



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2022 – 04:48 pm BST

PDB ID : 7ZCZ  
Title : Crystal Structure of truncated aspartate transcarbamoylase from Plasmodium falciparum with bound inhibitor 1-(4-chlorophenyl)methanamine  
Authors : Wang, C.; Zhang, B.  
Deposited on : 2022-03-29  
Resolution : 2.45 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)  
Xtriage (Phenix) : 1.13  
EDS : 2.29  
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) : 2.29

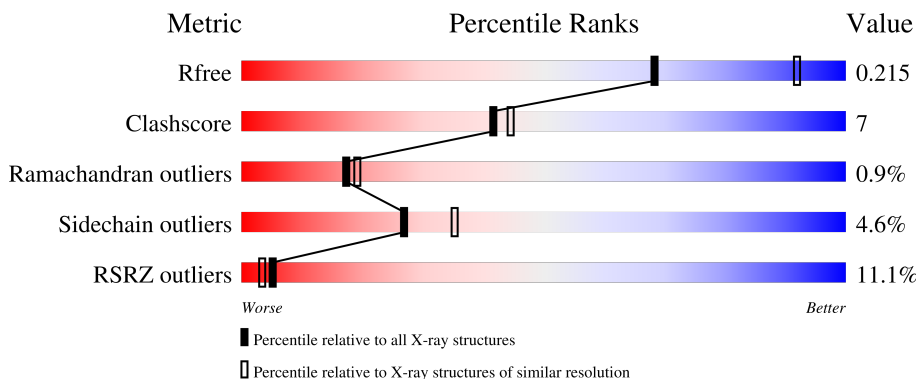
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.45 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	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

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	
1	B	349	
1	C	349	

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 16573 atoms, of which 8215 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	328	5330	1697	2677	437	511	8	83	0	0
1	B	345	5609	1792	2805	461	543	8	88	0	0
1	C	334	5421	1731	2717	444	521	8	85	0	0

There are 30 discrepancies between the modelled and reference sequences:

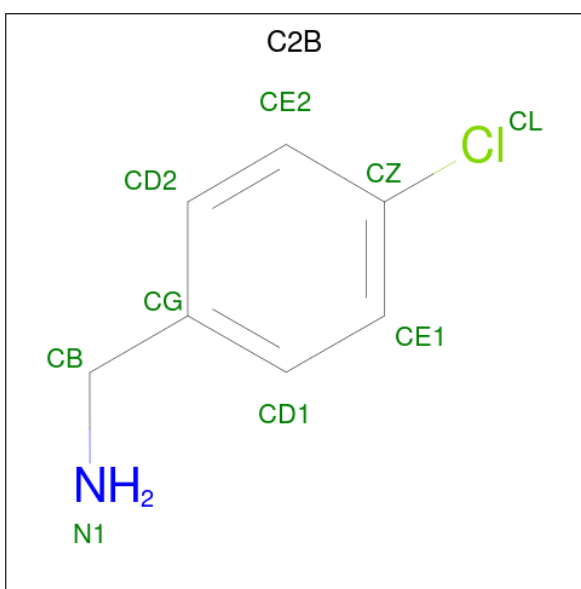
Chain	Residue	Modelled	Actual	Comment	Reference
A	376	SER	-	expression tag	UNP A0A5K1K910
A	377	ALA	-	expression tag	UNP A0A5K1K910
A	378	TRP	-	expression tag	UNP A0A5K1K910
A	379	SER	-	expression tag	UNP A0A5K1K910
A	380	HIS	-	expression tag	UNP A0A5K1K910
A	381	PRO	-	expression tag	UNP A0A5K1K910
A	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 1-(4-CHLOROPHENYL)METHANAMINE (three-letter code: C2B) (formula: C<sub>7</sub>H<sub>8</sub>ClN) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Cl	H			N
2	A	1	17	7	1	8	1	0	0
2	B	1	17	7	1	8	1	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Na	0	0
			1	1		

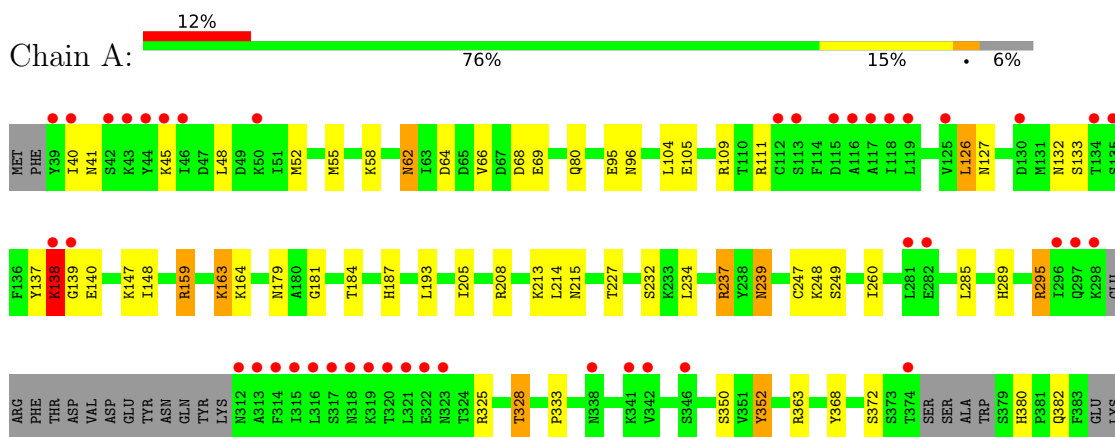
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	50	Total	O	0	0
			50	50		
5	B	74	Total	O	0	0
			74	74		
5	C	39	Total	O	0	0
			39	39		

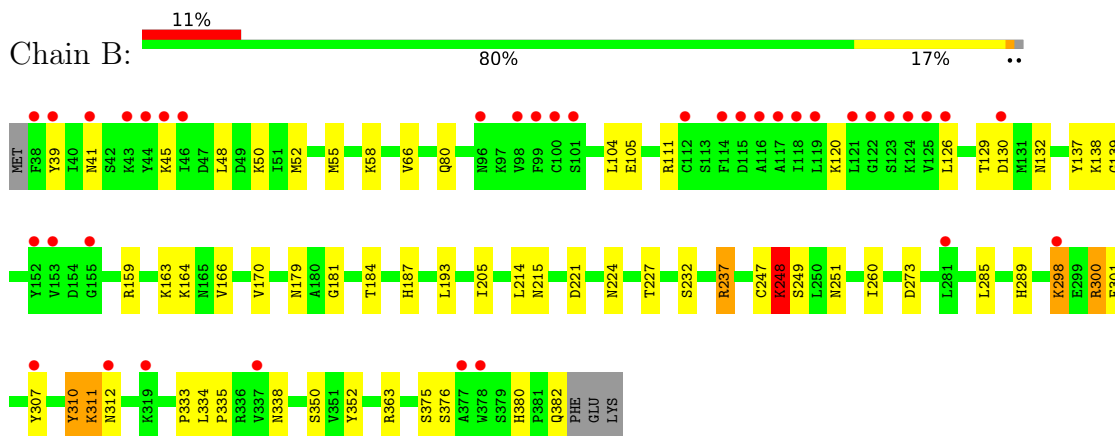
### 3 Residue-property plots

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.

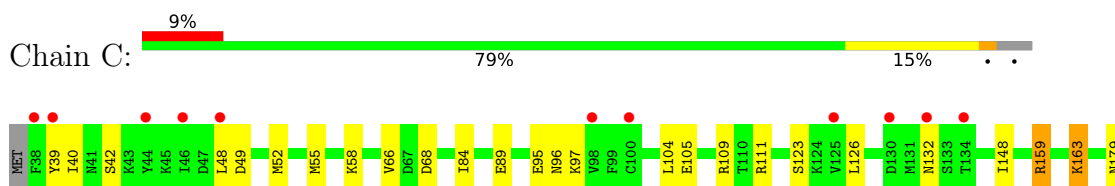
- Molecule 1: Aspartate carbamoyltransferase

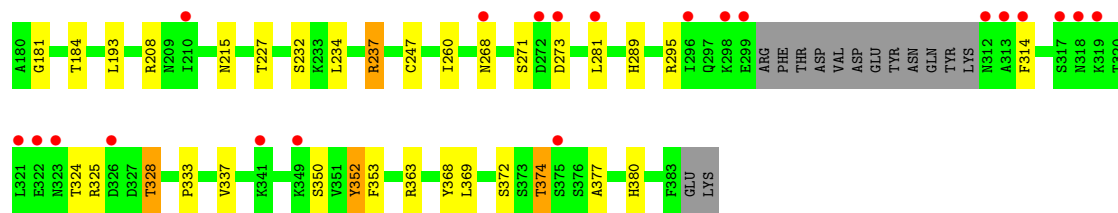


- Molecule 1: Aspartate carbamoyltransferase



- 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, $\alpha$ , $\beta$ , $\gamma$	86.66Å 103.63Å 86.86Å 90.00° 117.45° 90.00°	Depositor
Resolution (Å)	43.42 – 2.45 43.39 – 2.45	Depositor EDS
% Data completeness (in resolution range)	99.1 (43.42-2.45) 85.5 (43.39-2.45)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.53 (at 2.45Å)	Xtriage
Refinement program	REFMAC 5.8.0267, REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.176 , 0.218 0.179 , 0.215	Depositor DCC
$R_{free}$ test set	2021 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	48.5	Xtriage
Anisotropy	0.705	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>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h-l,k,h 0.000 for l,k,-h-l 0.018 for h,-k,-h-l 0.023 for -h-l,-k,l 0.007 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	16573	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.60% 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: NA, SO4, C2B

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	1/2701 (0.0%)	1.01	8/3646 (0.2%)
1	B	0.80	0/2859	0.99	4/3864 (0.1%)
1	C	0.78	0/2756	0.96	5/3723 (0.1%)
All	All	0.79	1/8316 (0.0%)	0.99	17/11233 (0.2%)

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 (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	69	GLU	CD-OE1	7.63	1.34	1.25

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	363	ARG	NE-CZ-NH2	8.40	124.50	120.30
1	A	126	LEU	CB-CA-C	7.36	124.18	110.20
1	B	363	ARG	NE-CZ-NH1	-6.93	116.84	120.30
1	B	111	ARG	NE-CZ-NH1	-6.68	116.96	120.30
1	A	363	ARG	NE-CZ-NH1	-6.59	117.00	120.30
1	A	126	LEU	N-CA-CB	-6.52	97.36	110.40
1	C	363	ARG	NE-CZ-NH1	-6.40	117.10	120.30
1	C	363	ARG	NE-CZ-NH2	6.28	123.44	120.30
1	A	237	ARG	NE-CZ-NH1	6.03	123.31	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	237	ARG	NE-CZ-NH1	5.86	123.23	120.30
1	A	126	LEU	CA-CB-CG	5.69	128.40	115.30
1	C	159	ARG	CB-CG-CD	5.68	126.38	111.60
1	C	237	ARG	CB-CG-CD	5.45	125.76	111.60
1	B	237	ARG	NE-CZ-NH1	5.41	123.00	120.30
1	A	237	ARG	CB-CG-CD	5.22	125.17	111.60
1	A	159	ARG	CB-CG-CD	5.17	125.03	111.60
1	B	363	ARG	NE-CZ-NH2	5.14	122.87	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	310	TYR	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	2653	2677	2668	41	0
1	B	2804	2805	2798	41	0
1	C	2704	2717	2709	36	0
2	A	9	8	8	1	0
2	B	9	8	8	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	C	5	0	0	0	0
4	B	1	0	0	0	0
5	A	50	0	0	3	0
5	B	74	0	0	4	0
5	C	39	0	0	2	0
All	All	8358	8215	8191	114	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 7.

All (114) 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:A:109:ARG:HD2	5:A:720:HOH:O	1.57	1.03
1:C:109:ARG:HD2	5:C:511:HOH:O	1.65	0.96
1:A:163:LYS:HB3	1:A:184:THR:HG23	1.50	0.94
1:B:215:ASN:H	1:B:289:HIS:HD2	1.22	0.86
1:A:215:ASN:H	1:A:289:HIS:HD2	1.23	0.85
1:B:137:TYR:O	1:B:139:GLY:N	2.10	0.84
1:C:215:ASN:H	1:C:289:HIS:HD2	1.25	0.83
1:A:137:TYR:O	1:A:139:GLY:N	2.13	0.80
1:B:163:LYS:HB2	1:B:184:THR:HG23	1.66	0.77
1:B:375:SER:HB2	1:B:380:HIS:HE1	1.50	0.76
1:C:163:LYS:HB2	1:C:184:THR:HG23	1.66	0.76
1:B:375:SER:HB2	1:B:380:HIS:CE1	2.23	0.73
1:A:163:LYS:H	1:A:163:LYS:HD3	1.54	0.72
1:A:163:LYS:H	1:A:163:LYS:CD	2.03	0.71
1:C:208:ARG:NH1	1:C:237:ARG:O	2.24	0.69
1:A:163:LYS:CB	1:A:184:THR:HG23	2.24	0.68
1:A:208:ARG:NH1	1:A:237:ARG:O	2.27	0.66
1:B:298:LYS:HA	1:B:307:TYR:CD2	2.33	0.64
1:B:164:LYS:CE	5:B:758:HOH:O	2.45	0.64
1:C:39:TYR:OH	1:C:377:ALA:O	2.17	0.62
1:C:109:ARG:CD	5:C:511:HOH:O	2.33	0.62
1:B:251:ASN:HB3	5:B:741:HOH:O	2.01	0.59
1:A:95:GLU:O	1:A:96:ASN:HB2	2.02	0.58
1:B:48:LEU:HG	1:B:52:MET:CE	2.34	0.58
1:C:48:LEU:HG	1:C:52:MET:HE1	1.84	0.58
1:A:62:ASN:HD21	1:A:64:ASP:HB2	1.69	0.58
1:B:163:LYS:HD2	1:B:184:THR:HG21	1.87	0.57
1:C:163:LYS:HD2	1:C:184:THR:HG21	1.86	0.57
1:B:164:LYS:HE2	5:B:758:HOH:O	2.02	0.57
1:C:105:GLU:OE1	1:C:159:ARG:HD3	2.04	0.57
1:B:179:ASN:ND2	1:B:181:GLY:H	2.03	0.57
1:A:80:GLN:HE21	1:A:382:GLN:HA	1.70	0.56
1:C:48:LEU:HG	1:C:52:MET:CE	2.35	0.56
1:A:179:ASN:ND2	1:A:181:GLY:H	2.04	0.56
1:A:48:LEU:HG	1:A:52:MET:CE	2.35	0.56
1:C:281:LEU:HD11	1:C:314:PHE:HA	1.86	0.56
1:C:66:VAL:O	1:C:237:ARG:NH2	2.35	0.55
1:A:368:TYR:O	1:A:372:SER:HB2	2.07	0.55
1:C:84:ILE:HG23	1:C:89:GLU:HB2	1.88	0.55
1:A:105:GLU:OE1	1:A:159:ARG:HD3	2.07	0.55
1:B:311:LYS:CD	1:B:338:ASN:HB2	2.37	0.55
1:B:105:GLU:OE1	1:B:159:ARG:HD3	2.08	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:215:ASN:H	1:C:289:HIS:CD2	2.16	0.54
1:B:66:VAL:O	1:B:237:ARG:NH2	2.40	0.54
1:B:310:TYR:C	1:B:311:LYS:O	2.47	0.53
1:A:227:THR:HG21	1:A:333:PRO:HG3	1.92	0.52
1:A:109:ARG:CD	5:A:720:HOH:O	2.32	0.51
1:C:52:MET:SD	1:C:380:HIS:CE1	3.04	0.51
1:B:80:GLN:HE21	1:B:382:GLN:HA	1.75	0.51
1:B:350:SER:HB2	1:B:352:TYR:CE1	2.46	0.51
1:A:127:ASN:O	1:C:111:ARG:NH1	2.44	0.50
1:B:55:MET:O	1:B:58:LYS:HB3	2.12	0.50
1:A:55:MET:O	1:A:58:LYS:HB3	2.12	0.50
1:A:295:ARG:HB2	1:A:295:ARG:NH1	2.27	0.50
1:A:163:LYS:HE2	1:A:164:LYS:H	1.76	0.50
1:A:66:VAL:O	1:A:237:ARG:NH2	2.39	0.50
1:B:215:ASN:H	1:B:289:HIS:CD2	2.14	0.49
1:C:179:ASN:ND2	1:C:181:GLY:H	2.10	0.49
1:C:350:SER:HB2	1:C:352:TYR:CE1	2.47	0.49
1:C:95:GLU:O	1:C:96:ASN:HB2	2.12	0.49
1:A:325:ARG:O	1:A:328:THR:HG23	2.13	0.48
1:C:55:MET:O	1:C:58:LYS:HB3	2.13	0.48
1:A:140:GLU:OE1	2:A:601:C2B:HD1	2.14	0.48
1:B:334:LEU:HD13	1:C:148:ILE:HD11	1.95	0.48
1:C:232:SER:HB3	1:C:260:ILE:HD11	1.95	0.48
1:A:213:LYS:HE2	5:A:735:HOH:O	2.13	0.47
1:B:300:ARG:HD3	1:B:300:ARG:HA	1.50	0.47
1:C:227:THR:HG21	1:C:333:PRO:HG3	1.95	0.47
1:C:368:TYR:O	1:C:372:SER:HB2	2.15	0.47
1:B:312:ASN:HD22	1:B:312:ASN:N	2.12	0.47
1:A:213:LYS:HD3	1:A:239:ASN:HD21	1.80	0.47
1:A:215:ASN:H	1:A:289:HIS:CD2	2.15	0.47
1:B:166:VAL:O	1:B:170:VAL:HG23	2.16	0.46
1:B:227:THR:HG21	1:B:333:PRO:HG3	1.97	0.46
1:B:52:MET:CE	1:B:380:HIS:CE1	2.98	0.46
1:B:52:MET:HE3	1:B:380:HIS:CE1	2.51	0.46
1:B:129:THR:HG22	1:B:130:ASP:H	1.80	0.46
1:B:248:LYS:O	1:B:251:ASN:ND2	2.49	0.46
1:B:301:PHE:CD2	1:B:301:PHE:N	2.83	0.45
1:C:325:ARG:O	1:C:328:THR:HG23	2.16	0.45
1:A:148:ILE:HD13	1:C:109:ARG:HE	1.82	0.45
1:A:147:LYS:HE3	1:C:353:PHE:CD2	2.53	0.44
1:B:311:LYS:HD3	1:B:338:ASN:HB2	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:377:ALA:HA	1:C:380:HIS:CD2	2.53	0.44
1:A:232:SER:HB3	1:A:260:ILE:HD11	2.00	0.43
1:A:350:SER:HB2	1:A:352:TYR:CE1	2.53	0.43
1:C:372:SER:OG	1:C:374:THR:HG23	2.18	0.43
1:B:193:LEU:C	1:B:193:LEU:HD12	2.39	0.43
1:A:163:LYS:HE2	1:A:163:LYS:N	2.33	0.43
1:A:193:LEU:HD12	1:A:193:LEU:C	2.39	0.42
1:B:298:LYS:C	1:B:300:ARG:H	2.23	0.42
1:A:48:LEU:HG	1:A:52:MET:HE3	2.01	0.42
1:A:234:LEU:HA	1:A:237:ARG:HD3	2.00	0.42
1:B:164:LYS:HE3	5:B:758:HOH:O	2.13	0.42
1:A:104:LEU:O	1:A:132:ASN:HA	2.20	0.42
1:C:193:LEU:C	1:C:193:LEU:HD12	2.39	0.42
1:B:39:TYR:CE1	1:B:45:LYS:HB3	2.55	0.42
1:B:232:SER:HB3	1:B:260:ILE:HD11	2.02	0.42
1:A:325:ARG:HB2	1:A:328:THR:HG22	2.02	0.41
1:B:334:LEU:HB3	1:B:335:PRO:HA	2.02	0.41
1:C:104:LEU:O	1:C:132:ASN:HA	2.20	0.41
1:B:104:LEU:O	1:B:132:ASN:HA	2.20	0.41
1:C:234:LEU:HA	1:C:237:ARG:HD3	2.02	0.41
1:A:295:ARG:HB2	1:A:295:ARG:CZ	2.50	0.41
1:C:324:THR:HB	1:C:328:THR:HG21	2.02	0.41
1:A:68:ASP:CG	1:A:208:ARG:HH22	2.25	0.40
1:A:52:MET:CE	1:A:380:HIS:CE1	3.05	0.40
1:B:120:LYS:HA	1:B:120:LYS:HD2	1.89	0.40
1:B:129:THR:HG22	1:B:130:ASP:N	2.36	0.40
1:B:221:ASP:OD2	1:B:224:ASN:HB2	2.22	0.40
1:C:68:ASP:CG	1:C:208:ARG:HH22	2.25	0.40
1:A:138:LYS:HE2	1:A:138:LYS:HA	2.03	0.40
1:C:52:MET:HE2	1:C:369:LEU:HD23	2.03	0.40
1:C:97:LYS:HB2	1:C:123:SER:OG	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	322/349 (92%)	306 (95%)	14 (4%)	2 (1%)	25	29
1	B	343/349 (98%)	326 (95%)	13 (4%)	4 (1%)	13	12
1	C	330/349 (95%)	309 (94%)	18 (6%)	3 (1%)	17	19
All	All	995/1047 (95%)	941 (95%)	45 (4%)	9 (1%)	17	19

All (9) 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	B	311	LYS
1	C	247	CYS
1	C	374	THR
1	B	41	ASN
1	C	337	VAL

### 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	308/328 (94%)	289 (94%)	19 (6%)	18	23
1	B	324/328 (99%)	311 (96%)	13 (4%)	31	41
1	C	313/328 (95%)	302 (96%)	11 (4%)	36	47
All	All	945/984 (96%)	902 (95%)	43 (5%)	27	35

All (43) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	ILE

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	41	ASN
1	A	45	LYS
1	A	62	ASN
1	A	111	ARG
1	A	126	LEU
1	A	133	SER
1	A	138	LYS
1	A	163	LYS
1	A	187	HIS
1	A	205	ILE
1	A	214	LEU
1	A	239	ASN
1	A	247	CYS
1	A	249	SER
1	A	285	LEU
1	A	295	ARG
1	A	328	THR
1	A	352	TYR
1	B	50	LYS
1	B	126	LEU
1	B	187	HIS
1	B	205	ILE
1	B	214	LEU
1	B	247	CYS
1	B	248	LYS
1	B	249	SER
1	B	273	ASP
1	B	285	LEU
1	B	298	LYS
1	B	300	ARG
1	B	376	SER
1	C	40	ILE
1	C	42	SER
1	C	49	ASP
1	C	126	LEU
1	C	163	LYS
1	C	268	ASN
1	C	271	SER
1	C	273	ASP
1	C	295	ARG
1	C	328	THR
1	C	352	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (30) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	80	GLN
1	A	165	ASN
1	A	179	ASN
1	A	199	HIS
1	A	239	ASN
1	A	243	ASN
1	A	280	ASN
1	A	289	HIS
1	A	323	ASN
1	A	338	ASN
1	B	41	ASN
1	B	80	GLN
1	B	165	ASN
1	B	179	ASN
1	B	243	ASN
1	B	280	ASN
1	B	289	HIS
1	B	312	ASN
1	B	323	ASN
1	B	338	ASN
1	C	80	GLN
1	C	165	ASN
1	C	179	ASN
1	C	199	HIS
1	C	224	ASN
1	C	243	ASN
1	C	280	ASN
1	C	289	HIS
1	C	323	ASN
1	C	338	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	C2B	A	601	-	9,9,9	0.24	0	11,11,11	0.57	0
2	C2B	B	601	-	9,9,9	0.60	0	11,11,11	0.68	0
3	SO4	A	602	-	4,4,4	0.29	0	6,6,6	0.10	0
3	SO4	B	602	-	4,4,4	0.39	0	6,6,6	0.23	0
3	SO4	C	401	-	4,4,4	0.25	0	6,6,6	0.22	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	C2B	A	601	-	-	0/2/2/2	0/1/1/1
2	C2B	B	601	-	-	1/2/2/2	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

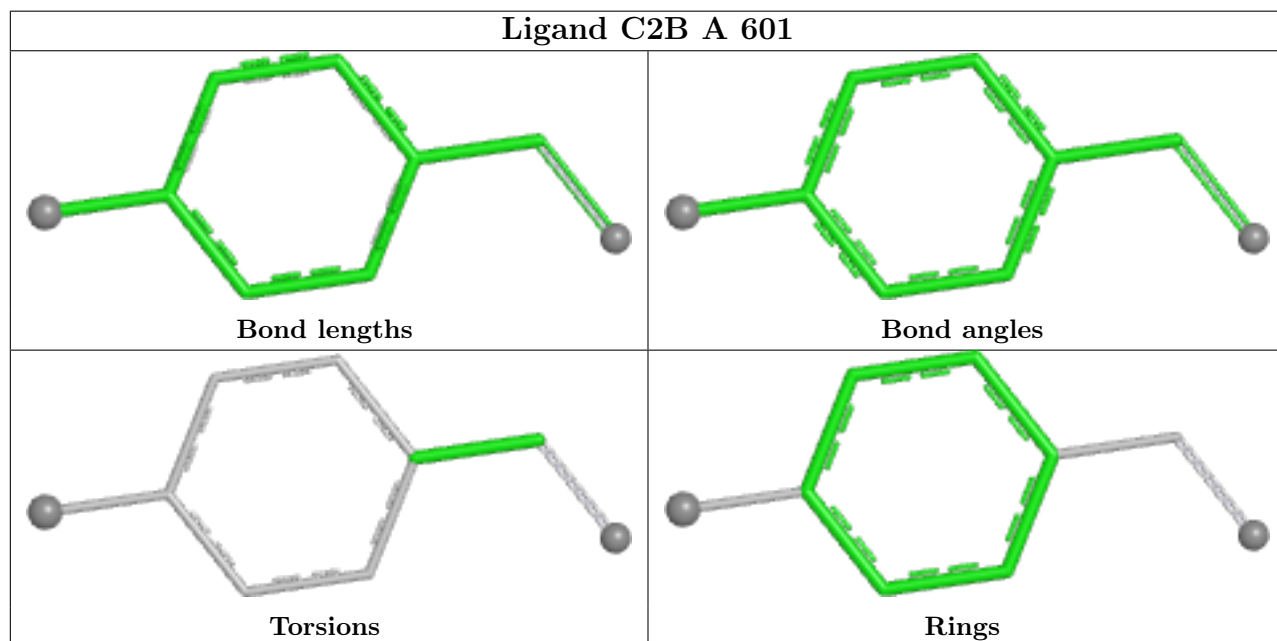
Mol	Chain	Res	Type	Atoms
2	B	601	C2B	N1-CB-CG-CD2

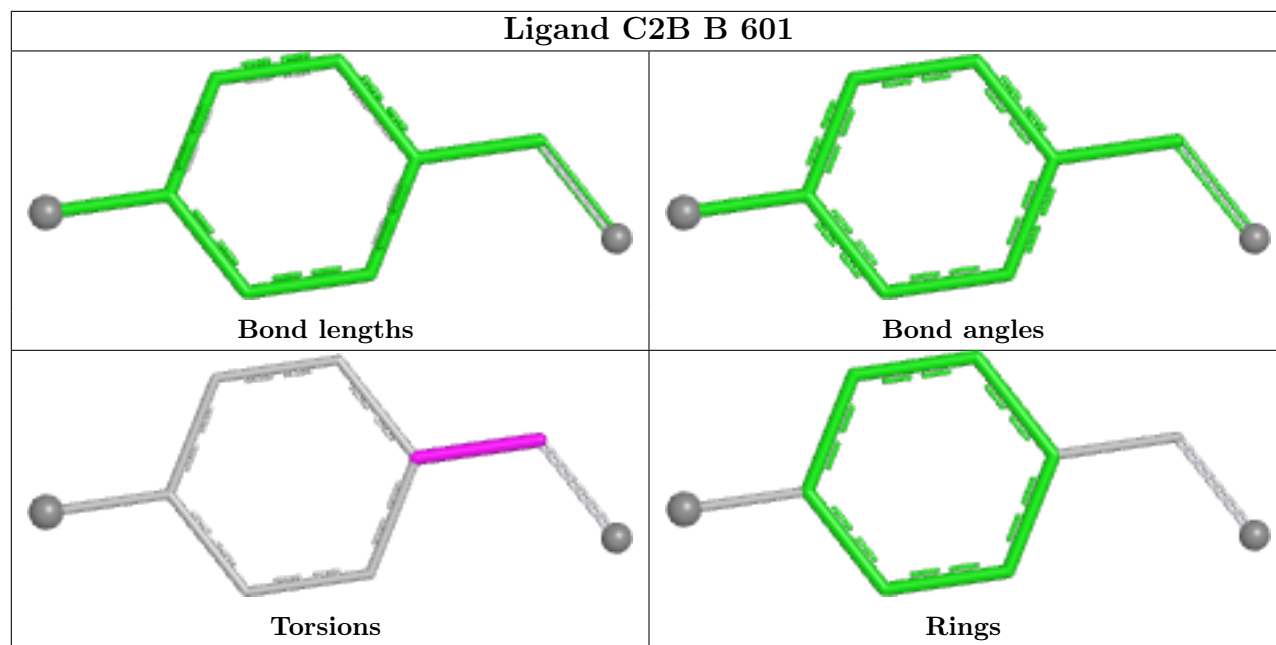
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	C2B	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	328/349 (93%)	0.68	43 (13%) <b>3</b> <b>2</b>	38, 61, 101, 112	0
1	B	345/349 (98%)	0.50	37 (10%) <b>6</b> <b>4</b>	38, 56, 96, 122	0
1	C	334/349 (95%)	0.56	32 (9%) <b>8</b> <b>5</b>	41, 67, 103, 128	0
All	All	1007/1047 (96%)	0.58	112 (11%) <b>5</b> <b>3</b>	38, 61, 101, 128	0

All (112) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	130	ASP	6.5
1	A	296	ILE	5.9
1	C	273	ASP	5.2
1	C	298	LYS	4.9
1	B	45	LYS	4.7
1	A	39	TYR	4.7
1	B	125	VAL	4.5
1	A	319	LYS	4.5
1	B	38	PHE	4.2
1	B	100	CYS	4.0
1	A	314	PHE	4.0
1	A	342	VAL	3.9
1	C	375	SER	3.8
1	C	38	PHE	3.8
1	A	297	GLN	3.8
1	A	338	ASN	3.7
1	A	341	LYS	3.7
1	A	321	LEU	3.6
1	C	210	ILE	3.6
1	A	139	GLY	3.6
1	C	314	PHE	3.6
1	B	377	ALA	3.6
1	C	46	ILE	3.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	378	TRP	3.4
1	B	39	TYR	3.4
1	B	44	TYR	3.4
1	A	313	ALA	3.4
1	B	99	PHE	3.3
1	B	319	LYS	3.3
1	A	130	ASP	3.3
1	B	43	LYS	3.3
1	A	116	ALA	3.2
1	C	44	TYR	3.2
1	C	323	ASN	3.2
1	A	322	GLU	3.1
1	A	317	SER	3.1
1	A	46	ILE	3.1
1	C	39	TYR	3.1
1	B	41	ASN	3.1
1	C	132	ASN	3.1
1	B	46	ILE	3.0
1	A	42	SER	3.0
1	A	320	THR	3.0
1	C	299	GLU	3.0
1	A	298	LYS	3.0
1	A	318	ASN	3.0
1	A	374	THR	3.0
1	A	119	LEU	2.9
1	B	98	VAL	2.9
1	A	315	ILE	2.9
1	C	268	ASN	2.9
1	B	298	LYS	2.9
1	A	43	LYS	2.9
1	A	312	ASN	2.9
1	B	312	ASN	2.9
1	A	281	LEU	2.9
1	B	123	SER	2.8
1	A	134	THR	2.8
1	B	118	ILE	2.8
1	C	48	LEU	2.7
1	B	119	LEU	2.7
1	B	130	ASP	2.7
1	C	272	ASP	2.7
1	A	112	CYS	2.6
1	A	113	SER	2.6

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	117	ALA	2.6
1	A	44	TYR	2.6
1	A	316	LEU	2.6
1	B	115	ASP	2.6
1	C	341	LYS	2.6
1	C	134	THR	2.6
1	A	45	LYS	2.6
1	C	296	ILE	2.5
1	A	138	LYS	2.5
1	C	349	LYS	2.5
1	A	50	LYS	2.5
1	C	281	LEU	2.5
1	B	153	VAL	2.4
1	B	126	LEU	2.4
1	A	135	SER	2.4
1	C	321	LEU	2.4
1	B	114	PHE	2.4
1	B	152	TYR	2.4
1	A	282	GLU	2.3
1	B	117	ALA	2.3
1	A	323	ASN	2.3
1	C	322	GLU	2.2
1	B	281	LEU	2.2
1	B	101	SER	2.2
1	C	317	SER	2.2
1	B	155	GLY	2.2
1	C	100	CYS	2.2
1	B	116	ALA	2.1
1	C	318	ASN	2.1
1	A	40	ILE	2.1
1	B	122	GLY	2.1
1	C	319	LYS	2.1
1	A	125	VAL	2.1
1	B	121	LEU	2.1
1	C	326	ASP	2.1
1	C	125	VAL	2.1
1	B	112	CYS	2.1
1	C	312	ASN	2.1
1	B	337	VAL	2.1
1	B	307	TYR	2.1
1	B	124	LYS	2.1
1	A	118	ILE	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	346	SER	2.0
1	C	313	ALA	2.0
1	B	96	ASN	2.0
1	C	98	VAL	2.0
1	A	115	ASP	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](#)

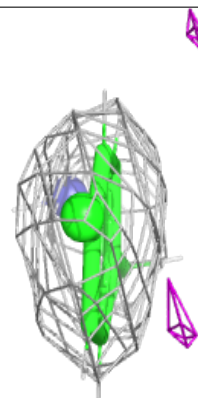
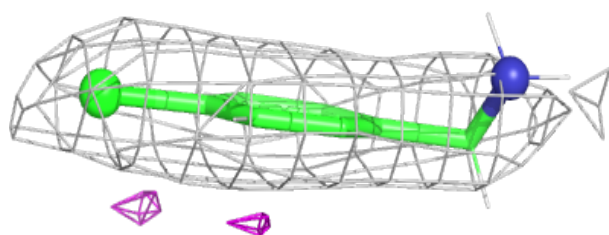
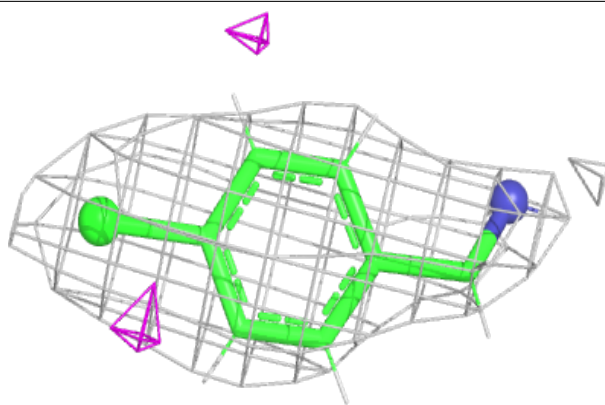
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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	NA	B	603	1/1	0.88	0.49	45,45,45,45	0
2	C2B	B	601	9/9	0.93	0.24	80,86,95,95	0
2	C2B	A	601	9/9	0.94	0.22	84,87,95,96	0
3	SO4	C	401	5/5	0.95	0.19	74,88,104,114	0
3	SO4	A	602	5/5	0.97	0.24	50,53,54,55	0
3	SO4	B	602	5/5	0.98	0.26	52,59,67,70	0

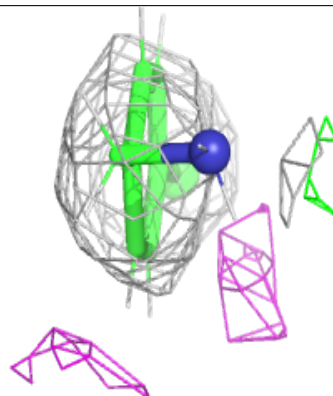
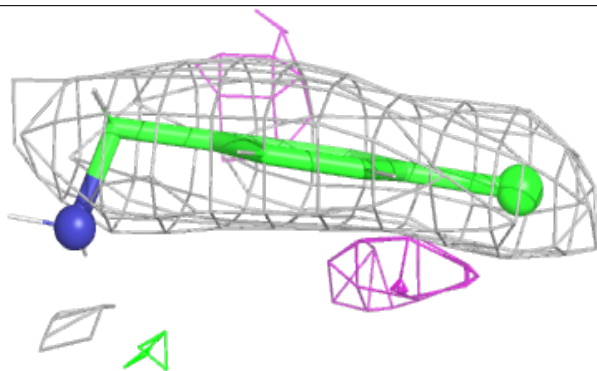
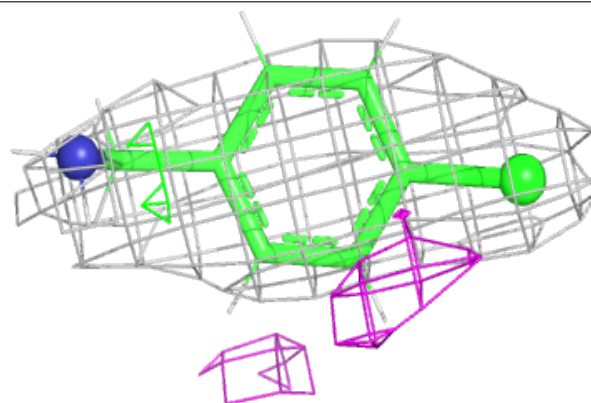
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around C2B B 601:**

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

**Electron density around C2B A 601:**

$2mF_o-DF_c$  (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.