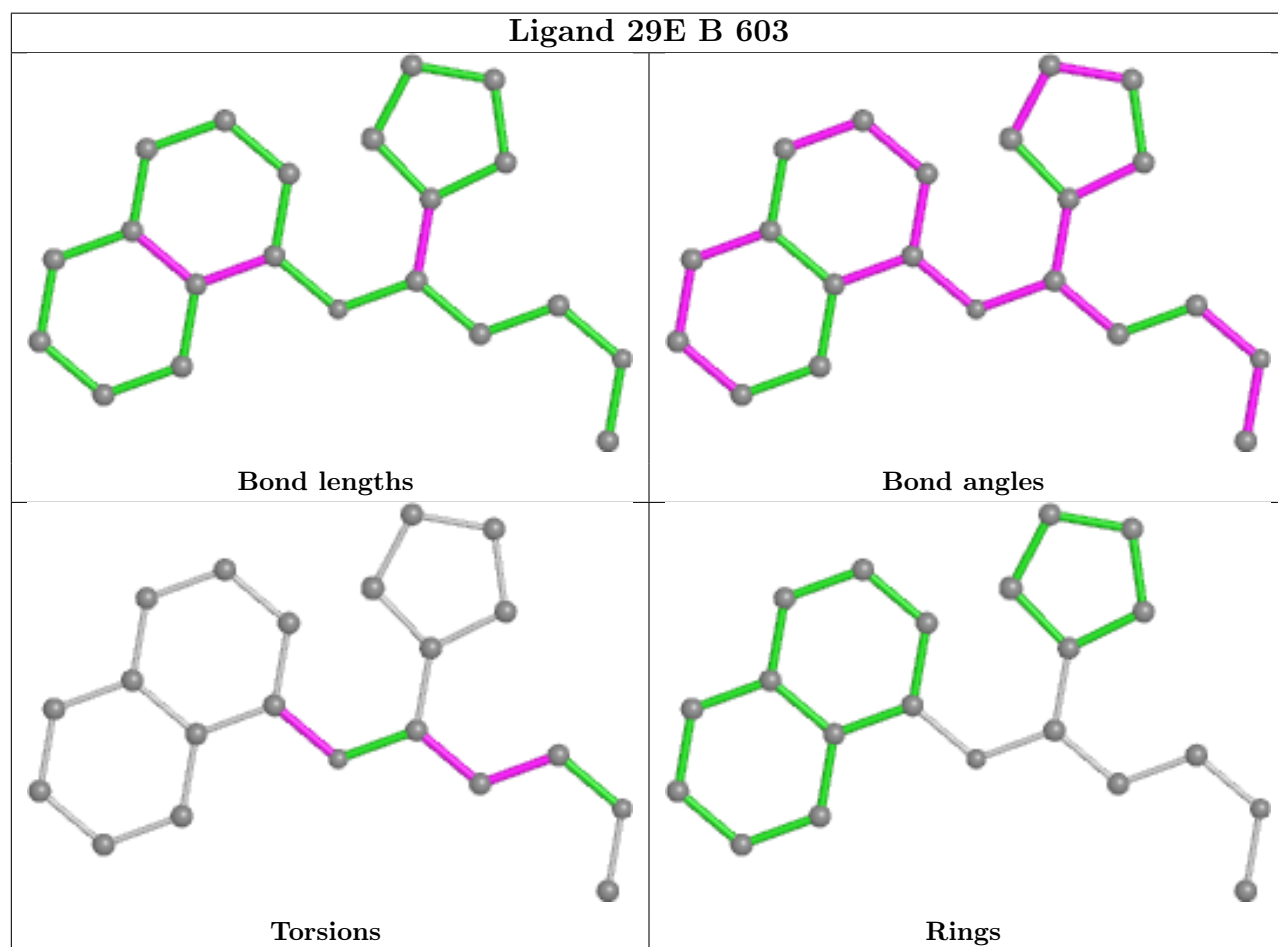
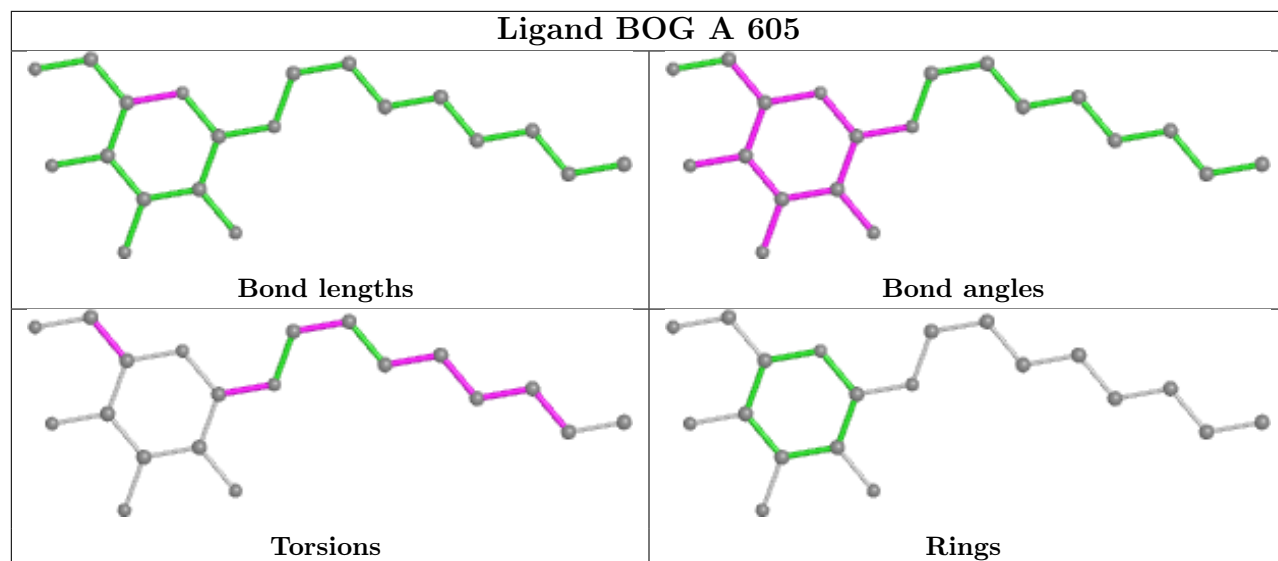
Mol	Chain	Res	Type	Atoms
4	A	606	BOG	C1'-C2'-C3'-C4'
4	A	604	BOG	C4'-C5'-C6'-C7'
4	A	606	BOG	C4'-C5'-C6'-C7'
4	A	606	BOG	O5-C5-C6-O6
4	A	606	BOG	C2'-C3'-C4'-C5'
4	A	605	BOG	C5'-C6'-C7'-C8'
3	B	603	29E	N-C1-C2-C3
4	A	604	BOG	C2'-C3'-C4'-C5'
4	A	605	BOG	C3'-C4'-C5'-C6'
4	A	605	BOG	C2'-C3'-C4'-C5'
4	A	604	BOG	C5'-C6'-C7'-C8'
3	A	603	29E	C2-C1-N-C
4	A	605	BOG	C4'-C5'-C6'-C7'
4	A	604	BOG	O5-C1-O1-C1'

There are no ring outliers.

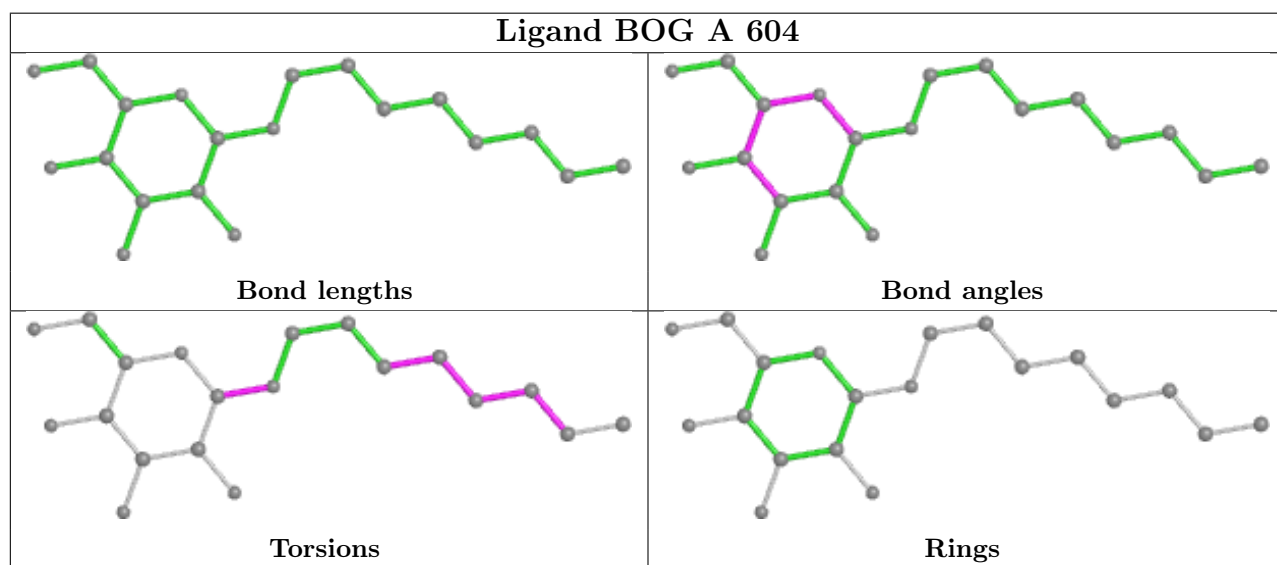
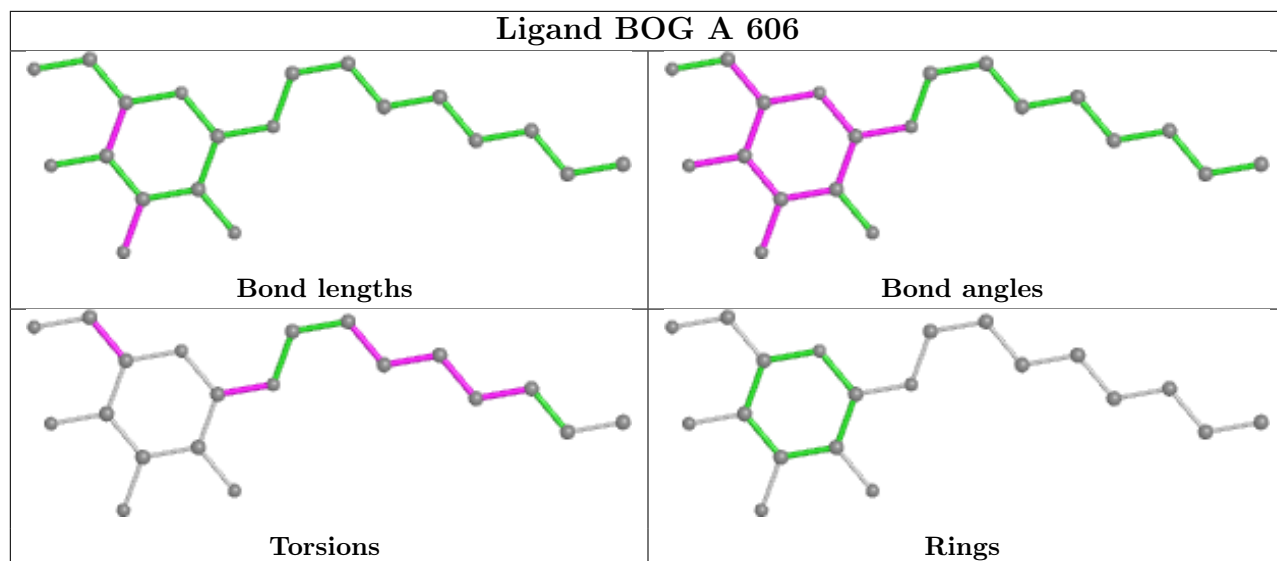
5 monomers are involved in 18 short contacts:

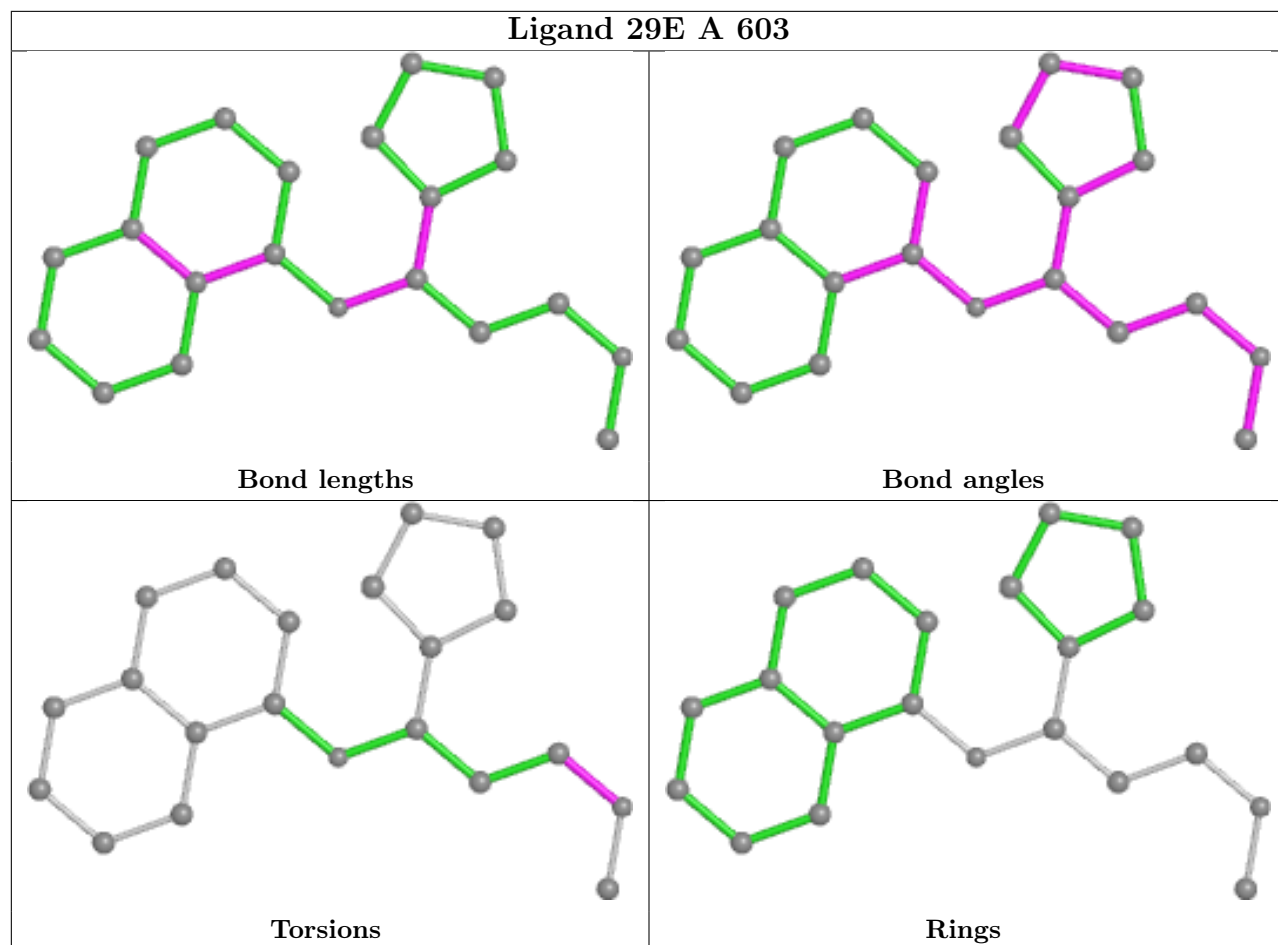
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	605	BOG	3	0
3	B	603	29E	5	0
4	A	606	BOG	2	0
4	A	604	BOG	4	0
3	A	603	29E	4	0

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

### 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, 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	504/519 (97%)	0.58	65 (12%) <b>3</b> <b>5</b>	31, 50, 82, 108	0
1	B	504/519 (97%)	0.61	65 (12%) <b>3</b> <b>5</b>	29, 49, 88, 113	0
All	All	1008/1038 (97%)	0.59	130 (12%) <b>3</b> <b>5</b>	29, 50, 86, 113	0

All (130) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	478	GLU	10.9
1	B	471	TYR	10.6
1	A	137	PRO	9.3
1	B	472	ILE	9.1
1	B	479	THR	8.3
1	B	476	MET	7.5
1	A	135	THR	7.1
1	B	446	ARG	6.7
1	B	474	LYS	6.7
1	B	450	TYR	6.3
1	B	475	ILE	6.2
1	A	138	ASP	6.1
1	A	156	LYS	5.9
1	A	158	ASP	5.8
1	A	157	GLY	5.8
1	A	472	ILE	5.4
1	A	136	ASP	5.3
1	B	467	TRP	5.3
1	A	510	HIS	5.3
1	A	140	ILE	5.2
1	A	219	PRO	5.0
1	A	475	ILE	5.1
1	A	131	PRO	5.0
1	A	474	LYS	4.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	131	PRO	4.8
1	A	312	VAL	4.7
1	B	510	HIS	4.6
1	A	228	ASN	4.5
1	B	232	THR	4.4
1	A	511	GLU	4.3
1	B	136	ASP	4.2
1	B	508	ARG	4.1
1	B	511	GLU	4.1
1	B	255	LEU	4.0
1	B	158	ASP	3.9
1	B	447	ILE	3.9
1	B	257	LEU	3.8
1	B	509	ASN	3.8
1	B	135	THR	3.8
1	B	454	TYR	3.8
1	A	450	TYR	3.7
1	A	220	ASN	3.6
1	A	241	PRO	3.5
1	A	309	ALA	3.5
1	A	233	PRO	3.5
1	B	104	VAL	3.4
1	A	471	TYR	3.4
1	B	259	PHE	3.3
1	B	470	GLU	3.3
1	B	137	PRO	3.3
1	A	257	LEU	3.3
1	A	231	TRP	3.3
1	A	193	ARG	3.2
1	A	25	LEU	3.2
1	A	104	VAL	3.2
1	A	238	LEU	3.2
1	A	139	SER	3.1
1	A	236	GLU	3.1
1	B	468	ALA	3.1
1	A	229	PHE	3.0
1	B	22	ALA	3.0
1	A	234	ASP	3.0
1	A	96	PHE	3.0
1	B	469	ARG	2.9
1	B	239	LYS	2.9
1	B	477	GLU	2.9

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	509	ASN	2.9
1	B	193	ARG	2.9
1	A	334	THR	2.8
1	B	430	ASP	2.8
1	A	244	TRP	2.8
1	B	237	LYS	2.8
1	B	253	PHE	2.8
1	B	464	LEU	2.7
1	B	236	GLU	2.7
1	A	508	ARG	2.7
1	B	185	ARG	2.7
1	B	138	ASP	2.7
1	B	313	ALA	2.6
1	A	86	ARG	2.6
1	A	203	PHE	2.6
1	A	242	GLY	2.6
1	A	477	GLU	2.5
1	B	449	TYR	2.5
1	B	260	GLY	2.5
1	A	214	PHE	2.5
1	A	11	ARG	2.5
1	A	356	SER	2.5
1	B	309	ALA	2.5
1	A	197	ILE	2.5
1	B	234	ASP	2.5
1	A	259	PHE	2.4
1	B	434	GLU	2.4
1	A	237	LYS	2.4
1	B	507	ARG	2.4
1	B	86	ARG	2.4
1	B	37	GLU	2.4
1	A	239	LYS	2.3
1	A	29	LEU	2.3
1	A	335	ALA	2.3
1	B	103	VAL	2.3
1	A	155	PRO	2.3
1	B	59	MET	2.3
1	A	232	THR	2.3
1	B	258	GLY	2.3
1	A	262	ILE	2.3
1	A	337	GLY	2.2
1	A	310	ASN	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	140	ILE	2.2
1	B	203	PHE	2.2
1	A	230	LEU	2.2
1	B	235	PHE	2.2
1	B	254	SER	2.2
1	B	256	GLY	2.2
1	A	129	GLU	2.1
1	A	313	ALA	2.1
1	A	355	SER	2.1
1	A	434	GLU	2.1
1	B	335	ALA	2.1
1	B	306	PHE	2.1
1	B	262	ILE	2.1
1	A	59	MET	2.1
1	B	100	ILE	2.1
1	A	470	GLU	2.1
1	B	312	VAL	2.1
1	A	88	ARG	2.0
1	B	189	LYS	2.0
1	B	495	LEU	2.0
1	B	228	ASN	2.0
1	A	469	ARG	2.0

## 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, 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.

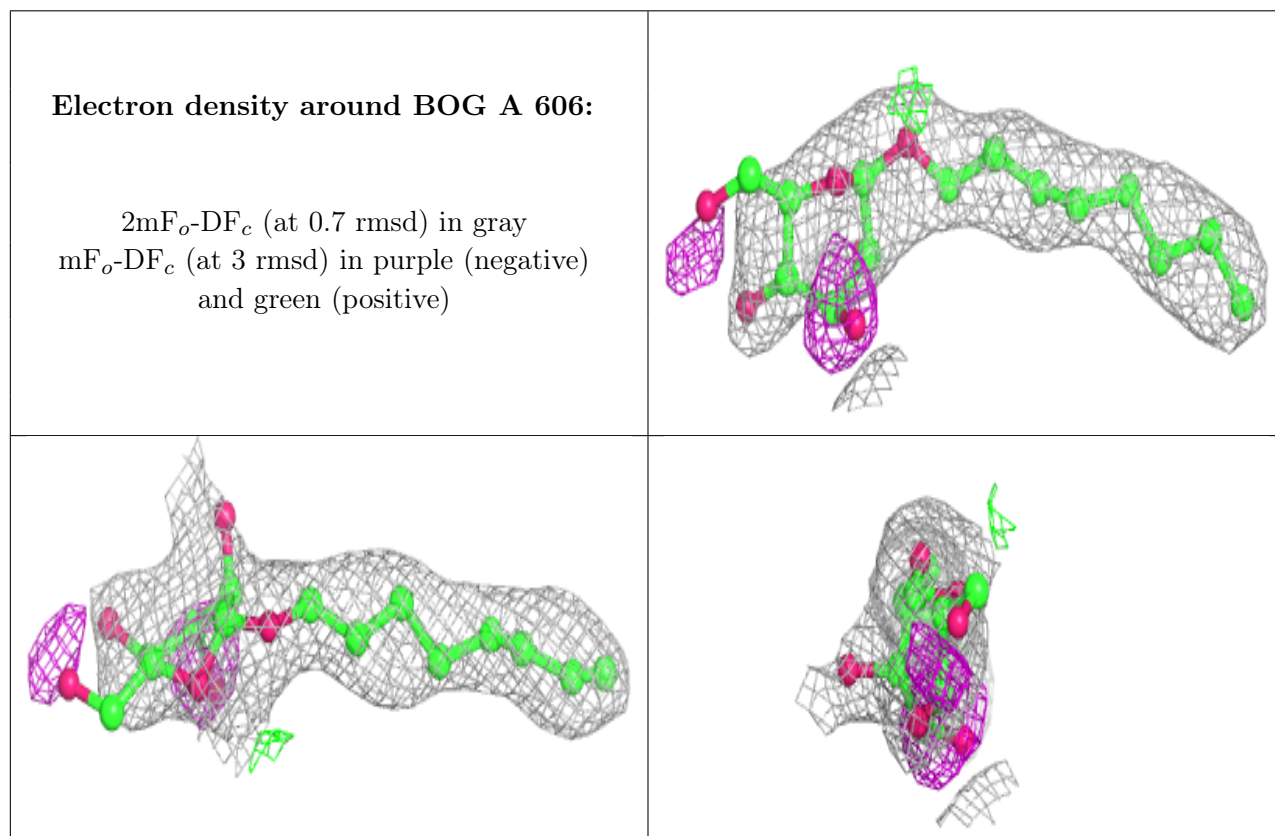
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	BOG	A	606	20/20	0.71	0.36	36,71,86,88	0

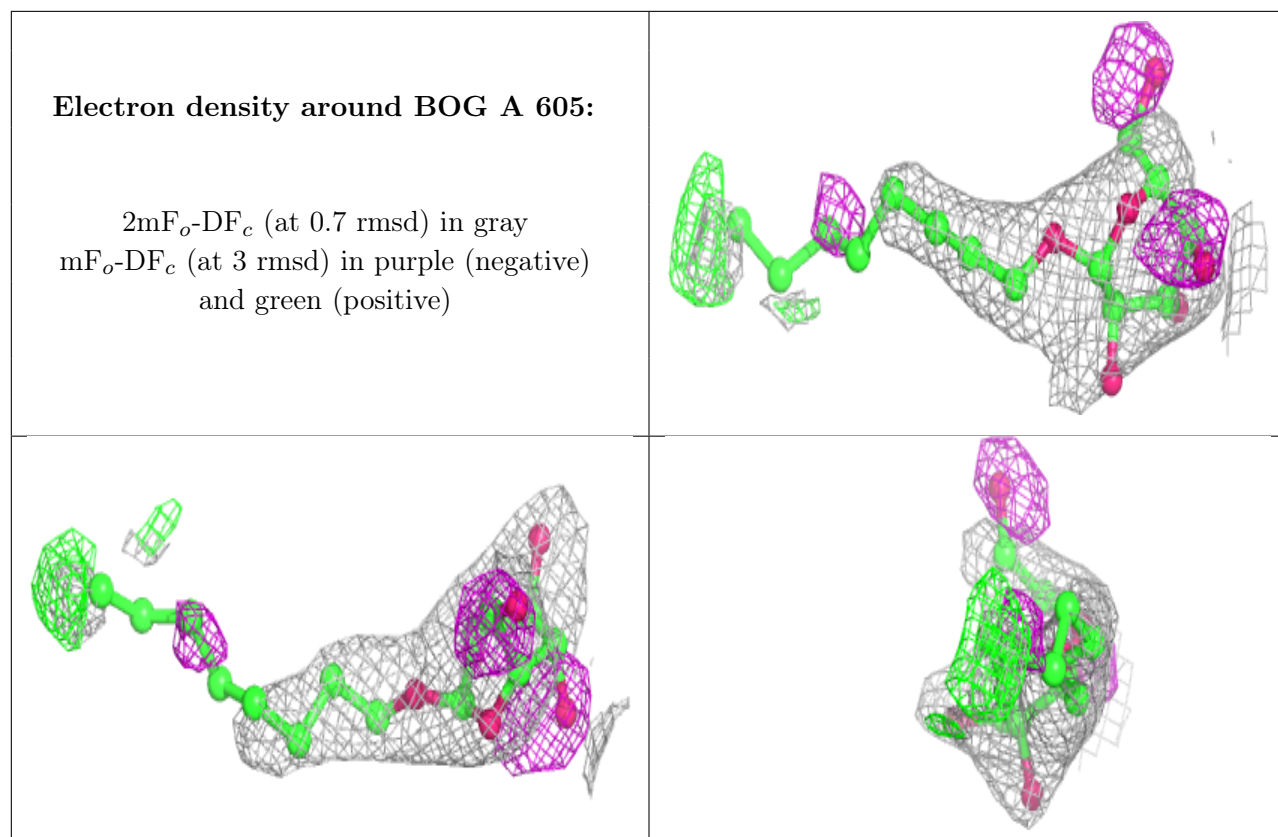
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NA	B	602	1/1	0.80	0.20	49,49,49,49	0
4	BOG	A	605	20/20	0.81	0.49	55,69,87,89	0
3	29E	B	603	21/21	0.86	0.31	40,51,58,86	0
3	29E	A	603	21/21	0.90	0.23	38,49,68,89	0
4	BOG	A	604	20/20	0.92	0.18	35,56,72,73	0
2	NA	B	601	1/1	0.93	0.13	38,38,38,38	0
2	NA	A	602	1/1	0.97	0.16	48,48,48,48	0
2	NA	A	601	1/1	0.97	0.11	39,39,39,39	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.

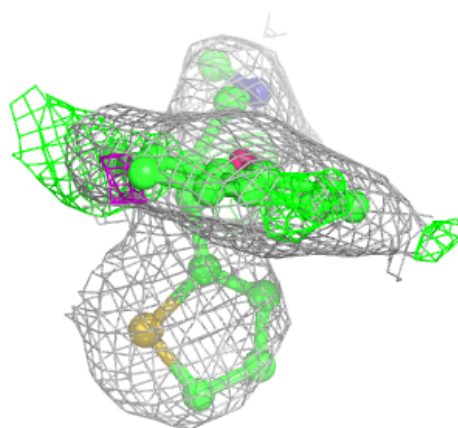
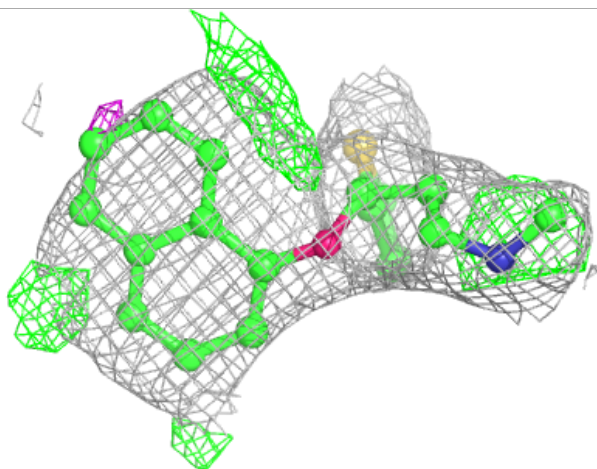
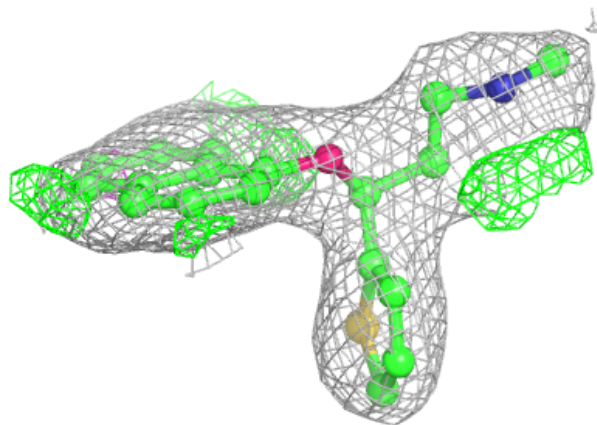






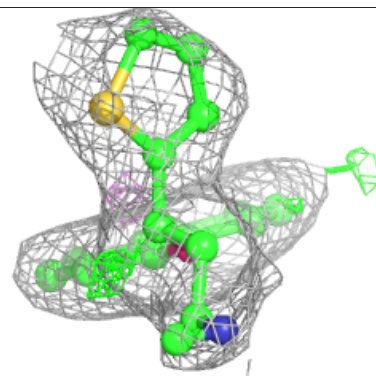
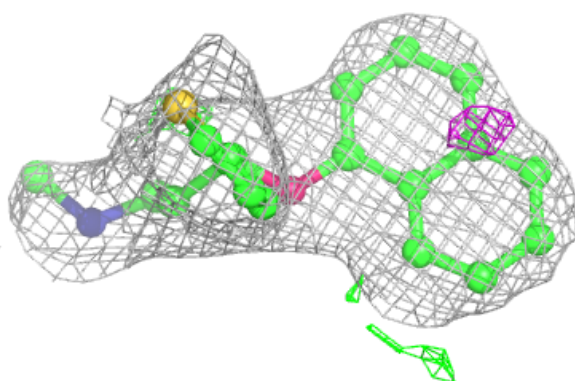
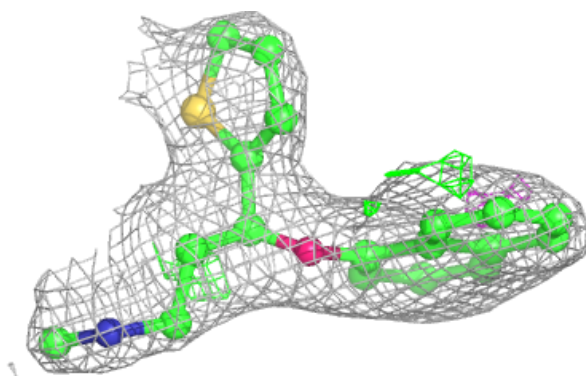
**Electron density around 29E B 603:**

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

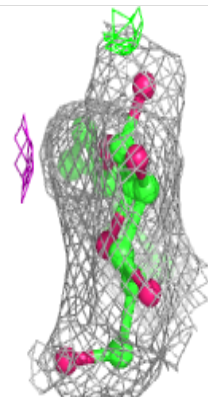
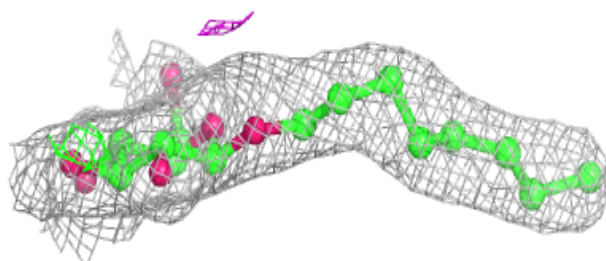
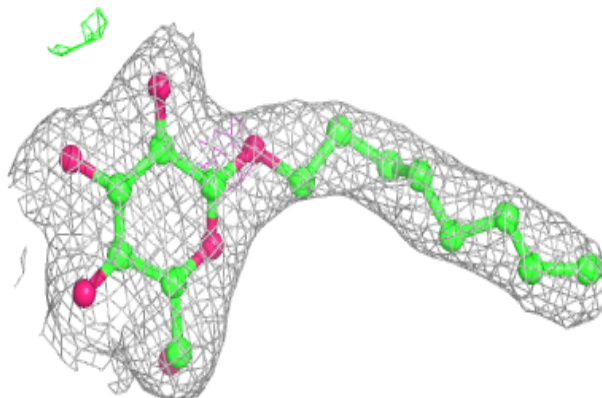


**Electron density around 29E A 603:**

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

**Electron density around BOG A 604:**

$2mF_o-DF_c$  (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.