



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:38 PM UTC

PDB ID : 7ZGS / pdb_00007zgs
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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

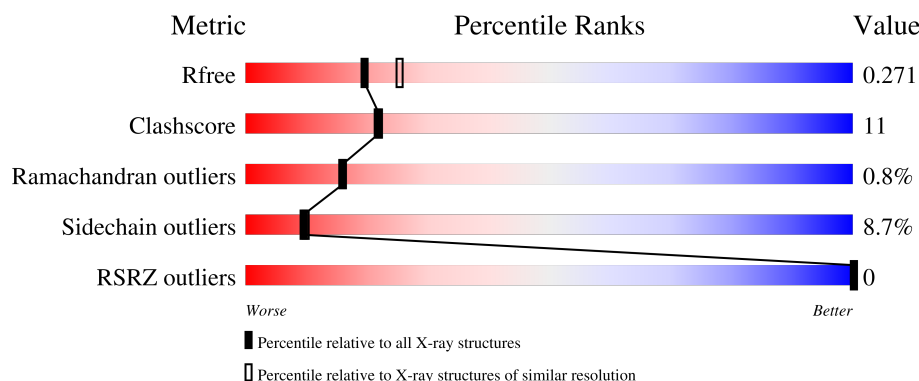
1 Overall quality at a glance

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}	180053	3031 (2.36-2.32)
Clashscore	190562	3127 (2.36-2.32)
Ramachandran outliers	187476	3095 (2.36-2.32)
Sidechain outliers	187428	3095 (2.36-2.32)
RSRZ outliers	180081	3033 (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 ≥ 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	 68% 21% 7%
1	B	349	 73% 21% 5%
1	C	349	 66% 23% 6% 5%

2 Entry composition

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

There are 30 discrepancies between the modelled and reference sequences:

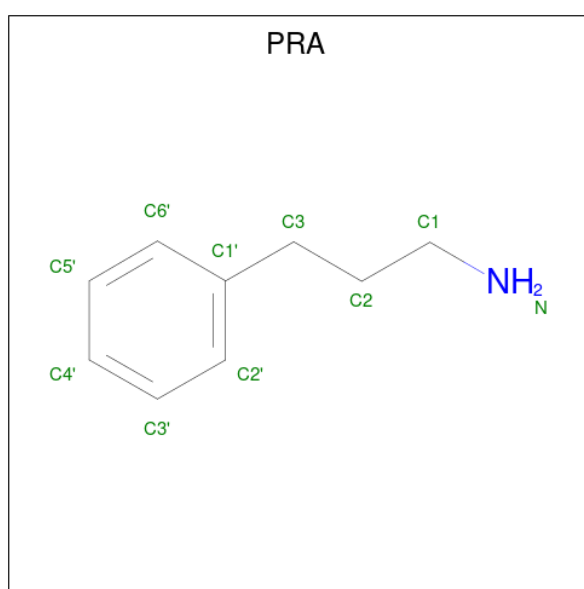
Chain	Residue	Modelled	Actual	Comment	Reference
A	376	SER	-	expression tag	UNP A0A5K1K910
A	377	ALA	-	expression tag	UNP A0A5K1K910
A	378	TRP	-	expression tag	UNP A0A5K1K910
A	379	SER	-	expression tag	UNP A0A5K1K910
A	380	HIS	-	expression tag	UNP A0A5K1K910
A	381	PRO	-	expression tag	UNP A0A5K1K910
A	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 (CCD ID: PRA) (formula: C₉H₁₃N) (labeled as "Ligand of Interest" by depositor).

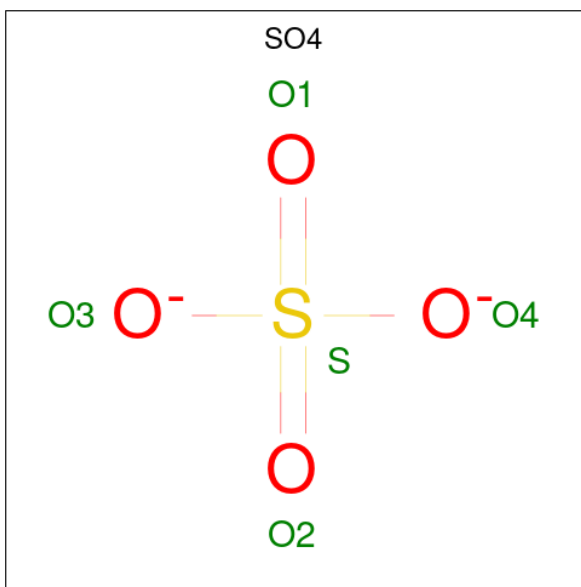


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	N	0	0
			23	9	13	1		
2	B	1	Total	C	H	N	0	0
			23	9	13	1		
2	C	1	Total	C	H	N	0	0
			23	9	13	1		

- Molecule 3 is SODIUM ION (CCD ID: NA) (formula: Na).

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

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 5 is water.

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

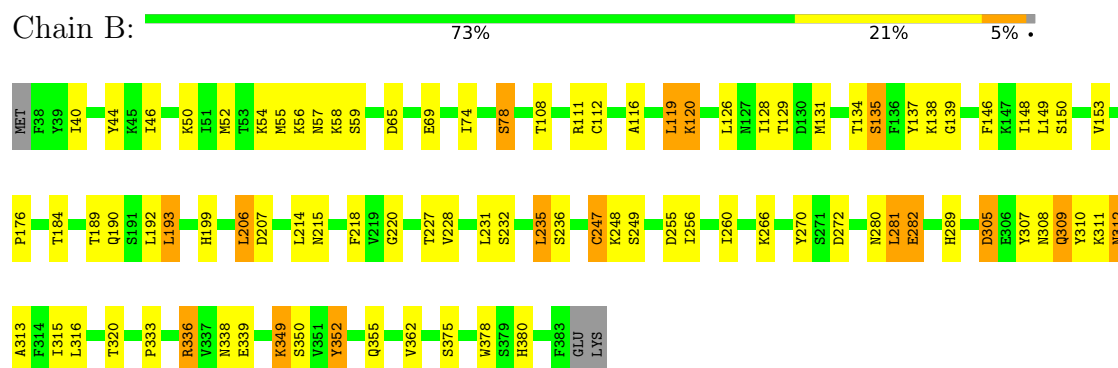
3 Residue-property plots

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.

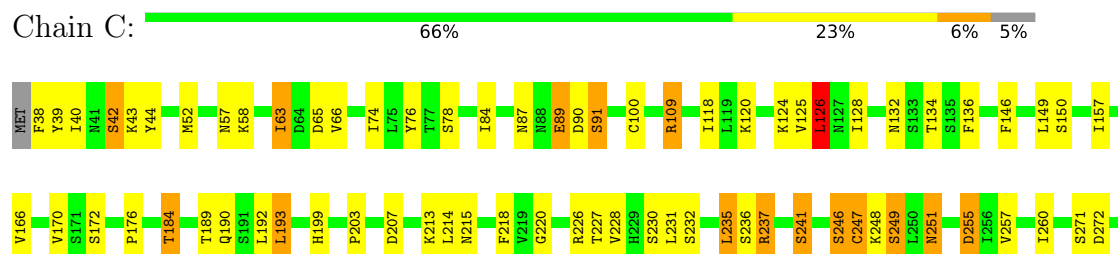
• Molecule 1: Aspartate carbamoyltransferase

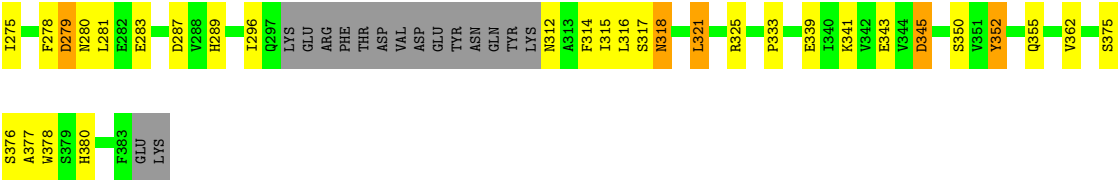


• Molecule 1: Aspartate carbamoyltransferase



• Molecule 1: Aspartate carbamoyltransferase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	86.85Å 104.37Å 87.05Å 90.00° 117.53° 90.00°	Depositor
Resolution (Å)	45.13 – 2.35 45.13 – 2.35	Depositor EDS
% Data completeness (in resolution range)	98.3 (45.13-2.35) 95.0 (45.13-2.35)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.71 (at 2.34Å)	Xtriage
Refinement program	REFMAC 5.8.0267, REFMAC 5.8.0267	Depositor
R, R_{free}	0.217 , 0.272 0.216 , 0.271	Depositor DCC
R_{free} test set	2712 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å ²)	46.8	Xtriage
Anisotropy	0.709	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 31.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.23$	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	0.97	EDS
Total number of atoms	16400	wwPDB-VP
Average B, all atoms (Å ²)	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.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NA, PRA, SO4

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	1.11	0/2664	1.53	11/3598 (0.3%)
1	B	1.12	0/2871	1.53	10/3880 (0.3%)
1	C	1.10	0/2738	1.57	22/3700 (0.6%)
All	All	1.11	0/8273	1.54	43/11178 (0.4%)

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

There are no bond length outliers.

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	349	LYS	CB-CA-C	9.24	129.31	109.99
1	C	279	ASP	CA-CB-CG	9.12	121.72	112.60
1	A	345	ASP	CB-CA-C	9.01	129.34	110.32
1	C	345	ASP	CA-CB-CG	8.02	120.62	112.60
1	A	345	ASP	CA-CB-CG	7.83	120.43	112.60
1	A	126	LEU	N-CA-CB	-7.73	98.43	110.57
1	C	345	ASP	CB-CA-C	7.45	126.03	110.32
1	C	126	LEU	N-CA-CB	-7.26	99.17	110.57
1	C	91	SER	N-CA-CB	-7.11	100.19	110.65
1	C	149	LEU	CA-C-N	6.72	130.19	120.38
1	C	149	LEU	C-N-CA	6.72	130.19	120.38
1	B	190	GLN	CA-C-N	6.70	129.15	120.44
1	B	190	GLN	C-N-CA	6.70	129.15	120.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	149	LEU	CA-C-N	6.28	129.55	120.38
1	B	149	LEU	C-N-CA	6.28	129.55	120.38
1	B	349	LYS	N-CA-CB	-6.24	100.23	110.40
1	C	246	SER	CA-C-N	6.13	133.25	121.54
1	C	246	SER	C-N-CA	6.13	133.25	121.54
1	A	345	ASP	N-CA-C	-5.96	105.11	112.38
1	C	255	ASP	CA-CB-CG	5.94	118.54	112.60
1	C	345	ASP	N-CA-C	-5.75	105.36	112.38
1	A	190	GLN	CA-C-N	5.68	127.82	120.44
1	A	190	GLN	C-N-CA	5.68	127.82	120.44
1	C	279	ASP	CB-CA-C	5.66	120.19	111.02
1	C	184	THR	CA-CB-OG1	-5.66	101.12	109.60
1	C	237	ARG	CB-CG-CD	5.57	124.12	111.30
1	A	120	LYS	CB-CA-C	5.56	121.34	110.67
1	B	305	ASP	CA-CB-CG	5.49	118.09	112.60
1	C	126	LEU	CB-CA-C	5.39	119.04	109.72
1	C	272	ASP	N-CA-C	-5.36	106.58	113.01
1	A	126	LEU	CB-CA-C	5.23	118.77	109.72
1	C	90	ASP	CA-C-N	5.23	130.58	122.26
1	C	90	ASP	C-N-CA	5.23	130.58	122.26
1	B	272	ASP	N-CA-C	-5.23	106.85	113.18
1	B	59	SER	CB-CA-C	5.22	118.36	109.80
1	C	376	SER	CA-C-N	5.21	127.53	120.38
1	C	376	SER	C-N-CA	5.21	127.53	120.38
1	C	125	VAL	CA-C-N	5.19	130.16	123.00
1	C	125	VAL	C-N-CA	5.19	130.16	123.00
1	A	125	VAL	CA-C-N	5.19	130.16	123.00
1	A	125	VAL	C-N-CA	5.19	130.16	123.00
1	A	59	SER	CB-CA-C	5.07	118.00	109.48
1	B	153	VAL	CA-C-O	-5.01	116.73	121.64

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

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	55	2
1	B	2815	2814	2807	55	2
1	C	2686	2698	2690	68	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	174	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 11.

All (174) 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
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:193:LEU:C	1:A:193:LEU:HD23	2.25	0.61
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:193:LEU:C	1:B:193:LEU:HD23	2.28	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:193:LEU:C	1:C:193:LEU:HD23	2.29	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: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:341:LYS:HD2	5:C:516:HOH:O	2.07	0.54
1:C:251:ASN:N	1:C:251:ASN:ND2	2.54	0.54
1:A:312:ASN:N	1:A:312:ASN:OD1	2.40	0.54
1:B:311:LYS:O	1:B:312:ASN:CG	2.51	0.54
1:B:378:TRP:C	1:B:378:TRP:CD1	2.86	0.53
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:130:ASP:OD1	1:B:131:MET:HE2	2.08	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: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:318:ASN:HB2	1:C:343:GLU:CD	2.34	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:193:LEU:C	1:A:193:LEU:CD2	2.85	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
1:C:84:ILE:HG23	1:C:89:GLU:HB3	1.94	0.49
1:B:148:ILE:HG21	2:B:401:PRA:H5'	1.95	0.48
1:B:193:LEU:C	1:B:193:LEU:CD2	2.86	0.48
1:A:126:LEU:C	1:A:126:LEU:HD23	2.39	0.48
1:A:78:SER:OG	1:A:362:VAL:HA	2.14	0.48
1:C:193:LEU:C	1:C:193:LEU:CD2	2.87	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: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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:B:308:ASN:O	1:B:312:ASN:CG	2.58	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:189:THR:O	1:A:193:LEU:HB3	2.17	0.44
1:B:54:LYS:HZ3	1:B:69:GLU:CD	2.24	0.44
1:C:189:THR:O	1:C:193:LEU:HB3	2.17	0.44
1:C:126:LEU:HD23	1:C:126:LEU:C	2.42	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
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: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:A:126:LEU:C	1:A:126:LEU:CD2	2.92	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:246:SER:C	1:C:247:CYS:O	2.62	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: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:184:THR:O	1:C:184:THR:HG22	2.19	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
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%)	21	22
1	B	344/349 (99%)	321 (93%)	19 (6%)	4 (1%)	10	8
1	C	328/349 (94%)	305 (93%)	21 (6%)	2 (1%)	21	22
All	All	990/1047 (95%)	928 (94%)	54 (6%)	8 (1%)	16	16

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
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%)	273 (90%)	31 (10%)	7	6
1	B	325/328 (99%)	303 (93%)	22 (7%)	14	16
1	C	311/328 (95%)	282 (91%)	29 (9%)	8	8

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	940/984 (96%)	858 (91%)	82 (9%)	9 10

All (82) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	ASP
1	A	69	GLU
1	A	78	SER
1	A	79	LYS
1	A	80	GLN
1	A	95	GLU
1	A	126	LEU
1	A	133	SER
1	A	134	THR
1	A	138	LYS
1	A	172	SER
1	A	184	THR
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
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	120	LYS
1	B	126	LEU

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Mol	Chain	Res	Type
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	C	40	ILE
1	C	42	SER
1	C	43	LYS
1	C	63	ILE
1	C	87	ASN
1	C	89	GLU
1	C	109	ARG
1	C	126	LEU
1	C	132	ASN
1	C	134	THR
1	C	172	SER
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

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Mol	Chain	Res	Type
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 (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	80	GLN
1	A	127	ASN
1	A	165	ASN
1	A	199	HIS
1	A	267	ASN
1	A	312	ASN
1	A	323	ASN
1	B	96	ASN
1	B	258	ASN
1	B	267	ASN
1	B	289	HIS
1	B	309	GLN
1	B	323	ASN
1	C	127	ASN
1	C	187	HIS
1	C	199	HIS
1	C	243	ASN
1	C	251	ASN
1	C	267	ASN
1	C	289	HIS
1	C	323	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

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
4	SO4	C	403	-	4,4,4	0.30	0	6,6,6	0.26	0
4	SO4	C	402	-	4,4,4	0.27	0	6,6,6	0.28	0
2	PRA	B	401	-	10,10,10	0.25	0	11,11,11	0.33	0
2	PRA	C	401	-	10,10,10	0.35	0	11,11,11	0.27	0
2	PRA	A	401	-	10,10,10	0.20	0	11,11,11	0.30	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:

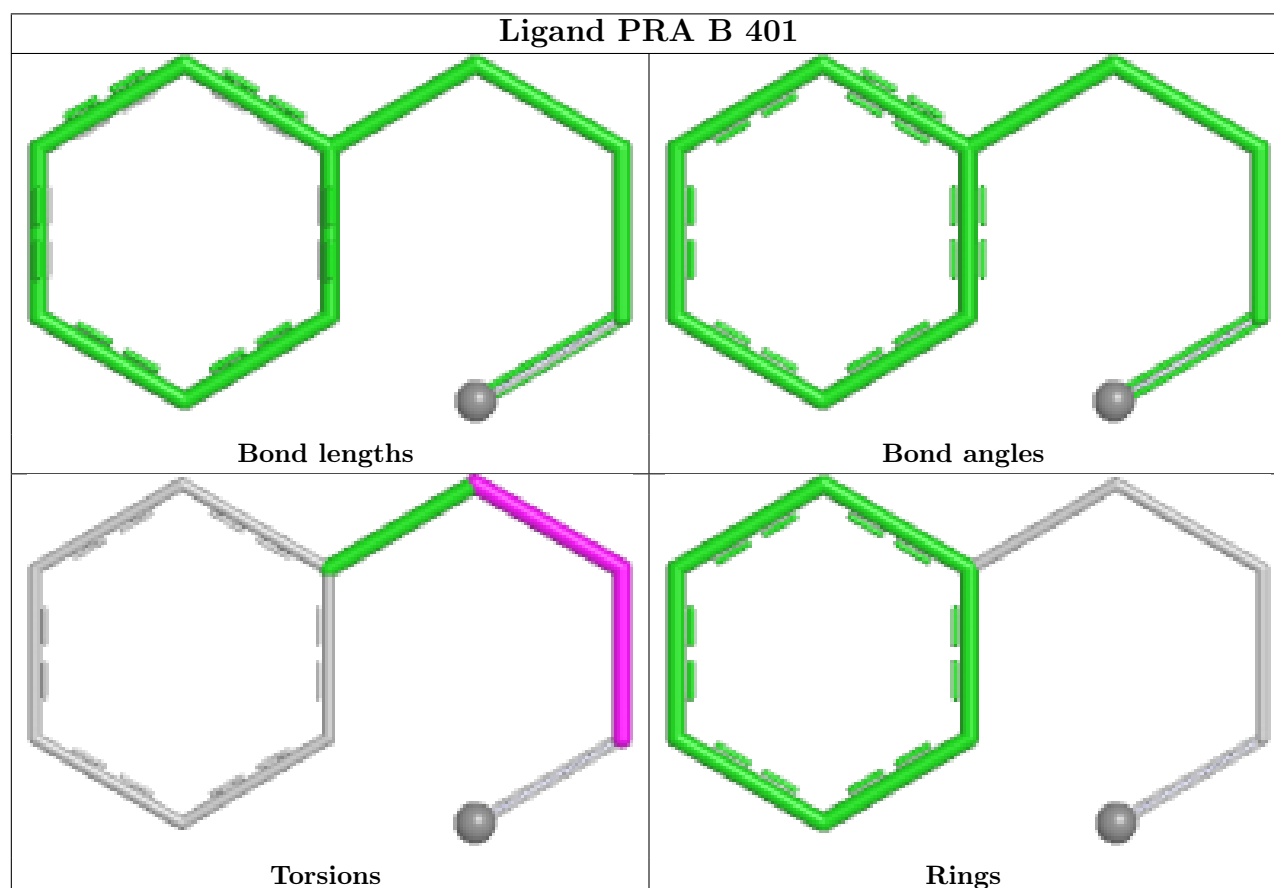
Mol	Chain	Res	Type	Atoms
2	A	401	PRA	C1-C2-C3-C1'
2	C	401	PRA	C1-C2-C3-C1'
2	B	401	PRA	C1-C2-C3-C1'
2	B	401	PRA	N-C1-C2-C3
2	A	401	PRA	C2'-C1'-C3-C2
2	A	401	PRA	C6'-C1'-C3-C2

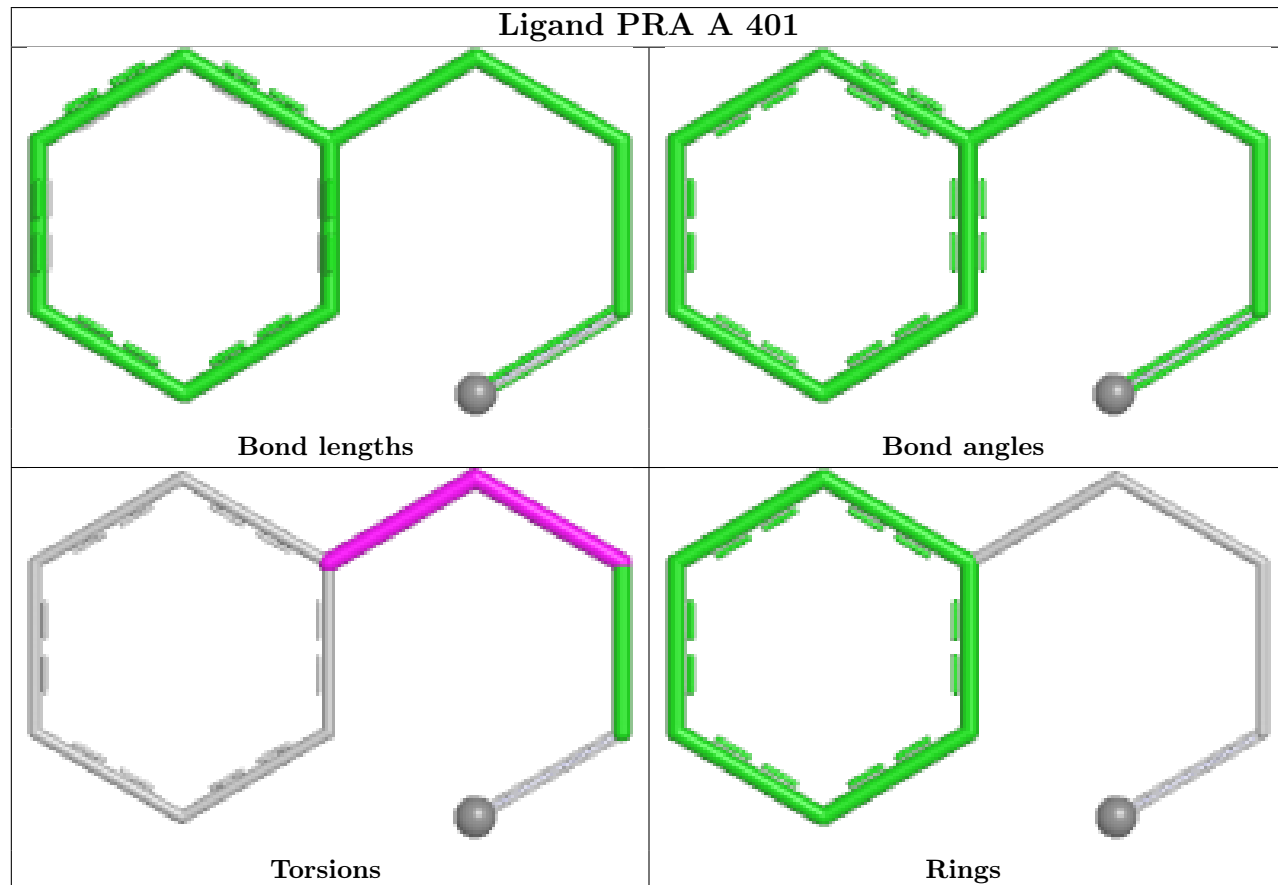
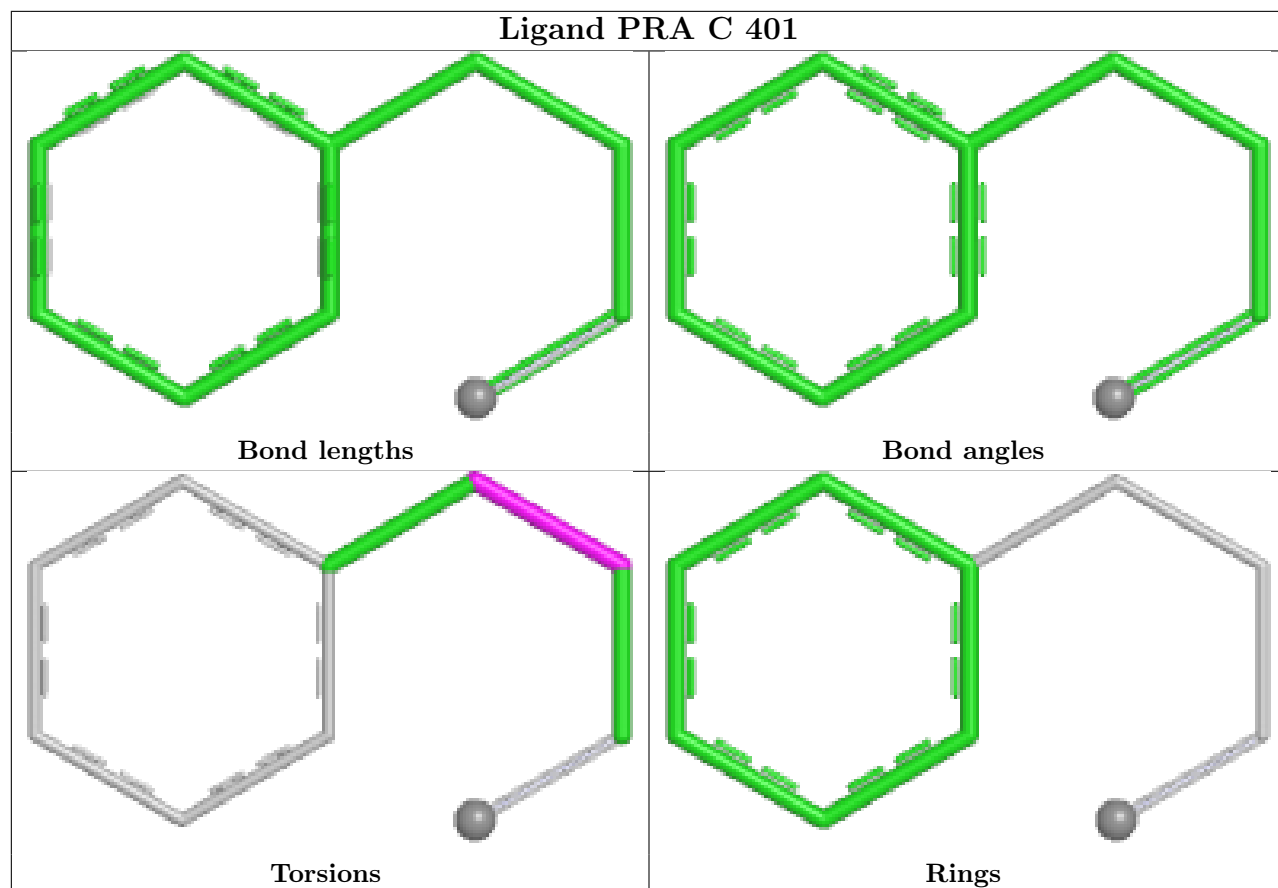
There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	PRA	2	0
2	C	401	PRA	1	0
2	A	401	PRA	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	324/349 (92%)	-0.98	0 100 100	38, 60, 97, 124	0
1	B	346/349 (99%)	-1.11	0 100 100	36, 55, 98, 124	0
1	C	332/349 (95%)	-0.90	0 100 100	37, 64, 97, 121	0
All	All	1002/1047 (95%)	-1.00	0 100 100	36, 60, 97, 124	0

There are no RSRZ outliers to report.

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](#)

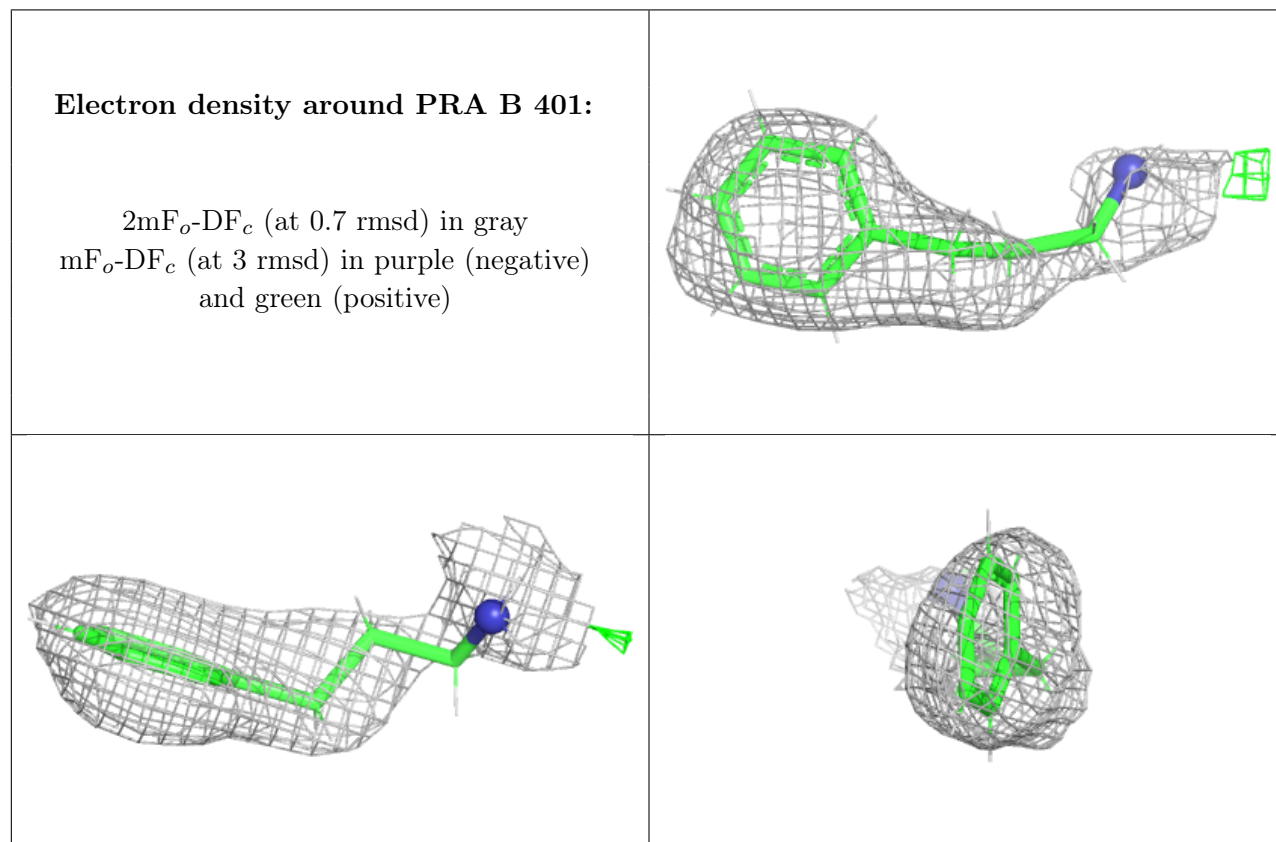
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

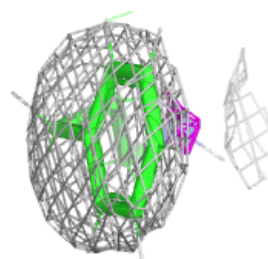
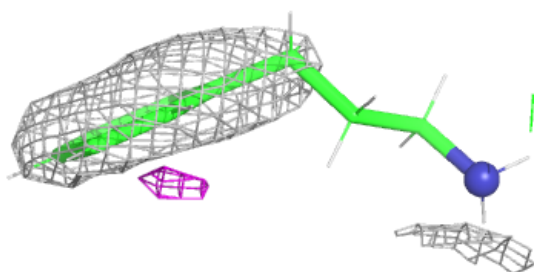
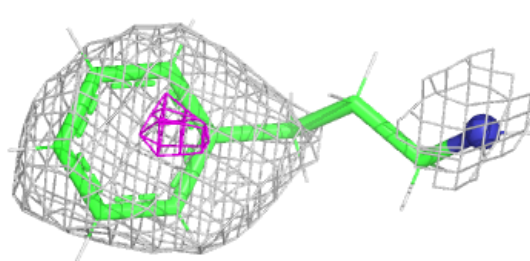
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	PRA	B	401	10/10	0.98	0.08	71,79,93,94	0
2	PRA	C	401	10/10	0.98	0.08	73,80,92,93	0
3	NA	A	402	1/1	0.98	0.13	53,53,53,53	0
2	PRA	A	401	10/10	0.99	0.06	63,70,87,90	0
4	SO4	C	402	5/5	1.00	0.04	50,51,64,73	0
4	SO4	C	403	5/5	1.00	0.03	48,51,54,57	0

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.

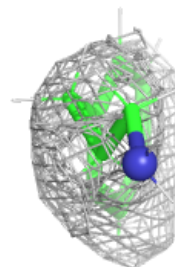
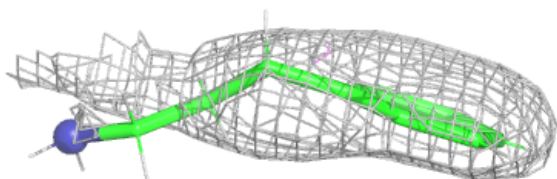
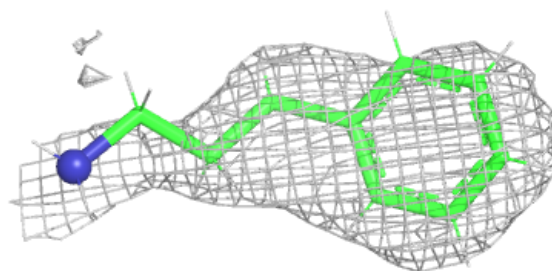


Electron density around PRA C 401:

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

**Electron density around PRA A 401:**

$2mF_o-DF_c$ (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.