



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 30, 2022 – 06:06 pm BST

PDB ID : 7ZGS  
Title : Crystal Structure of truncated aspartate transcarbamoylase from Plasmodium falciparum with bound inhibitor 2-phenylethan-1-amine  
Authors : Wang, C.; Zhang, B.  
Deposited on : 2022-04-04  
Resolution : 2.35 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 : 1.8.4, CSD as541be (2020)  
Xtrriage (Phenix) : 1.13  
EDS : 2.30  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0267  
CCP4 : 7.1.010 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.30

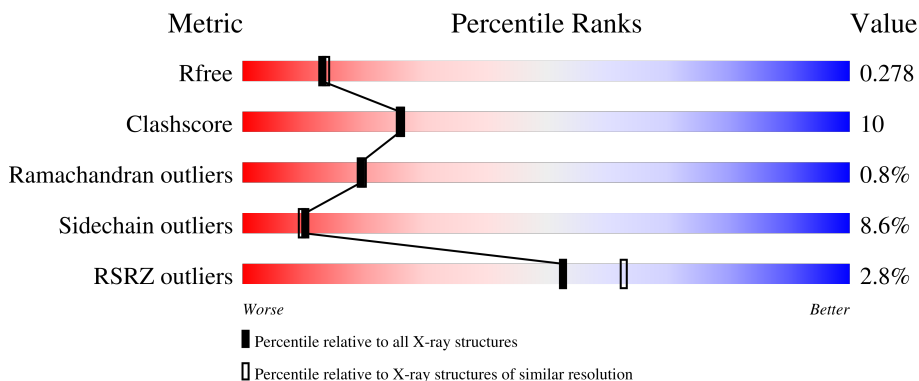
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


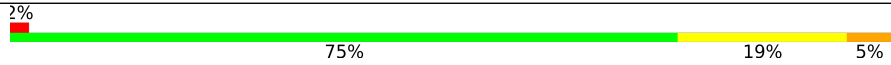
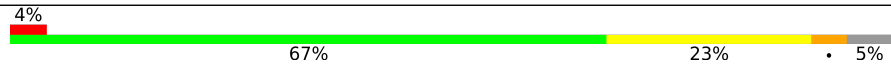
The reported resolution of this entry is 2.35 Å.

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	2096 (2.36-2.32)
Clashscore	141614	2193 (2.36-2.32)
Ramachandran outliers	138981	2159 (2.36-2.32)
Sidechain outliers	138945	2160 (2.36-2.32)
RSRZ outliers	127900	2067 (2.36-2.32)

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	349	 2% 68% 21% 7%
1	B	349	 2% 75% 19% 5%
1	C	349	 4% 67% 23% 5%

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 16400 atoms, of which 8183 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 Aspartate carbamoyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	324	Total 5248	C 1674	H 2632	N 428	O 506	S 8	83	0	0
1	B	346	Total 5629	C 1801	H 2814	N 462	O 544	S 8	88	0	0
1	C	332	Total 5384	C 1720	H 2698	N 441	O 517	S 8	85	0	0

There are 30 discrepancies between the modelled and reference sequences:

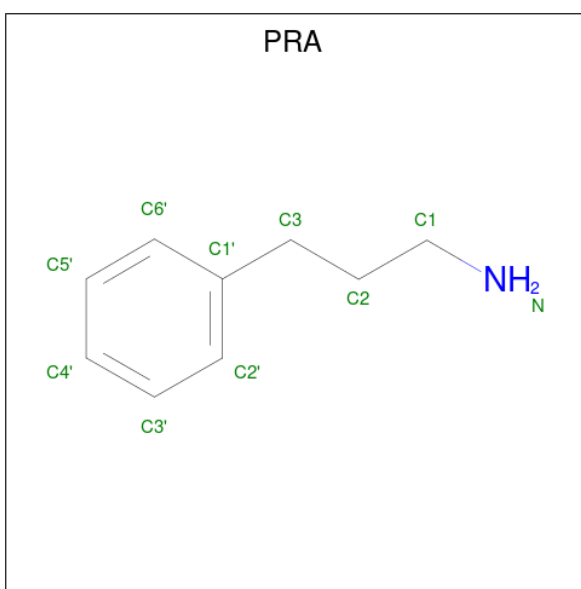
Chain	Residue	Modelled	Actual	Comment	Reference
A	376	SER	-	expression tag	UNP A0A5K1K910
A	377	ALA	-	expression tag	UNP A0A5K1K910
A	378	TRP	-	expression tag	UNP A0A5K1K910
A	379	SER	-	expression tag	UNP A0A5K1K910
A	380	HIS	-	expression tag	UNP A0A5K1K910
A	381	PRO	-	expression tag	UNP A0A5K1K910
A	382	GLN	-	expression tag	UNP A0A5K1K910
A	383	PHE	-	expression tag	UNP A0A5K1K910
A	384	GLU	-	expression tag	UNP A0A5K1K910
A	385	LYS	-	expression tag	UNP A0A5K1K910
B	376	SER	-	expression tag	UNP A0A5K1K910
B	377	ALA	-	expression tag	UNP A0A5K1K910
B	378	TRP	-	expression tag	UNP A0A5K1K910
B	379	SER	-	expression tag	UNP A0A5K1K910
B	380	HIS	-	expression tag	UNP A0A5K1K910
B	381	PRO	-	expression tag	UNP A0A5K1K910
B	382	GLN	-	expression tag	UNP A0A5K1K910
B	383	PHE	-	expression tag	UNP A0A5K1K910
B	384	GLU	-	expression tag	UNP A0A5K1K910
B	385	LYS	-	expression tag	UNP A0A5K1K910
C	376	SER	-	expression tag	UNP A0A5K1K910
C	377	ALA	-	expression tag	UNP A0A5K1K910
C	378	TRP	-	expression tag	UNP A0A5K1K910

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Chain	Residue	Modelled	Actual	Comment	Reference
C	379	SER	-	expression tag	UNP A0A5K1K910
C	380	HIS	-	expression tag	UNP A0A5K1K910
C	381	PRO	-	expression tag	UNP A0A5K1K910
C	382	GLN	-	expression tag	UNP A0A5K1K910
C	383	PHE	-	expression tag	UNP A0A5K1K910
C	384	GLU	-	expression tag	UNP A0A5K1K910
C	385	LYS	-	expression tag	UNP A0A5K1K910

- Molecule 2 is 3-PHENYLPROPYLAMINE (three-letter code: PRA) (formula: C<sub>9</sub>H<sub>13</sub>N) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	N	0	0
			23	9	13	1		
2	B	1	Total	C	H	N	0	0
			23	9	13	1		
2	C	1	Total	C	H	N	0	0
			23	9	13	1		

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Na	0	0
			1	1		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0

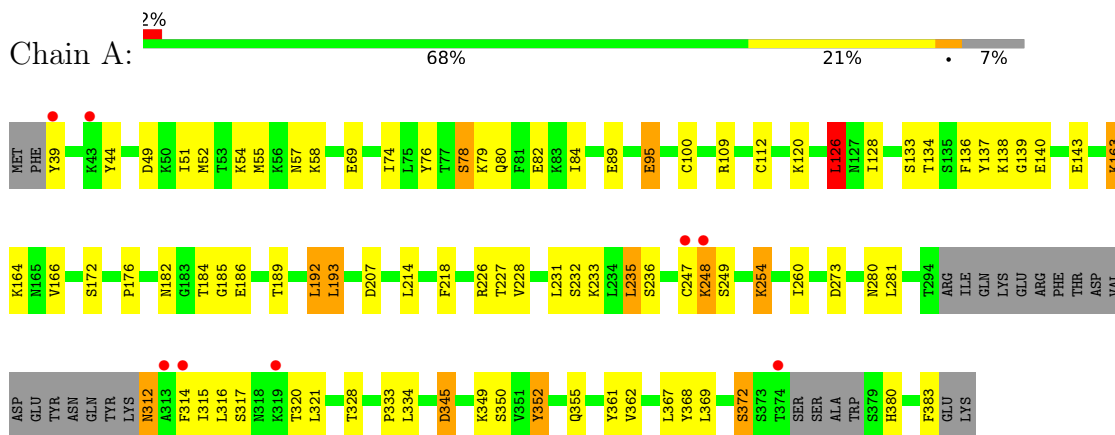
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	18	Total O 18 18	0	0
5	B	19	Total O 19 19	0	0
5	C	22	Total O 22 22	0	0

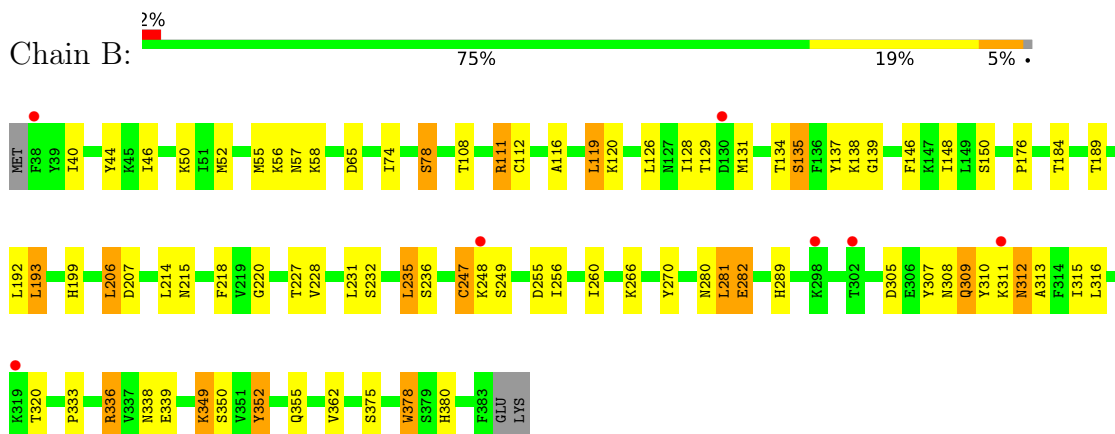
### 3 Residue-property plots [i](#)

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.

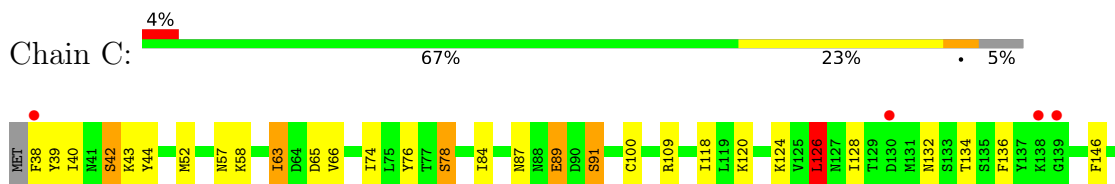
- Molecule 1: Aspartate carbamoyltransferase

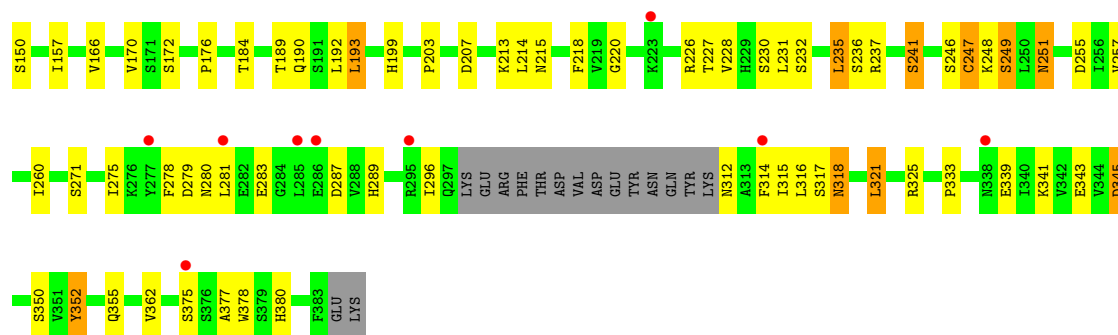


- Molecule 1: Aspartate carbamoyltransferase



- Molecule 1: Aspartate carbamoyltransferase





## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.85Å 104.37Å 87.05Å 90.00° 117.53° 90.00°	Depositor
Resolution (Å)	45.13 – 2.35 45.09 – 2.35	Depositor EDS
% Data completeness (in resolution range)	98.3 (45.13-2.35) 95.0 (45.09-2.35)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.71 (at 2.34Å)	Xtriage
Refinement program	REFMAC 5.8.0267, REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.217 , 0.272 0.218 , 0.278	Depositor DCC
$R_{free}$ test set	2651 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.8	Xtriage
Anisotropy	0.709	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	0.064 for -h-l,k,h 0.064 for l,k,-h-l 0.077 for h,-k,-h-l 0.069 for -h-l,-k,l 0.216 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	16400	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.31% 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: SO4, PRA, NA

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	0.78	2/2664 (0.1%)	0.98	3/3598 (0.1%)
1	B	0.78	0/2871	0.98	3/3880 (0.1%)
1	C	0.77	1/2738 (0.0%)	0.99	3/3700 (0.1%)
All	All	0.78	3/8273 (0.0%)	0.98	9/11178 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	91	SER	CB-OG	-5.78	1.34	1.42
1	A	143	GLU	CD-OE2	5.71	1.31	1.25
1	A	186	GLU	CD-OE2	5.04	1.31	1.25

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	345	ASP	CB-CA-C	9.47	129.34	110.40
1	B	349	LYS	CB-CA-C	9.45	129.31	110.40
1	C	345	ASP	CB-CA-C	7.82	126.03	110.40
1	C	91	SER	N-CA-CB	-6.87	100.19	110.50
1	B	111	ARG	NE-CZ-NH1	-6.29	117.15	120.30
1	A	126	LEU	N-CA-CB	-5.98	98.43	110.40
1	B	349	LYS	N-CA-CB	-5.76	100.23	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	126	LEU	N-CA-CB	-5.62	99.17	110.40
1	A	120	LYS	CB-CA-C	5.47	121.34	110.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	375	SER	Peptide

## 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	2616	2632	2623	54	2
1	B	2815	2814	2807	53	2
1	C	2686	2698	2690	67	0
2	A	10	13	14	4	0
2	B	10	13	14	2	0
2	C	10	13	14	1	0
3	A	1	0	0	0	0
4	C	10	0	0	0	0
5	A	18	0	0	1	0
5	B	19	0	0	0	0
5	C	22	0	0	2	0
All	All	8217	8183	8162	171	2

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 10.

All (171) 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:C:109:ARG:HD2	5:C:512:HOH:O	1.66	0.93
1:B:215:ASN:H	1:B:289:HIS:HD2	1.15	0.92
1:C:215:ASN:H	1:C:289:HIS:HD2	1.15	0.91

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:136:PHE:O	2:A:401:PRA:N	2.05	0.90
1:A:281:LEU:HD23	1:A:320:THR:HG21	1.54	0.89
1:A:51:ILE:HG22	1:A:55:MET:HE2	1.63	0.80
1:C:63:ILE:CD1	1:C:63:ILE:H	1.96	0.78
1:A:95:GLU:O	5:A:501:HOH:O	2.01	0.78
1:A:137:TYR:O	1:A:139:GLY:N	2.18	0.77
1:B:137:TYR:O	1:B:139:GLY:N	2.19	0.76
1:C:100:CYS:SG	1:C:126:LEU:HD22	2.28	0.74
1:C:146:PHE:O	1:C:150:SER:HB2	1.89	0.73
1:C:63:ILE:HG12	1:C:230:SER:OG	1.88	0.72
1:B:146:PHE:O	1:B:150:SER:HB2	1.90	0.70
1:C:220:GLY:HA3	1:C:296:ILE:HG12	1.73	0.70
1:C:52:MET:SD	1:C:380:HIS:CE1	2.85	0.70
1:C:248:LYS:HG3	1:C:249:SER:H	1.58	0.69
1:A:368:TYR:O	1:A:372:SER:HB2	1.93	0.69
1:C:66:VAL:O	1:C:237:ARG:NH2	2.26	0.67
1:B:308:ASN:O	1:B:311:LYS:O	2.12	0.66
1:A:52:MET:SD	1:A:380:HIS:CE1	2.90	0.65
1:A:163:LYS:HB3	1:A:184:THR:HG23	1.80	0.64
1:B:199:HIS:CD2	1:B:206:LEU:HD22	2.33	0.64
1:A:100:CYS:SG	1:A:126:LEU:HD22	2.39	0.63
1:C:63:ILE:CD1	1:C:63:ILE:N	2.62	0.63
1:C:63:ILE:N	1:C:63:ILE:HD12	2.14	0.62
1:B:280:ASN:OD1	1:B:282:GLU:HG3	1.99	0.62
1:A:231:LEU:HG	1:A:235:LEU:HD22	1.82	0.60
1:A:163:LYS:CB	1:A:184:THR:HG23	2.33	0.59
1:B:215:ASN:H	1:B:289:HIS:CD2	2.08	0.59
1:C:63:ILE:H	1:C:63:ILE:HD12	1.67	0.59
1:A:236:SER:OG	1:A:260:ILE:HA	2.03	0.59
1:B:220:GLY:O	1:B:310:TYR:OH	2.20	0.59
1:B:307:TYR:OH	1:B:311:LYS:HD2	2.03	0.58
1:B:281:LEU:HD23	1:B:320:THR:HG21	1.85	0.58
1:B:236:SER:OG	1:B:260:ILE:HA	2.03	0.58
1:A:136:PHE:O	2:A:401:PRA:C1	2.52	0.58
1:A:312:ASN:HB2	1:A:315:ILE:HD11	1.84	0.58
1:B:148:ILE:CG2	2:B:401:PRA:H5'	2.33	0.57
1:A:140:GLU:OE1	2:A:401:PRA:H31	2.05	0.57
1:C:39:TYR:OH	1:C:377:ALA:O	2.22	0.57
1:C:220:GLY:CA	1:C:296:ILE:HG12	2.34	0.57
1:B:247:CYS:HB2	1:B:310:TYR:CE1	2.40	0.57
1:A:193:LEU:C	1:A:193:LEU:HD23	2.25	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:52:MET:SD	1:B:380:HIS:CE1	2.98	0.56
1:C:236:SER:OG	1:C:260:ILE:HA	2.04	0.56
1:C:232:SER:O	1:C:236:SER:HB2	2.05	0.56
1:B:231:LEU:HG	1:B:235:LEU:HD22	1.87	0.56
1:A:44:TYR:OH	1:A:207:ASP:HA	2.06	0.56
1:A:166:VAL:HG11	1:A:182:ASN:HD22	1.70	0.56
1:C:213:LYS:HD2	1:C:241:SER:OG	2.05	0.55
1:A:52:MET:SD	1:A:380:HIS:HE1	2.30	0.55
1:C:251:ASN:N	1:C:251:ASN:ND2	2.54	0.55
1:A:312:ASN:N	1:A:312:ASN:OD1	2.40	0.55
1:C:341:LYS:HD2	5:C:516:HOH:O	2.07	0.54
1:B:193:LEU:C	1:B:193:LEU:HD23	2.28	0.54
1:A:51:ILE:HG22	1:A:55:MET:CE	2.36	0.53
1:C:231:LEU:HG	1:C:235:LEU:HD22	1.89	0.53
1:A:232:SER:O	1:A:236:SER:HB2	2.08	0.53
1:A:80:GLN:HE21	1:A:383:PHE:H	1.57	0.53
1:C:39:TYR:HD1	1:C:76:TYR:HH	1.57	0.53
1:B:315:ILE:HG13	1:B:338:ASN:O	2.09	0.53
1:A:84:ILE:HG23	1:A:89:GLU:HB3	1.91	0.52
1:B:44:TYR:OH	1:B:207:ASP:HA	2.09	0.52
1:B:336:ARG:HA	1:B:339:GLU:OE1	2.09	0.52
1:A:328:THR:O	1:A:349:LYS:HG2	2.09	0.52
1:A:51:ILE:CG2	1:A:55:MET:HE2	2.38	0.52
1:C:193:LEU:C	1:C:193:LEU:HD23	2.29	0.52
1:B:311:LYS:HD3	1:B:338:ASN:HB2	1.91	0.52
1:C:44:TYR:OH	1:C:207:ASP:HA	2.10	0.52
1:A:281:LEU:HD23	1:A:320:THR:CG2	2.36	0.52
1:B:74:ILE:O	1:B:78:SER:HB2	2.10	0.51
1:C:341:LYS:HG3	1:C:343:GLU:HB3	1.92	0.51
1:A:227:THR:HG21	1:A:333:PRO:HG3	1.93	0.51
1:C:246:SER:O	1:C:247:CYS:O	2.28	0.51
1:C:215:ASN:H	1:C:289:HIS:CD2	2.08	0.50
1:C:74:ILE:O	1:C:78:SER:HB2	2.10	0.50
1:A:55:MET:O	1:A:58:LYS:HB3	2.12	0.50
1:C:78:SER:OG	1:C:362:VAL:HA	2.11	0.50
1:A:166:VAL:HG11	1:A:182:ASN:ND2	2.27	0.50
1:B:78:SER:OG	1:B:362:VAL:HA	2.12	0.50
1:A:39:TYR:HD1	1:A:76:TYR:HH	1.59	0.49
1:B:131:MET:HG2	1:B:135:SER:OG	2.11	0.49
1:C:52:MET:SD	1:C:380:HIS:HE1	2.36	0.49
1:B:55:MET:O	1:B:58:LYS:HB3	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:84:ILE:HG23	1:C:89:GLU:HB3	1.94	0.49
1:B:311:LYS:O	1:B:312:ASN:CG	2.51	0.49
1:B:378:TRP:CD1	1:B:378:TRP:C	2.86	0.49
1:B:148:ILE:HG21	2:B:401:PRA:H5'	1.95	0.48
1:A:78:SER:OG	1:A:362:VAL:HA	2.14	0.48
1:B:184:THR:HG22	1:B:184:THR:O	2.13	0.48
1:C:287:ASP:HA	1:C:325:ARG:HD2	1.96	0.48
1:A:57:ASN:HA	1:A:176:PRO:HG2	1.96	0.47
1:A:185:GLY:CA	1:A:226:ARG:HD3	2.44	0.47
1:A:312:ASN:HB2	1:A:315:ILE:CD1	2.43	0.47
1:B:119:LEU:HG	1:C:124:LYS:HB3	1.96	0.47
1:C:318:ASN:HB2	1:C:343:GLU:CD	2.34	0.47
1:A:218:PHE:CD1	1:A:228:VAL:HG13	2.49	0.47
1:C:227:THR:HG21	1:C:333:PRO:HG3	1.95	0.47
1:A:185:GLY:HA3	1:A:226:ARG:HD3	1.95	0.47
1:A:112:CYS:SG	1:B:128:ILE:HD11	2.54	0.47
1:B:52:MET:SD	1:B:380:HIS:HE1	2.37	0.47
1:B:232:SER:O	1:B:236:SER:HB2	2.14	0.47
1:C:377:ALA:HA	1:C:380:HIS:HD2	1.81	0.46
1:B:307:TYR:CZ	1:B:311:LYS:HD2	2.51	0.46
1:A:163:LYS:HG2	1:A:164:LYS:H	1.79	0.46
1:B:58:LYS:CE	1:B:65:ASP:O	2.64	0.46
1:B:227:THR:HG21	1:B:333:PRO:HG3	1.97	0.46
1:C:218:PHE:CD1	1:C:228:VAL:HG13	2.51	0.46
1:B:350:SER:OG	1:B:352:TYR:CZ	2.69	0.46
1:C:248:LYS:HG3	1:C:249:SER:N	2.29	0.45
1:C:190:GLN:HA	1:C:193:LEU:HD13	1.98	0.45
1:C:278:PHE:CD1	1:C:283:GLU:HB3	2.52	0.45
1:A:74:ILE:O	1:A:78:SER:HB2	2.17	0.45
1:C:57:ASN:HA	1:C:176:PRO:HG2	1.99	0.45
1:C:38:PHE:CZ	1:C:378:TRP:CZ3	3.05	0.45
1:A:350:SER:OG	1:A:352:TYR:CZ	2.70	0.44
1:C:281:LEU:HD11	1:C:314:PHE:HA	1.98	0.44
1:A:128:ILE:HG21	1:A:136:PHE:CE1	2.51	0.44
1:C:377:ALA:HA	1:C:380:HIS:CD2	2.53	0.44
1:A:193:LEU:C	1:A:193:LEU:CD2	2.85	0.44
1:A:189:THR:O	1:A:193:LEU:HB3	2.17	0.44
1:C:189:THR:O	1:C:193:LEU:HB3	2.17	0.44
1:B:193:LEU:C	1:B:193:LEU:CD2	2.86	0.44
1:A:352:TYR:O	1:A:355:GLN:HB3	2.17	0.44
1:B:189:THR:O	1:B:193:LEU:HB3	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:126:LEU:C	1:A:126:LEU:HD23	2.39	0.43
1:A:281:LEU:HD11	1:A:314:PHE:HA	1.98	0.43
1:A:82:GLU:HG3	1:A:361:TYR:CE2	2.53	0.43
1:B:352:TYR:O	1:B:355:GLN:HB3	2.18	0.43
1:C:193:LEU:C	1:C:193:LEU:CD2	2.87	0.43
1:C:350:SER:OG	1:C:352:TYR:CZ	2.71	0.43
1:B:309:GLN:HE21	1:B:309:GLN:N	2.15	0.43
1:B:310:TYR:O	1:B:313:ALA:HB3	2.18	0.43
1:C:199:HIS:CD2	1:C:203:PRO:HA	2.53	0.43
1:B:111:ARG:HD2	1:B:129:THR:CG2	2.48	0.43
1:C:39:TYR:HD1	1:C:76:TYR:CZ	2.36	0.43
1:C:58:LYS:HE2	1:C:65:ASP:O	2.19	0.43
1:B:112:CYS:SG	1:C:126:LEU:HD21	2.59	0.43
1:A:316:LEU:HD12	1:A:316:LEU:HA	1.90	0.42
1:C:184:THR:O	1:C:184:THR:HG22	2.19	0.42
1:B:40:ILE:CG2	1:B:46:ILE:HD11	2.49	0.42
1:A:136:PHE:O	2:A:401:PRA:H21	2.19	0.42
1:B:255:ASP:HB3	1:B:256:ILE:HD12	2.01	0.42
1:C:352:TYR:O	1:C:355:GLN:HB3	2.19	0.42
1:B:116:ALA:O	1:B:120:LYS:HB2	2.19	0.42
1:C:316:LEU:HD11	1:C:321:LEU:CD1	2.50	0.42
1:C:109:ARG:HE	1:C:109:ARG:HB3	1.46	0.42
1:B:308:ASN:O	1:B:312:ASN:CG	2.58	0.41
1:C:339:GLU:OE1	1:C:339:GLU:N	2.53	0.41
1:C:128:ILE:HG21	1:C:136:PHE:CE1	2.55	0.41
1:A:39:TYR:HD1	1:A:76:TYR:CZ	2.38	0.41
1:C:312:ASN:HA	1:C:315:ILE:HD12	2.03	0.41
1:A:192:LEU:HD12	1:A:192:LEU:HA	1.91	0.41
1:B:218:PHE:CD1	1:B:228:VAL:HG13	2.55	0.41
1:C:118:ILE:HD11	1:C:157:ILE:CD1	2.51	0.41
1:C:146:PHE:O	1:C:150:SER:CB	2.66	0.41
1:C:316:LEU:HD12	1:C:316:LEU:HA	1.91	0.41
1:A:109:ARG:NH1	1:A:334:LEU:O	2.53	0.41
1:B:57:ASN:HA	1:B:176:PRO:HG2	2.02	0.41
1:B:108:THR:HG22	2:C:401:PRA:H2'	2.03	0.41
1:B:316:LEU:HD12	1:B:316:LEU:HA	1.89	0.41
1:C:58:LYS:CE	1:C:65:ASP:O	2.69	0.41
1:C:91:SER:OG	1:C:120:LYS:HE3	2.21	0.41
1:C:166:VAL:O	1:C:170:VAL:HG23	2.21	0.41
1:C:246:SER:OG	1:C:251:ASN:ND2	2.54	0.41
1:A:235:LEU:HD12	1:A:235:LEU:HA	1.97	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:111:ARG:HD2	1:B:129:THR:HG22	2.03	0.40
1:C:38:PHE:CE1	1:C:378:TRP:CZ3	3.09	0.40
1:C:257:VAL:HG13	1:C:275:ILE:HD13	2.03	0.40
1:B:311:LYS:O	1:B:312:ASN:OD1	2.39	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:254:LYS:NZ	1:B:270:TYR:O[1_554]	1.91	0.29
1:A:254:LYS:HZ1	1:B:270:TYR:O[1_554]	1.51	0.09

## 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	318/349 (91%)	302 (95%)	14 (4%)	2 (1%)	25	26
1	B	344/349 (99%)	321 (93%)	19 (6%)	4 (1%)	13	11
1	C	328/349 (94%)	305 (93%)	21 (6%)	2 (1%)	25	26
All	All	990/1047 (95%)	928 (94%)	54 (6%)	8 (1%)	19	20

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	138	LYS
1	A	248	LYS
1	B	138	LYS
1	B	248	LYS
1	C	247	CYS
1	B	312	ASN
1	B	305	ASP

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Mol	Chain	Res	Type
1	C	42	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	304/328 (93%)	274 (90%)	30 (10%)	8 6
1	B	325/328 (99%)	303 (93%)	22 (7%)	16 17
1	C	311/328 (95%)	282 (91%)	29 (9%)	9 8
All	All	940/984 (96%)	859 (91%)	81 (9%)	10 10

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	ASP
1	A	54	LYS
1	A	69	GLU
1	A	78	SER
1	A	79	LYS
1	A	95	GLU
1	A	126	LEU
1	A	133	SER
1	A	134	THR
1	A	163	LYS
1	A	172	SER
1	A	192	LEU
1	A	193	LEU
1	A	214	LEU
1	A	233	LYS
1	A	235	LEU
1	A	247	CYS
1	A	248	LYS
1	A	249	SER
1	A	254	LYS
1	A	273	ASP

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	280	ASN
1	A	312	ASN
1	A	317	SER
1	A	321	LEU
1	A	345	ASP
1	A	352	TYR
1	A	367	LEU
1	A	369	LEU
1	A	372	SER
1	B	50	LYS
1	B	56	LYS
1	B	78	SER
1	B	119	LEU
1	B	126	LEU
1	B	134	THR
1	B	135	SER
1	B	192	LEU
1	B	193	LEU
1	B	206	LEU
1	B	214	LEU
1	B	235	LEU
1	B	247	CYS
1	B	249	SER
1	B	266	LYS
1	B	281	LEU
1	B	282	GLU
1	B	309	GLN
1	B	336	ARG
1	B	349	LYS
1	B	352	TYR
1	B	378	TRP
1	C	40	ILE
1	C	42	SER
1	C	43	LYS
1	C	63	ILE
1	C	78	SER
1	C	87	ASN
1	C	89	GLU
1	C	126	LEU
1	C	132	ASN
1	C	134	THR
1	C	172	SER

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Mol	Chain	Res	Type
1	C	192	LEU
1	C	193	LEU
1	C	214	LEU
1	C	226	ARG
1	C	235	LEU
1	C	241	SER
1	C	249	SER
1	C	251	ASN
1	C	255	ASP
1	C	271	SER
1	C	279	ASP
1	C	280	ASN
1	C	317	SER
1	C	318	ASN
1	C	321	LEU
1	C	345	ASP
1	C	352	TYR
1	C	375	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	80	GLN
1	A	165	ASN
1	A	190	GLN
1	A	199	HIS
1	A	312	ASN
1	A	323	ASN
1	B	96	ASN
1	B	190	GLN
1	B	258	ASN
1	B	289	HIS
1	B	309	GLN
1	B	323	ASN
1	C	190	GLN
1	C	199	HIS
1	C	243	ASN
1	C	251	ASN
1	C	289	HIS
1	C	323	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 6 ligands modelled in this entry, 1 is 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
2	PRA	A	401	-	10,10,10	0.17	0	11,11,11	0.26	0
2	PRA	C	401	-	10,10,10	0.33	0	11,11,11	0.25	0
4	SO4	C	403	-	4,4,4	0.36	0	6,6,6	0.25	0
2	PRA	B	401	-	10,10,10	0.22	0	11,11,11	0.29	0
4	SO4	C	402	-	4,4,4	0.32	0	6,6,6	0.28	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
2	PRA	C	401	-	-	1/4/4/4	0/1/1/1
2	PRA	A	401	-	-	3/4/4/4	0/1/1/1
2	PRA	B	401	-	-	2/4/4/4	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

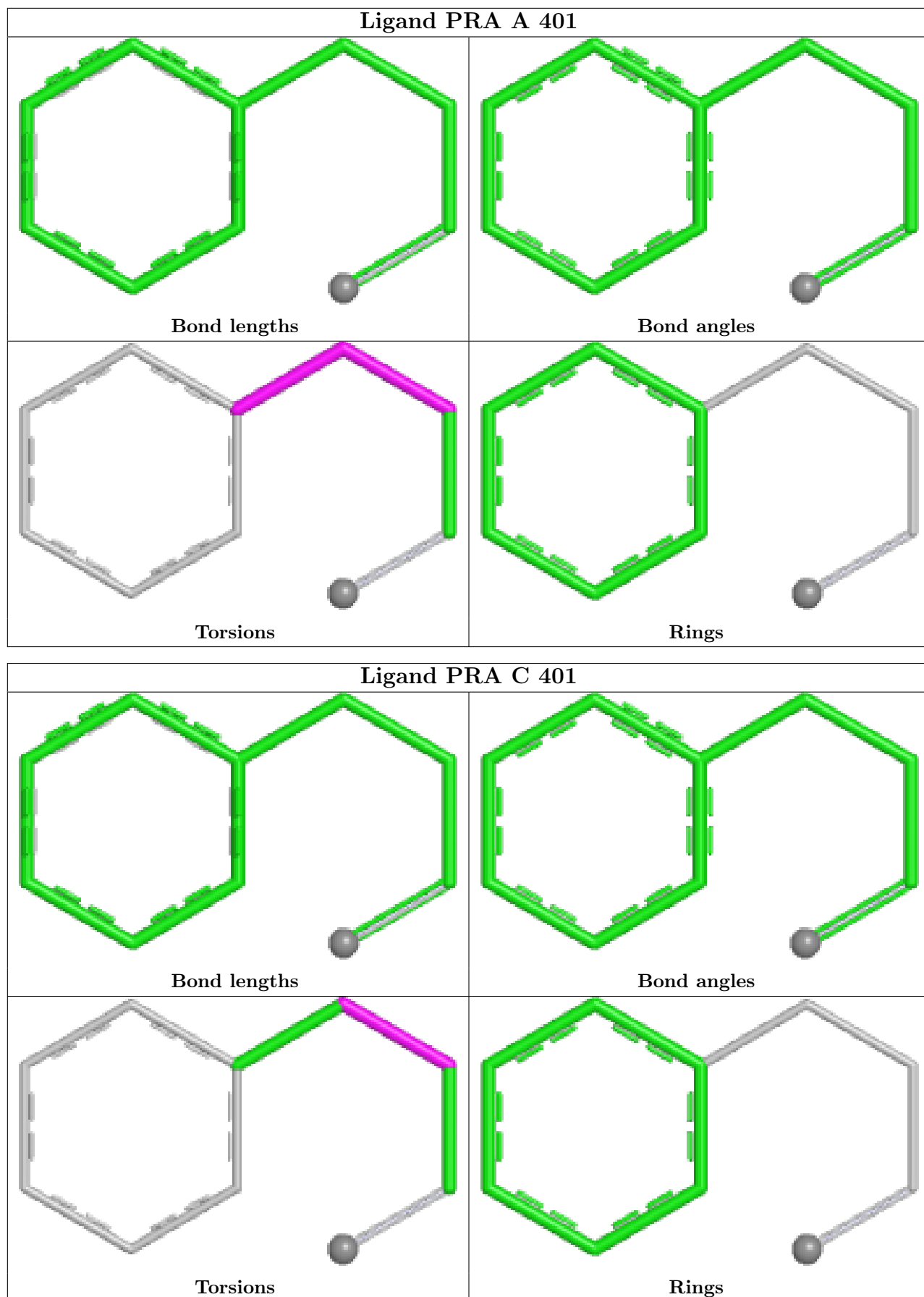
Mol	Chain	Res	Type	Atoms
2	A	401	PRA	C1-C2-C3-C1'
2	C	401	PRA	C1-C2-C3-C1'
2	B	401	PRA	C1-C2-C3-C1'
2	A	401	PRA	C2'-C1'-C3-C2
2	B	401	PRA	N-C1-C2-C3
2	A	401	PRA	C6'-C1'-C3-C2

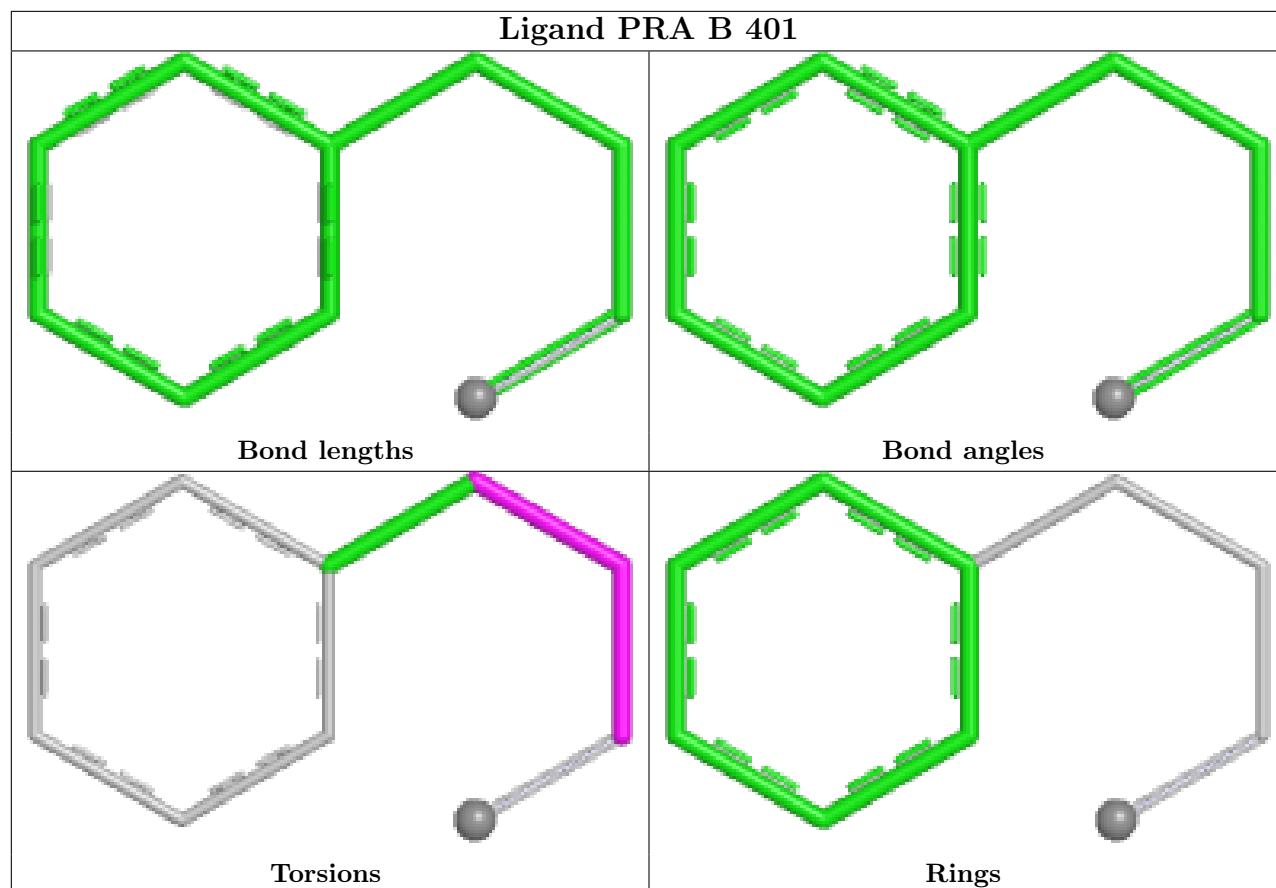
There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	401	PRA	4	0
2	C	401	PRA	1	0
2	B	401	PRA	2	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	324/349 (92%)	0.34	8 (2%) 57 66	39, 60, 99, 121	0
1	B	346/349 (99%)	0.28	7 (2%) 65 74	36, 55, 99, 124	0
1	C	332/349 (95%)	0.39	13 (3%) 39 50	38, 65, 99, 122	0
All	All	1002/1047 (95%)	0.33	28 (2%) 53 63	36, 60, 99, 124	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	375	SER	4.5
1	C	130	ASP	4.0
1	B	130	ASP	3.6
1	C	38	PHE	3.4
1	B	248	LYS	3.2
1	B	302	THR	3.2
1	C	281	LEU	3.1
1	C	138	LYS	2.9
1	A	248	LYS	2.9
1	B	319	LYS	2.9
1	A	39	TYR	2.9
1	A	247	CYS	2.7
1	B	38	PHE	2.7
1	C	295	ARG	2.6
1	A	313	ALA	2.6
1	C	139	GLY	2.5
1	B	298	LYS	2.3
1	A	314	PHE	2.3
1	A	43	LYS	2.3
1	B	311	LYS	2.3
1	C	314	PHE	2.3
1	C	338	ASN	2.2
1	A	319	LYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	285	LEU	2.1
1	A	374	THR	2.1
1	C	277	TYR	2.1
1	C	286	GLU	2.0
1	C	223	LYS	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.

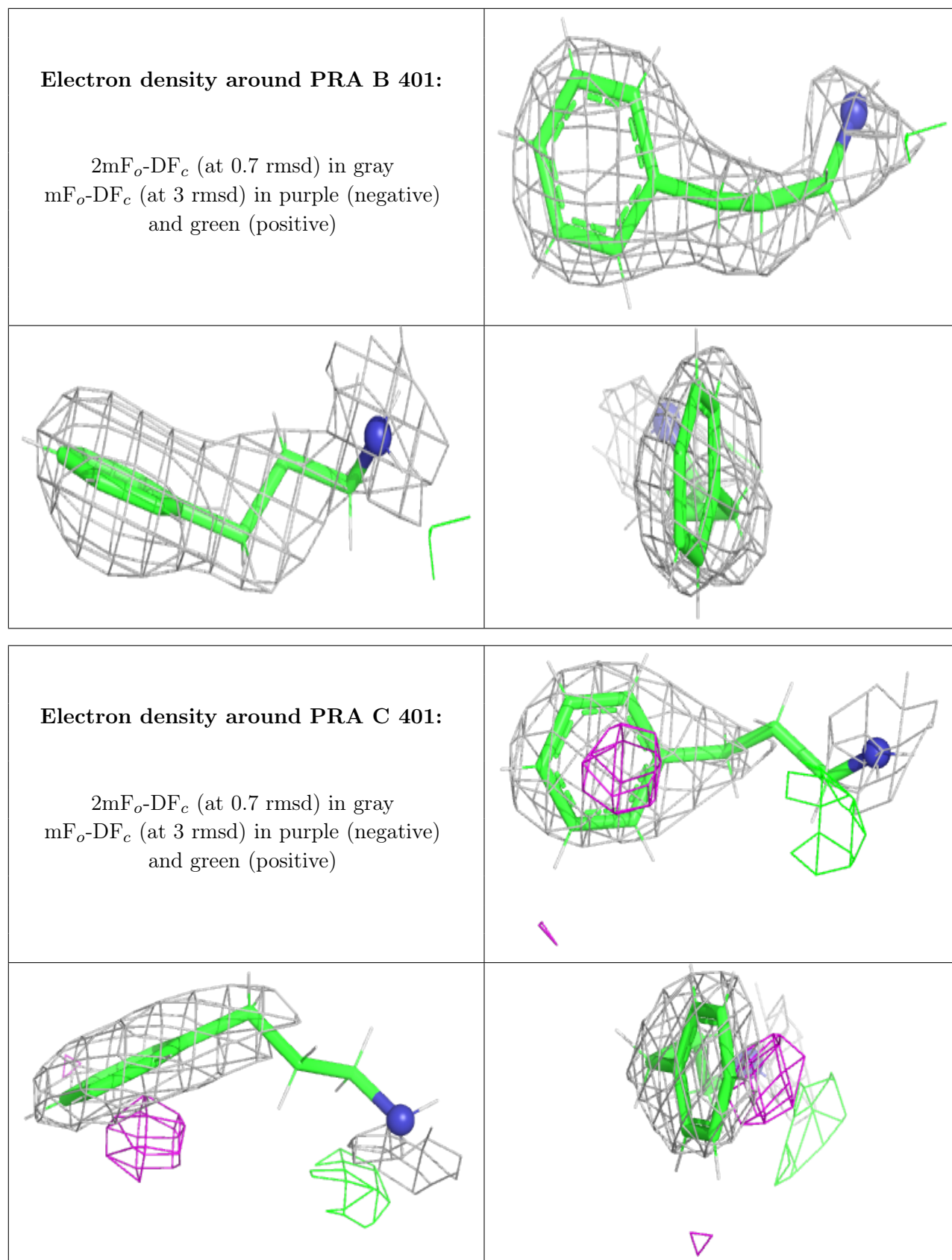
## 6.4 Ligands [i](#)

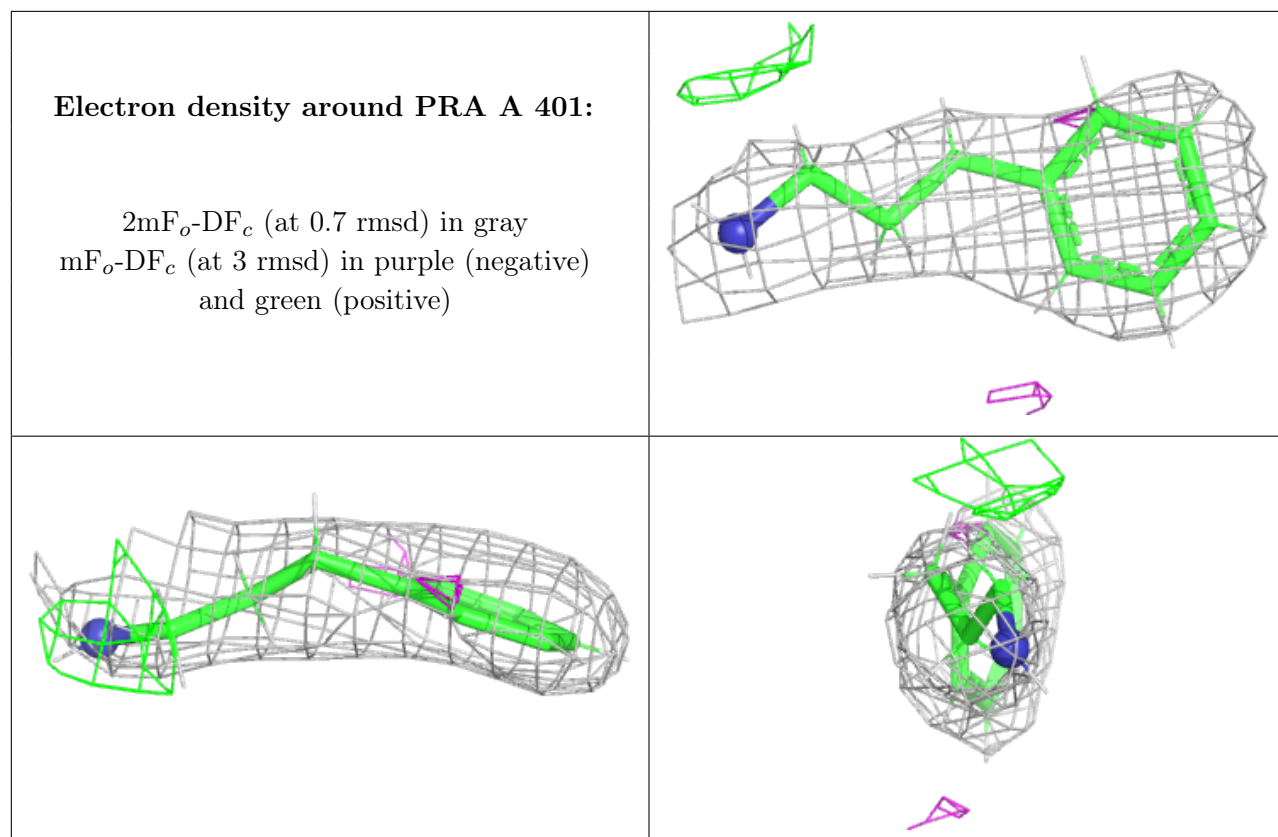
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
3	NA	A	402	1/1	0.86	0.26	53,53,53,53	0
2	PRA	B	401	10/10	0.87	0.27	71,79,93,94	0
2	PRA	C	401	10/10	0.88	0.43	73,80,92,93	0
2	PRA	A	401	10/10	0.90	0.22	63,70,87,90	0
4	SO4	C	402	5/5	0.98	0.13	50,51,64,73	0
4	SO4	C	403	5/5	0.99	0.11	48,51,54,57	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.







## 6.5 Other polymers [i](#)

There are no such residues in this entry.