



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 04:03 AM EDT

PDB ID : 6PQI  
Title : Crystal Structure of Class D Beta-lactamase OXA-48 with Cefotaxime  
Authors : Akhtar, A.; Chen, Y.  
Deposited on : 2019-07-09  
Resolution : 2.05 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)

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<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 : 2.35.1  
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) : 2.35.1

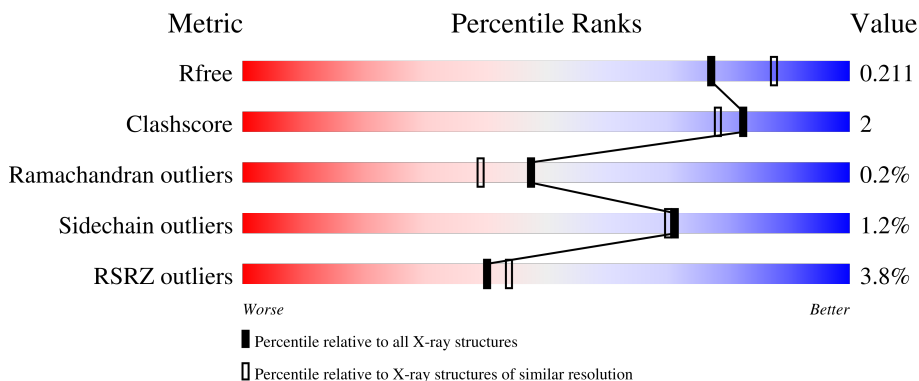
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.05 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	1692 (2.04-2.04)
Clashscore	141614	1773 (2.04-2.04)
Ramachandran outliers	138981	1752 (2.04-2.04)
Sidechain outliers	138945	1752 (2.04-2.04)
RSRZ outliers	127900	1672 (2.04-2.04)

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	263	 4% 87% 7% 6%
1	B	263	 2% 84% 9% 7%
1	C	263	 3% 87% 7% 6%
1	D	263	 5% 84% 8% 7%

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 8460 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 Class D Carbapenemase OXA-48.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	247	Total 2029	C 1294	N 357	O 371	S 7	0	1	0
1	B	245	Total 2007	C 1281	N 353	O 366	S 7	0	0	0
1	C	248	Total 2032	C 1296	N 357	O 372	S 7	0	0	0
1	D	244	Total 2002	C 1277	N 354	O 364	S 7	0	1	0

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	MET	-	initiating methionine	UNP A0A482LRD5
A	4	LYS	-	expression tag	UNP A0A482LRD5
A	5	HIS	-	expression tag	UNP A0A482LRD5
A	6	HIS	-	expression tag	UNP A0A482LRD5
A	7	HIS	-	expression tag	UNP A0A482LRD5
A	8	HIS	-	expression tag	UNP A0A482LRD5
A	9	HIS	-	expression tag	UNP A0A482LRD5
A	10	HIS	-	expression tag	UNP A0A482LRD5
A	11	MET	-	expression tag	UNP A0A482LRD5
A	12	HIS	-	expression tag	UNP A0A482LRD5
A	13	HIS	-	expression tag	UNP A0A482LRD5
A	14	HIS	-	expression tag	UNP A0A482LRD5
A	15	HIS	-	expression tag	UNP A0A482LRD5
A	16	HIS	-	expression tag	UNP A0A482LRD5
A	17	HIS	-	expression tag	UNP A0A482LRD5
A	18	GLU	-	expression tag	UNP A0A482LRD5
A	19	ASN	-	expression tag	UNP A0A482LRD5
A	20	LEU	-	expression tag	UNP A0A482LRD5
A	21	TYR	-	expression tag	UNP A0A482LRD5
A	22	PHE	-	expression tag	UNP A0A482LRD5
A	23	GLN	-	expression tag	UNP A0A482LRD5

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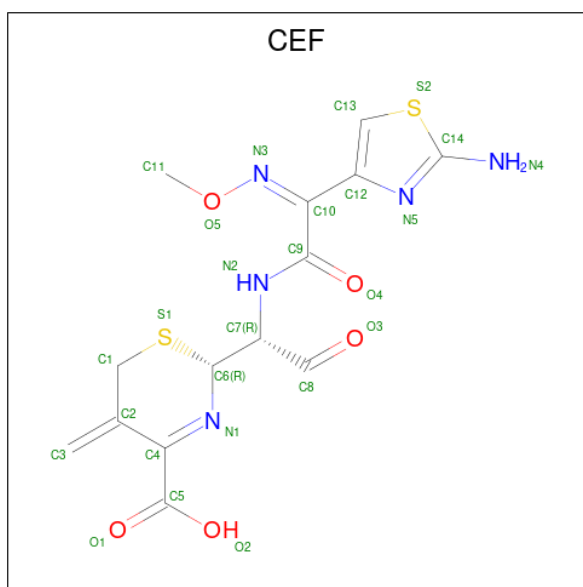
Chain	Residue	Modelled	Actual	Comment	Reference
A	24	GLY	-	expression tag	UNP A0A482LRD5
B	3	MET	-	initiating methionine	UNP A0A482LRD5
B	4	LYS	-	expression tag	UNP A0A482LRD5
B	5	HIS	-	expression tag	UNP A0A482LRD5
B	6	HIS	-	expression tag	UNP A0A482LRD5
B	7	HIS	-	expression tag	UNP A0A482LRD5
B	8	HIS	-	expression tag	UNP A0A482LRD5
B	9	HIS	-	expression tag	UNP A0A482LRD5
B	10	HIS	-	expression tag	UNP A0A482LRD5
B	11	MET	-	expression tag	UNP A0A482LRD5
B	12	HIS	-	expression tag	UNP A0A482LRD5
B	13	HIS	-	expression tag	UNP A0A482LRD5
B	14	HIS	-	expression tag	UNP A0A482LRD5
B	15	HIS	-	expression tag	UNP A0A482LRD5
B	16	HIS	-	expression tag	UNP A0A482LRD5
B	17	HIS	-	expression tag	UNP A0A482LRD5
B	18	GLU	-	expression tag	UNP A0A482LRD5
B	19	ASN	-	expression tag	UNP A0A482LRD5
B	20	LEU	-	expression tag	UNP A0A482LRD5
B	21	TYR	-	expression tag	UNP A0A482LRD5
B	22	PHE	-	expression tag	UNP A0A482LRD5
B	23	GLN	-	expression tag	UNP A0A482LRD5
B	24	GLY	-	expression tag	UNP A0A482LRD5
C	3	MET	-	initiating methionine	UNP A0A482LRD5
C	4	LYS	-	expression tag	UNP A0A482LRD5
C	5	HIS	-	expression tag	UNP A0A482LRD5
C	6	HIS	-	expression tag	UNP A0A482LRD5
C	7	HIS	-	expression tag	UNP A0A482LRD5
C	8	HIS	-	expression tag	UNP A0A482LRD5
C	9	HIS	-	expression tag	UNP A0A482LRD5
C	10	HIS	-	expression tag	UNP A0A482LRD5
C	11	MET	-	expression tag	UNP A0A482LRD5
C	12	HIS	-	expression tag	UNP A0A482LRD5
C	13	HIS	-	expression tag	UNP A0A482LRD5
C	14	HIS	-	expression tag	UNP A0A482LRD5
C	15	HIS	-	expression tag	UNP A0A482LRD5
C	16	HIS	-	expression tag	UNP A0A482LRD5
C	17	HIS	-	expression tag	UNP A0A482LRD5
C	18	GLU	-	expression tag	UNP A0A482LRD5
C	19	ASN	-	expression tag	UNP A0A482LRD5
C	20	LEU	-	expression tag	UNP A0A482LRD5
C	21	TYR	-	expression tag	UNP A0A482LRD5

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Chain	Residue	Modelled	Actual	Comment	Reference
C	22	PHE	-	expression tag	UNP A0A482LRD5
C	23	GLN	-	expression tag	UNP A0A482LRD5
C	24	GLY	-	expression tag	UNP A0A482LRD5
D	3	MET	-	initiating methionine	UNP A0A482LRD5
D	4	LYS	-	expression tag	UNP A0A482LRD5
D	5	HIS	-	expression tag	UNP A0A482LRD5
D	6	HIS	-	expression tag	UNP A0A482LRD5
D	7	HIS	-	expression tag	UNP A0A482LRD5
D	8	HIS	-	expression tag	UNP A0A482LRD5
D	9	HIS	-	expression tag	UNP A0A482LRD5
D	10	HIS	-	expression tag	UNP A0A482LRD5
D	11	MET	-	expression tag	UNP A0A482LRD5
D	12	HIS	-	expression tag	UNP A0A482LRD5
D	13	HIS	-	expression tag	UNP A0A482LRD5
D	14	HIS	-	expression tag	UNP A0A482LRD5
D	15	HIS	-	expression tag	UNP A0A482LRD5
D	16	HIS	-	expression tag	UNP A0A482LRD5
D	17	HIS	-	expression tag	UNP A0A482LRD5
D	18	GLU	-	expression tag	UNP A0A482LRD5
D	19	ASN	-	expression tag	UNP A0A482LRD5
D	20	LEU	-	expression tag	UNP A0A482LRD5
D	21	TYR	-	expression tag	UNP A0A482LRD5
D	22	PHE	-	expression tag	UNP A0A482LRD5
D	23	GLN	-	expression tag	UNP A0A482LRD5
D	24	GLY	-	expression tag	UNP A0A482LRD5

- Molecule 2 is CEFOTAXIME, C3' cleaved, open, bound form (three-letter code: CEF) (formula: C<sub>14</sub>H<sub>15</sub>N<sub>5</sub>O<sub>5</sub>S<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
2	A	1	Total	C	N	O	S	0	0
			26	14	5	5	2		
2	B	1	Total	C	N	O	S	0	0
			26	14	5	5	2		
2	C	1	Total	C	N	O	S	0	0
			26	14	5	5	2		
2	D	1	Total	C	N	O	S	0	0
			26	14	5	5	2		

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



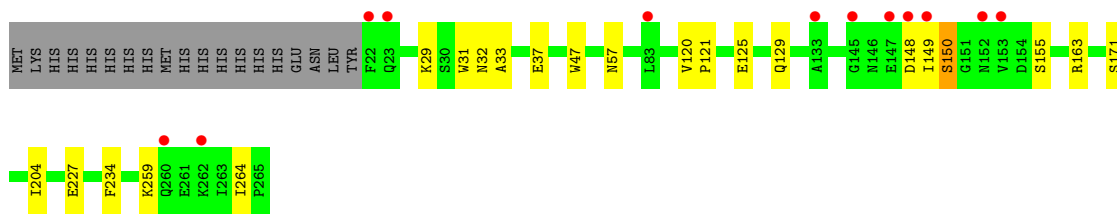
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	74	Total O 74 74	0	0
5	B	72	Total O 72 72	0	0
5	C	69	Total O 69 69	0	0
5	D	53	Total O 53 53	0	0







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	59.73Å 107.00Å 96.20Å 90.00° 104.17° 90.00°	Depositor
Resolution (Å)	41.64 – 2.05 41.64 – 2.04	Depositor EDS
% Data completeness (in resolution range)	98.2 (41.64-2.05) 98.3 (41.64-2.04)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.02 (at 2.05Å)	Xtrriage
Refinement program	PHENIX 1.16_3549	Depositor
R, $R_{free}$	0.182 , 0.212 0.182 , 0.211	Depositor DCC
$R_{free}$ test set	1995 reflections (2.72%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.0	Xtrriage
Anisotropy	0.403	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 49.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	8460	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 13.85% 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: CL, CEF, ACT

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	0.33	0/2080	0.41	0/2813
1	B	0.24	0/2058	0.41	0/2783
1	C	0.29	0/2083	0.41	0/2817
1	D	0.27	0/2053	0.42	0/2776
All	All	0.28	0/8274	0.41	0/11189

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	2029	0	1977	8	0
1	B	2007	0	1956	12	0
1	C	2032	0	1979	10	0
1	D	2002	0	1949	12	0
2	A	26	0	0	1	0
2	B	26	0	0	0	0
2	C	26	0	0	1	0
2	D	26	0	0	0	0
3	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	1	0	0	1	0
3	C	1	0	0	0	0
3	D	2	0	0	0	0
4	A	4	0	3	0	0
4	C	4	0	3	0	0
4	D	4	0	3	1	0
5	A	74	0	0	0	0
5	B	72	0	0	0	0
5	C	69	0	0	0	0
5	D	53	0	0	0	0
All	All	8460	0	7870	40	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 2.

All (40) 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:B:73:LYS:NZ	3:B:302:CL:CL	2.53	0.77
1:B:31:TRP:HB2	1:B:57:ASN:HB3	1.81	0.62
1:B:145:GLY:O	1:C:60:LYS:NZ	2.33	0.59
1:B:259:LYS:HG3	1:B:264:ILE:HG13	1.85	0.58
1:A:213:THR:H	2:A:301:CEF:C11	2.18	0.56
1:D:31:TRP:HB2	1:D:57:ASN:HB3	1.87	0.55
1:B:98:GLN:OE1	1:D:163:ARG:NH2	2.41	0.54
1:C:70:SER:HB2	1:C:210:GLY:HA2	1.91	0.52
1:C:213:THR:H	2:C:301:CEF:C11	2.22	0.52
1:C:31:TRP:HB2	1:C:57:ASN:HB3	1.90	0.52
1:D:121:PRO:HB2	4:D:304:ACT:H3	1.93	0.51
1:A:67:LEU:HD11	1:A:215:ILE:HD12	1.94	0.50
1:B:70:SER:HB2	1:B:210:GLY:HA2	1.95	0.49
1:D:33:ALA:O	1:D:37:GLU:HG2	2.13	0.49
1:D:29:LYS:HZ2	1:D:32:ASN:HD21	1.62	0.47
1:A:204:ILE:HB	1:A:227:GLU:HB2	1.96	0.47
1:D:259:LYS:HG2	1:D:264:ILE:HG13	1.97	0.46
1:C:132:GLU:HG3	1:C:149:ILE:HD11	1.97	0.46
1:C:69:ALA:HB2	1:C:212:SER:HB2	1.98	0.46
1:C:204:ILE:HB	1:C:227:GLU:HB2	1.97	0.46
1:B:204:ILE:HB	1:B:227:GLU:HB2	1.97	0.46
1:B:34:HIS:NE2	1:B:260:GLN:OE1	2.36	0.45
1:D:29:LYS:NZ	1:D:32:ASN:HD21	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:204:ILE:HB	1:D:227:GLU:HB2	1.97	0.45
1:C:177:TYR:CZ	1:C:232:VAL:HG21	2.53	0.44
1:D:148:ASP:OD1	1:D:150:SER:HB3	2.18	0.44
1:B:177:TYR:CZ	1:B:232:VAL:HG21	2.53	0.44
1:D:47:TRP:HB3	1:D:234:PHE:HB2	2.00	0.44
1:A:177:TYR:CZ	1:A:232:VAL:HG21	2.53	0.43
1:A:31:TRP:HB2	1:A:57:ASN:HB3	2.01	0.42
1:B:155:SER:OG	1:B:158:LEU:HD12	2.19	0.42
1:D:125:GLU:O	1:D:129:GLN:HG3	2.18	0.42
1:B:220:GLY:O	1:B:238:ASN:HA	2.20	0.41
1:A:70:SER:HB2	1:A:210:GLY:HA2	2.01	0.41
1:C:230:ASP:OD1	1:C:230:ASP:N	2.53	0.41
1:A:220:GLY:O	1:A:238:ASN:HA	2.20	0.41
1:C:220:GLY:O	1:C:238:ASN:HA	2.21	0.41
1:A:25:TRP:HB2	1:A:59:LEU:HD13	2.04	0.40
1:D:120:VAL:N	1:D:121:PRO:HD2	2.36	0.40
1:B:120:VAL:N	1:B:121:PRO:HD2	2.37	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	246/263 (94%)	241 (98%)	5 (2%)	0	100	100
1	B	243/263 (92%)	239 (98%)	4 (2%)	0	100	100
1	C	246/263 (94%)	240 (98%)	6 (2%)	0	100	100
1	D	243/263 (92%)	235 (97%)	6 (2%)	2 (1%)	19	10
All	All	978/1052 (93%)	955 (98%)	21 (2%)	2 (0%)	47	39

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	149	ILE
1	D	150	SER

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	216/231 (94%)	213 (99%)	3 (1%)	67	65
1	B	213/231 (92%)	210 (99%)	3 (1%)	67	65
1	C	216/231 (94%)	214 (99%)	2 (1%)	78	79
1	D	212/231 (92%)	210 (99%)	2 (1%)	78	79
All	All	857/924 (93%)	847 (99%)	10 (1%)	71	70

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

Mol	Chain	Res	Type
1	A	94	LYS
1	A	118	SER
1	A	137	LYS
1	B	21	TYR
1	B	41	GLN
1	B	136	SER
1	C	23	GLN
1	C	137	LYS
1	D	155	SER
1	D	171	SER

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

Mol	Chain	Res	Type
1	C	19	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 6 are monoatomic - leaving 7 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
2	CEF	A	301	1	19,27,27	1.58	3 (15%)	14,37,37	3.30	6 (42%)
4	ACT	C	303	-	3,3,3	1.27	0	3,3,3	1.39	0
4	ACT	A	304	-	3,3,3	1.28	0	3,3,3	1.41	0
2	CEF	D	301	1	19,27,27	1.42	2 (10%)	14,37,37	2.91	7 (50%)
2	CEF	B	301	1	19,27,27	1.44	2 (10%)	14,37,37	2.93	8 (57%)
4	ACT	D	304	-	3,3,3	1.28	0	3,3,3	1.38	0
2	CEF	C	301	1	19,27,27	1.52	3 (15%)	14,37,37	3.34	6 (42%)

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	CEF	D	301	1	-	3/14/38/38	0/1/2/2
2	CEF	C	301	1	-	4/14/38/38	0/1/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CEF	B	301	1	-	3/14/38/38	0/1/2/2
2	CEF	A	301	1	-	3/14/38/38	0/1/2/2

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	CEF	O2-C5	-3.88	1.19	1.30
2	B	301	CEF	O2-C5	-3.64	1.19	1.30
2	C	301	CEF	C13-S2	-3.53	1.65	1.70
2	C	301	CEF	O2-C5	-3.51	1.20	1.30
2	D	301	CEF	O2-C5	-3.41	1.20	1.30
2	A	301	CEF	C13-S2	-3.28	1.65	1.70
2	B	301	CEF	C1-S1	-2.52	1.76	1.82
2	D	301	CEF	C1-S1	-2.39	1.76	1.82
2	C	301	CEF	O5-C11	-2.19	1.40	1.43
2	A	301	CEF	O4-C9	-2.17	1.19	1.23

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	CEF	N4-C14-N5	8.53	134.24	123.19
2	C	301	CEF	N4-C14-N5	8.14	133.73	123.19
2	B	301	CEF	N4-C14-N5	6.74	131.91	123.19
2	D	301	CEF	N4-C14-N5	5.84	130.74	123.19
2	C	301	CEF	O5-N3-C10	5.37	117.19	111.28
2	D	301	CEF	O5-N3-C10	5.06	116.85	111.28
2	A	301	CEF	O5-N3-C10	4.99	116.77	111.28
2	A	301	CEF	C2-C1-S1	-4.51	102.35	111.65
2	B	301	CEF	C10-C9-N2	4.39	121.67	114.38
2	C	301	CEF	C12-C13-S2	-4.16	106.68	111.79
2	C	301	CEF	C2-C1-S1	-4.07	103.25	111.65
2	D	301	CEF	O4-C9-C10	-3.96	115.79	120.35
2	D	301	CEF	C10-C9-N2	3.75	120.60	114.38
2	A	301	CEF	C12-C13-S2	-3.62	107.35	111.79
2	B	301	CEF	C2-C1-S1	-3.33	104.78	111.65
2	C	301	CEF	C10-C9-N2	3.27	119.82	114.38
2	D	301	CEF	C2-C1-S1	-3.14	105.17	111.65
2	B	301	CEF	C11-O5-N3	3.12	112.03	108.40
2	B	301	CEF	O4-C9-C10	-3.01	116.89	120.35
2	B	301	CEF	O5-N3-C10	2.98	114.56	111.28
2	A	301	CEF	C10-C9-N2	2.95	119.28	114.38
2	C	301	CEF	O4-C9-C10	-2.44	117.54	120.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	CEF	O3-C8-C7	-2.39	118.18	124.83
2	B	301	CEF	O2-C5-O1	-2.34	118.26	123.61
2	D	301	CEF	C11-O5-N3	2.09	110.83	108.40
2	A	301	CEF	O4-C9-C10	-2.04	118.00	120.35
2	B	301	CEF	O3-C8-C7	-2.01	119.22	124.83

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	301	CEF	N1-C4-C5-O2
2	A	301	CEF	C2-C4-C5-O1
2	C	301	CEF	C2-C4-C5-O1
2	D	301	CEF	C2-C4-C5-O1
2	A	301	CEF	N1-C4-C5-O2
2	B	301	CEF	N1-C4-C5-O2
2	B	301	CEF	C2-C4-C5-O1
2	A	301	CEF	N3-C10-C9-O4
2	C	301	CEF	N3-C10-C9-N2
2	D	301	CEF	N3-C10-C9-N2
2	B	301	CEF	N3-C10-C9-O4
2	C	301	CEF	N3-C10-C9-O4
2	D	301	CEF	N3-C10-C9-O4

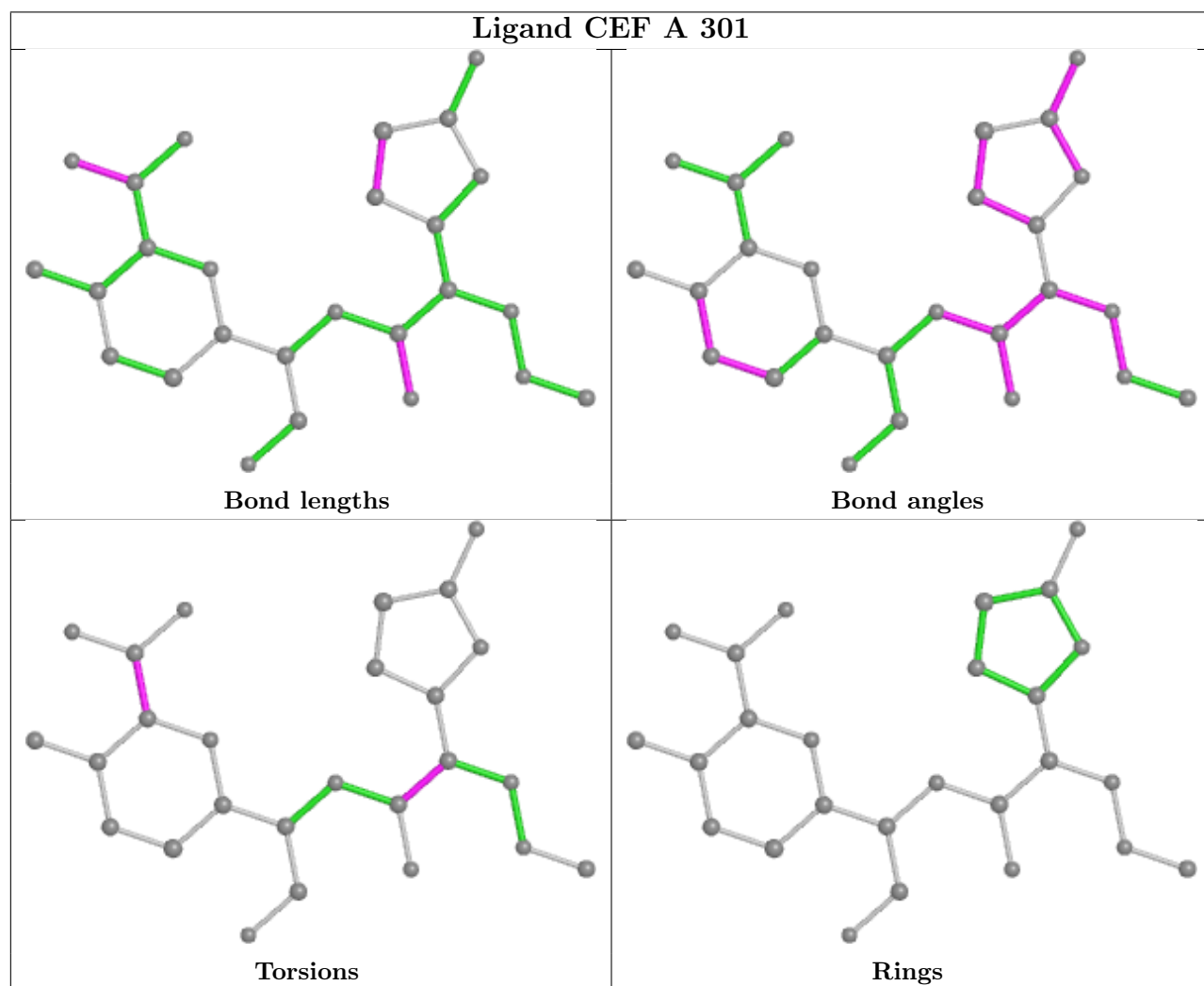
There are no ring outliers.

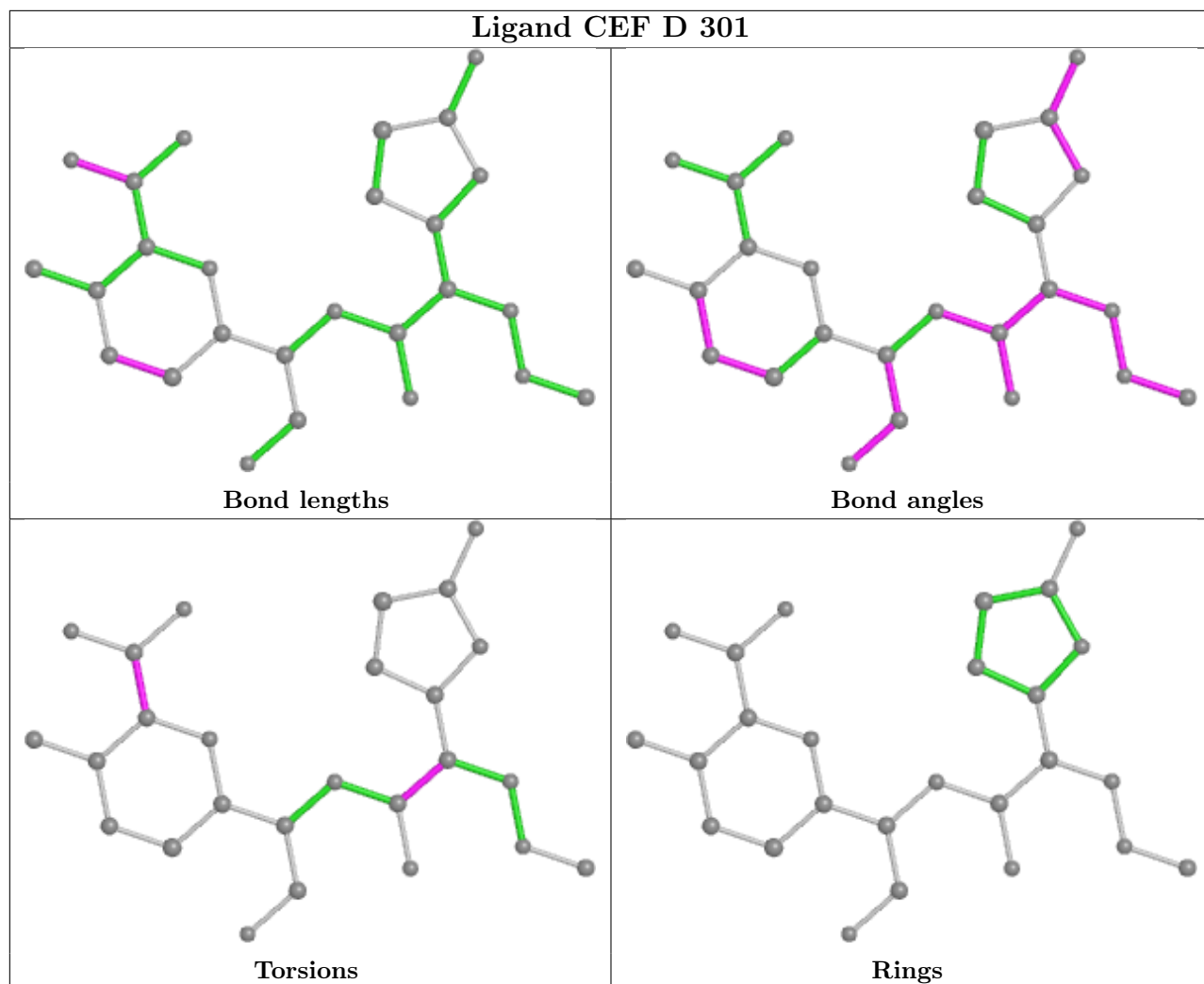
3 monomers are involved in 3 short contacts:

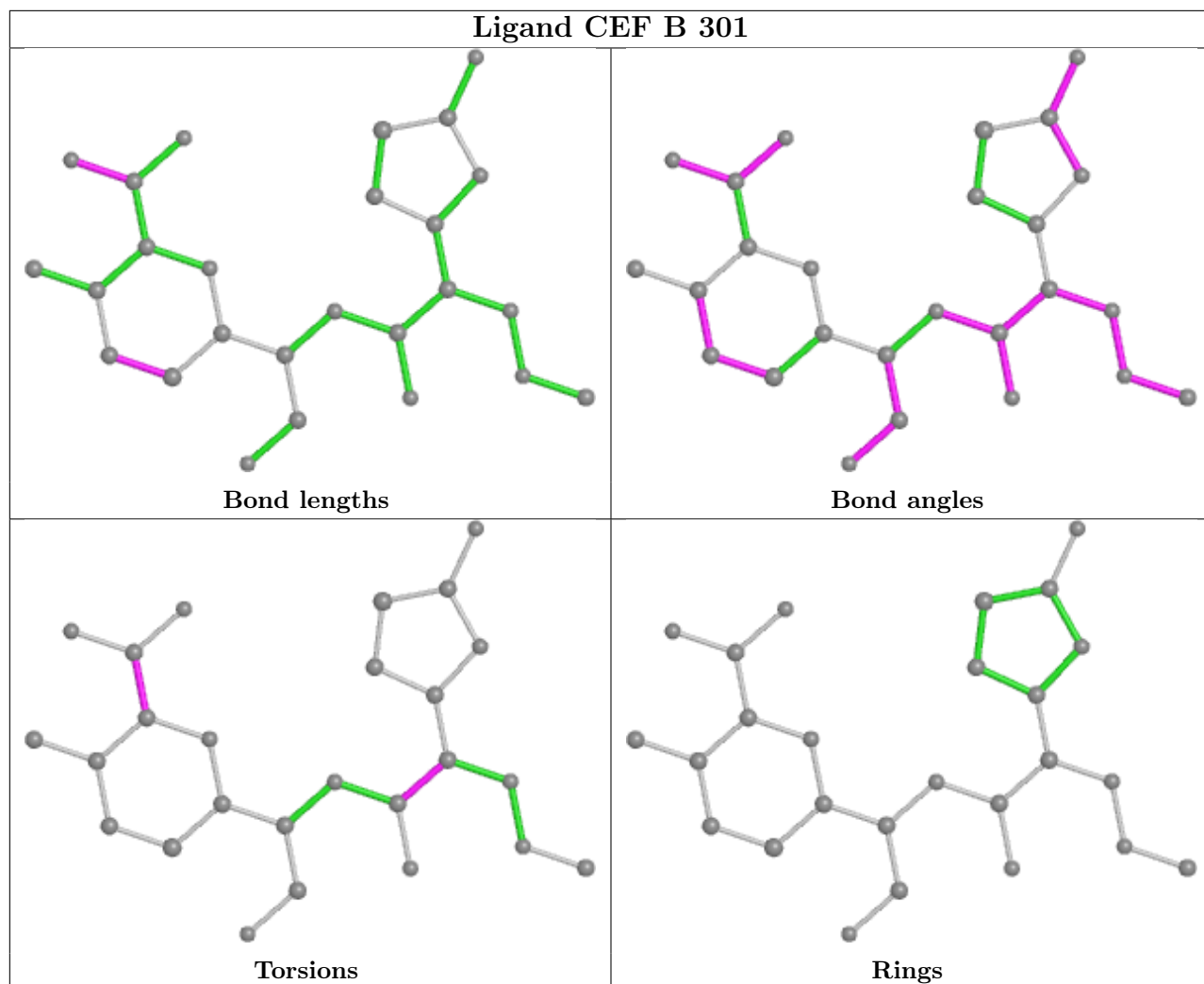
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	CEF	1	0
4	D	304	ACT	1	0
2	C	301	CEF	1	0

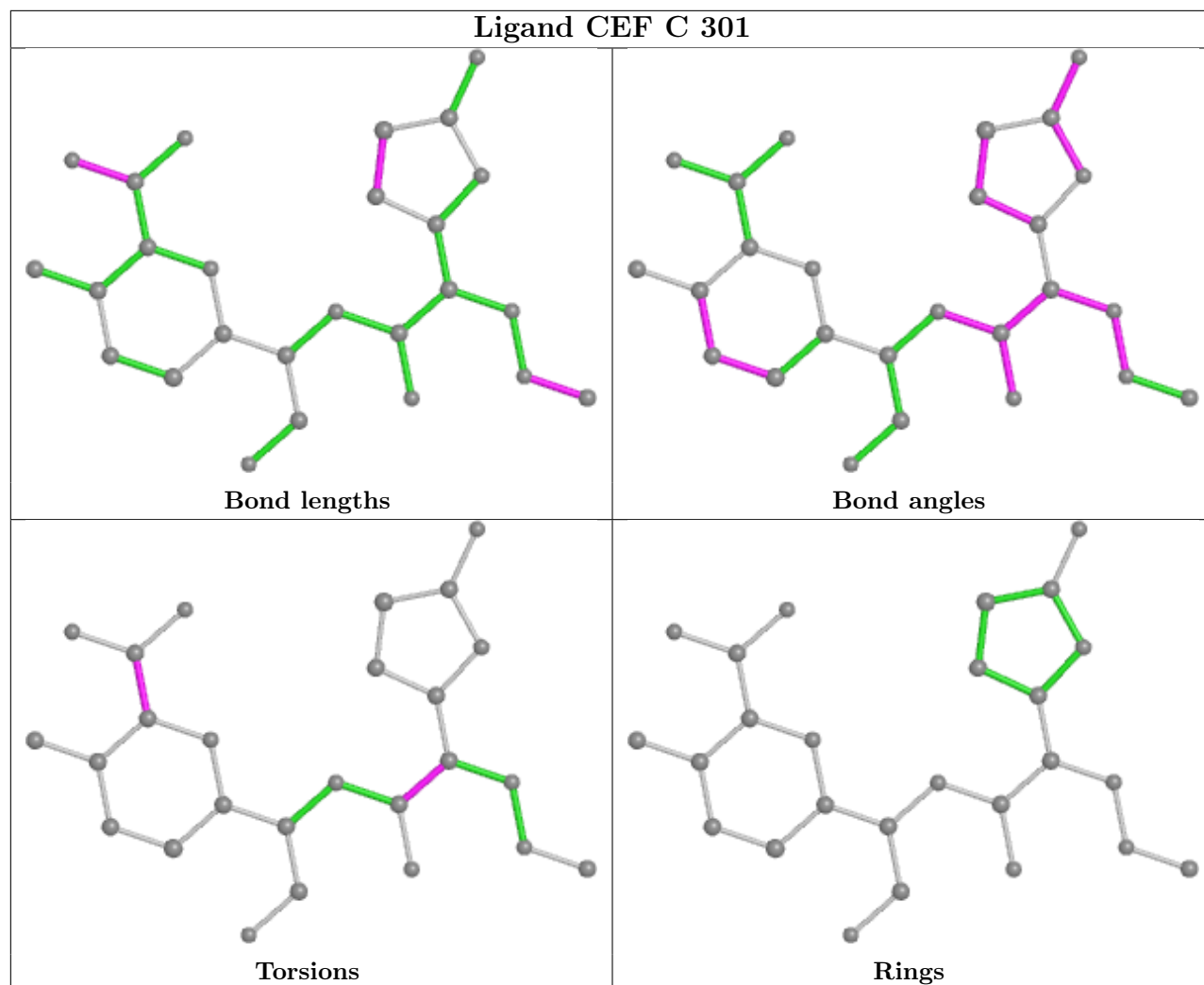
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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

### 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	247/263 (93%)	0.21	11 (4%) 33 35	28, 40, 61, 82	0
1	B	245/263 (93%)	0.17	6 (2%) 59 63	29, 41, 68, 88	0
1	C	248/263 (94%)	0.20	8 (3%) 47 52	28, 41, 65, 94	0
1	D	244/263 (92%)	0.19	12 (4%) 29 31	28, 40, 62, 82	0
All	All	984/1052 (93%)	0.19	37 (3%) 40 44	28, 41, 65, 94	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	21	TYR	7.5
1	A	20	LEU	5.8
1	A	21	TYR	5.8
1	A	19	ASN	5.7
1	B	22	PHE	4.5
1	C	18	GLU	4.4
1	D	149	ILE	4.3
1	D	22	PHE	4.2
1	A	24	GLY	4.1
1	C	101	ASP	3.6
1	B	245	ASP	3.4
1	C	245	ASP	3.3
1	C	19	ASN	3.2
1	C	21	TYR	2.9
1	D	148	ASP	2.8
1	A	101	ASP	2.7
1	D	260	GLN	2.6
1	D	262	LYS	2.5
1	A	74	ILE	2.5
1	D	145	GLY	2.5
1	D	23	GLN	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	103	ALA	2.4
1	B	153	VAL	2.3
1	A	173	LEU	2.3
1	A	196	LEU	2.3
1	D	83	LEU	2.3
1	B	37	GLU	2.3
1	D	133	ALA	2.3
1	C	164	ILE	2.3
1	B	243	THR	2.2
1	D	147	GLU	2.2
1	D	153	VAL	2.1
1	A	170	ILE	2.1
1	D	152	ASN	2.1
1	A	225	TRP	2.1
1	C	102	ILE	2.0
1	C	243	THR	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.

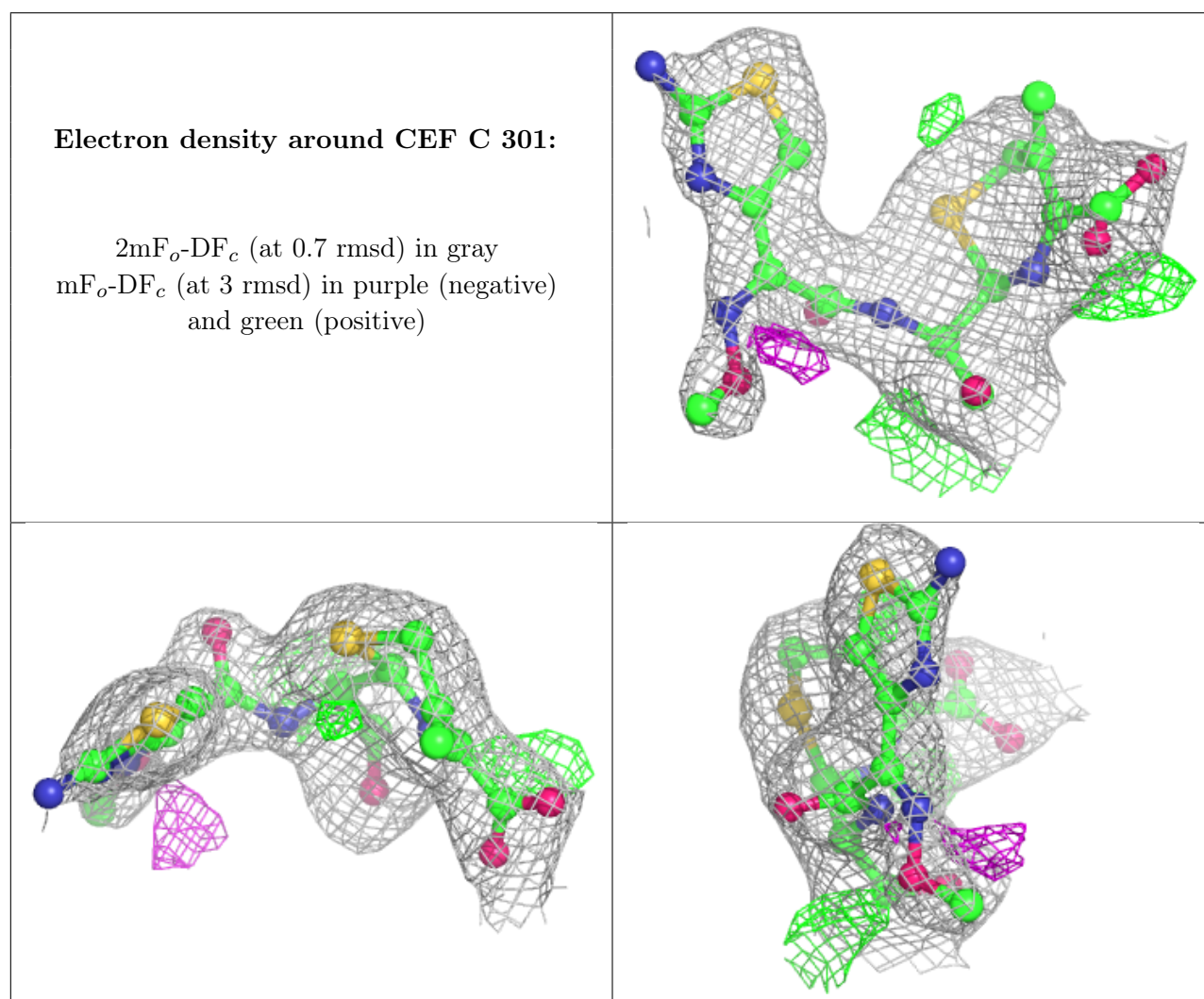
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	ACT	C	303	4/4	0.78	0.38	55,61,63,64	0
4	ACT	A	304	4/4	0.79	0.25	56,59,63,65	0
2	CEF	C	301	26/26	0.80	0.18	37,53,64,68	26
2	CEF	B	301	26/26	0.83	0.14	33,49,67,73	26
2	CEF	D	301	26/26	0.83	0.18	33,53,63,74	0
2	CEF	A	301	26/26	0.87	0.15	33,49,63,68	26
4	ACT	D	304	4/4	0.90	0.20	42,45,51,55	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CL	C	302	1/1	0.94	0.09	43,43,43,43	1
3	CL	D	303	1/1	0.97	0.10	42,42,42,42	1
3	CL	B	302	1/1	0.98	0.11	40,40,40,40	1
3	CL	A	303	1/1	0.98	0.09	43,43,43,43	1
3	CL	A	302	1/1	0.99	0.15	33,33,33,33	0
3	CL	D	302	1/1	0.99	0.21	28,28,28,28	1

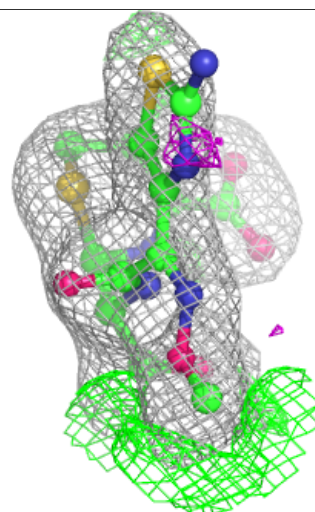
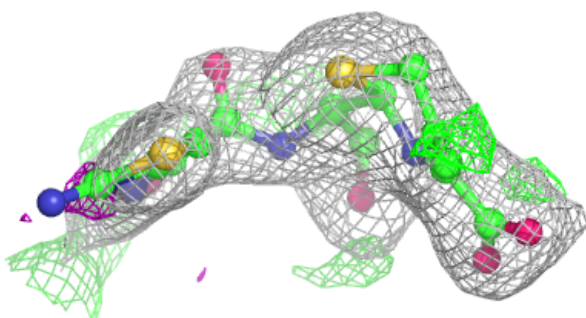
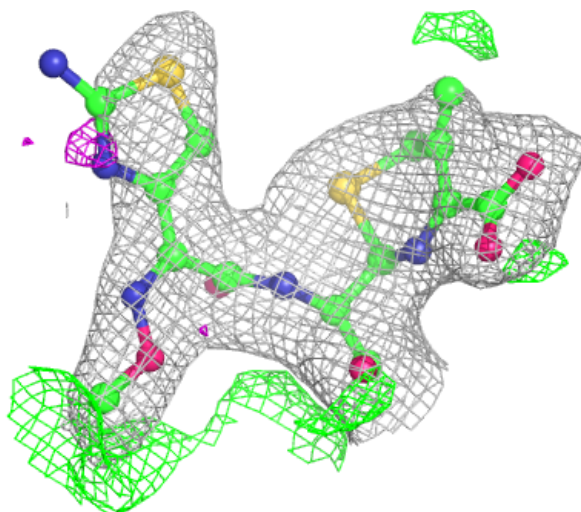
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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





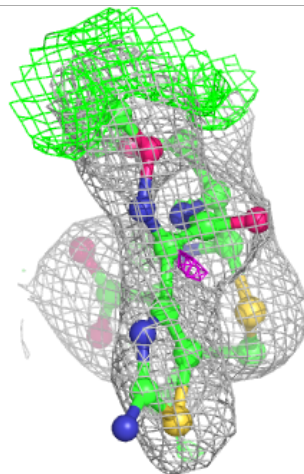
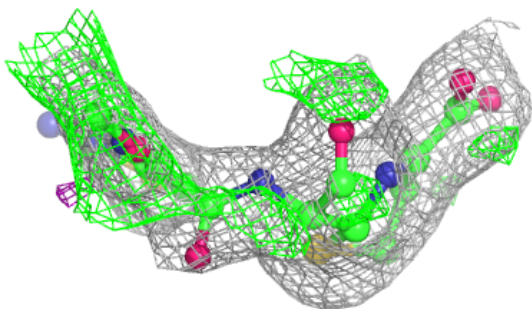
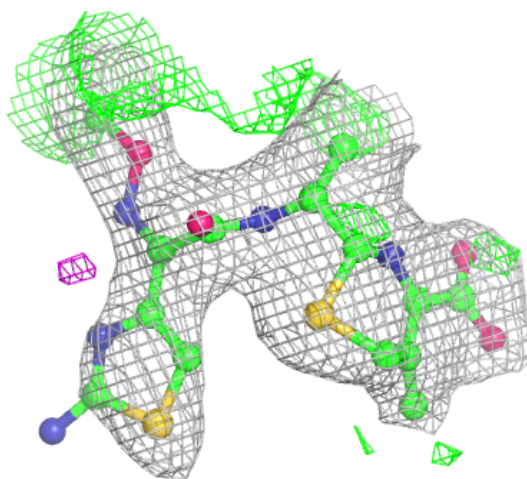
**Electron density around CEF B 301:**

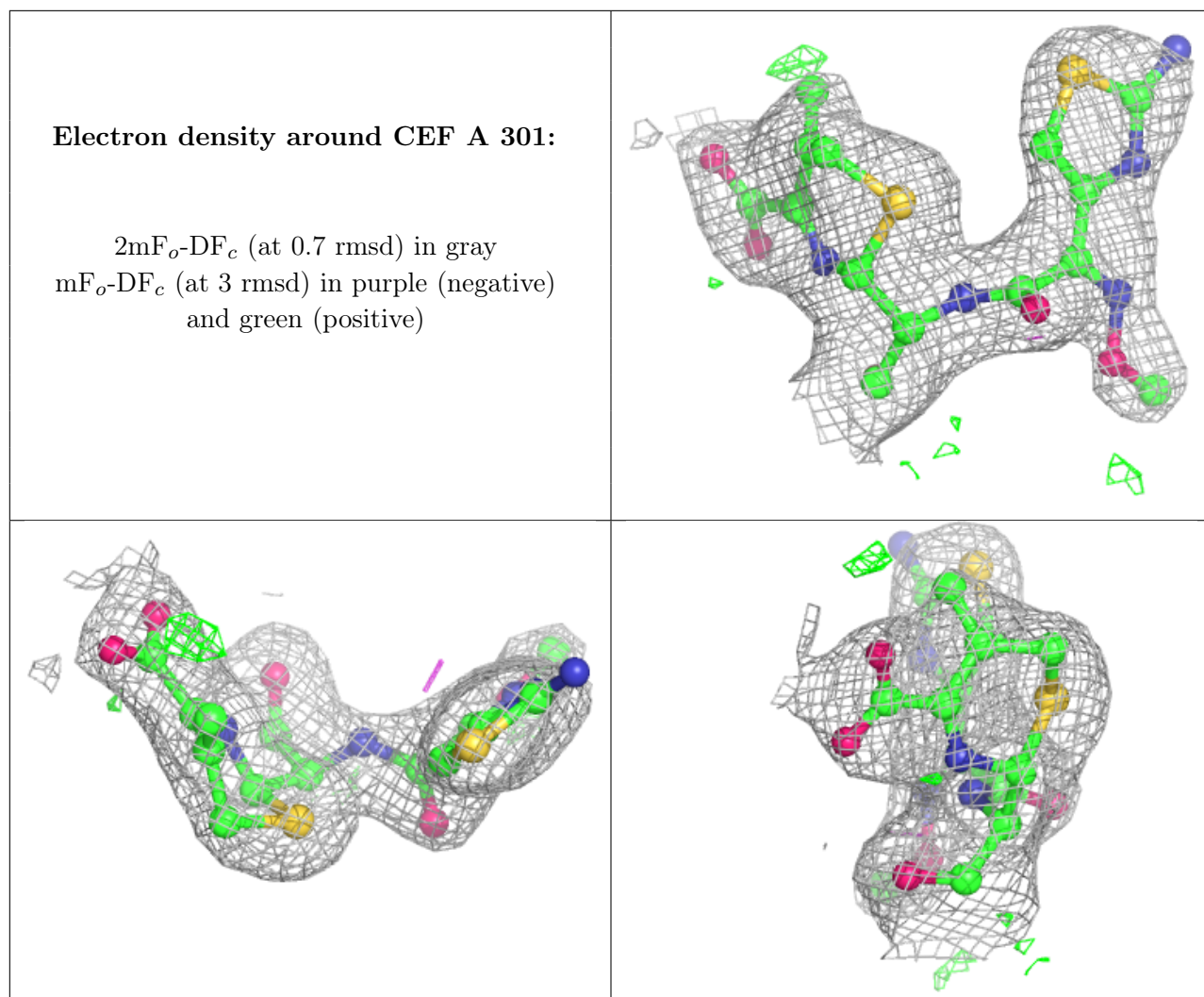
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around CEF 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)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.