



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2022 – 04:53 pm BST

PDB ID : 7ZID
Title : Crystal Structure of truncated aspartate transcarbamoylase from Plasmodium falciparum in complex with BDA-14
Authors : Wang, C.; Zhang, B.
Deposited on : 2022-04-07
Resolution : 2.55 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtrriage (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

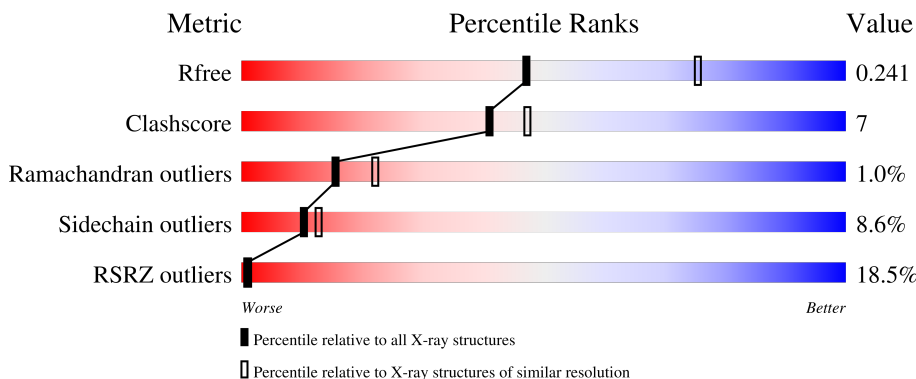
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 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	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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	 20% 72% 16% • 8%
1	B	349	 8% 74% 17% • 5%
1	C	349	 24% 72% 16% • 9%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 15800 atoms, of which 7903 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	320	5189	1649	2604	429	499	8	80	0	0
1	B	331	5356	1704	2681	440	523	8	82	0	0
1	C	319	5144	1634	2580	423	499	8	82	0	0

There are 30 discrepancies between the modelled and reference sequences:

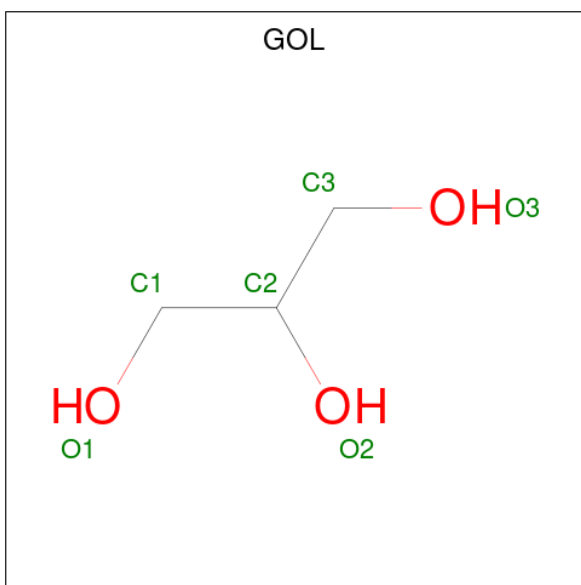
Chain	Residue	Modelled	Actual	Comment	Reference
A	376	SER	-	expression tag	UNP A0A5K1K910
A	377	ALA	-	expression tag	UNP A0A5K1K910
A	378	TRP	-	expression tag	UNP A0A5K1K910
A	379	SER	-	expression tag	UNP A0A5K1K910
A	380	HIS	-	expression tag	UNP A0A5K1K910
A	381	PRO	-	expression tag	UNP A0A5K1K910
A	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 GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



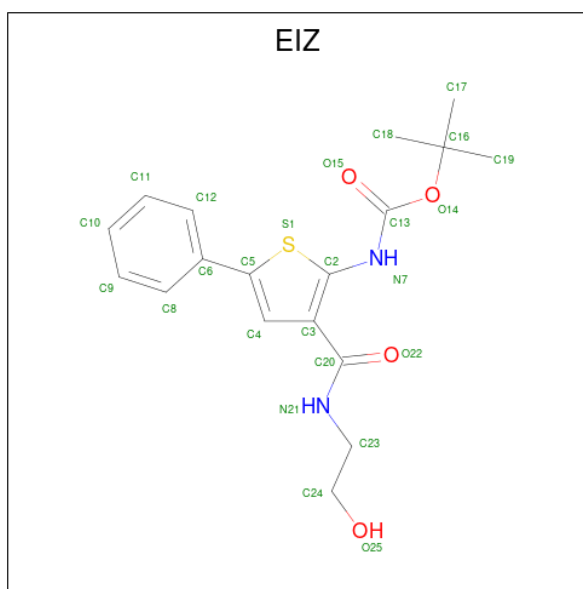
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
2	A	1	14	3	8	3	2	0
2	A	1	Total	C	H	O	2	0
			14	3	8	3		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 4 is tert-butyl N-[3-(2-hydroxyethylcarbamoyl)-5-phenyl-thiophen-2-yl]carbamate (three-letter code: EIZ) (formula: C₁₈H₂₂N₂O₄S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C H N O S 47 18 22 2 4 1	1	0

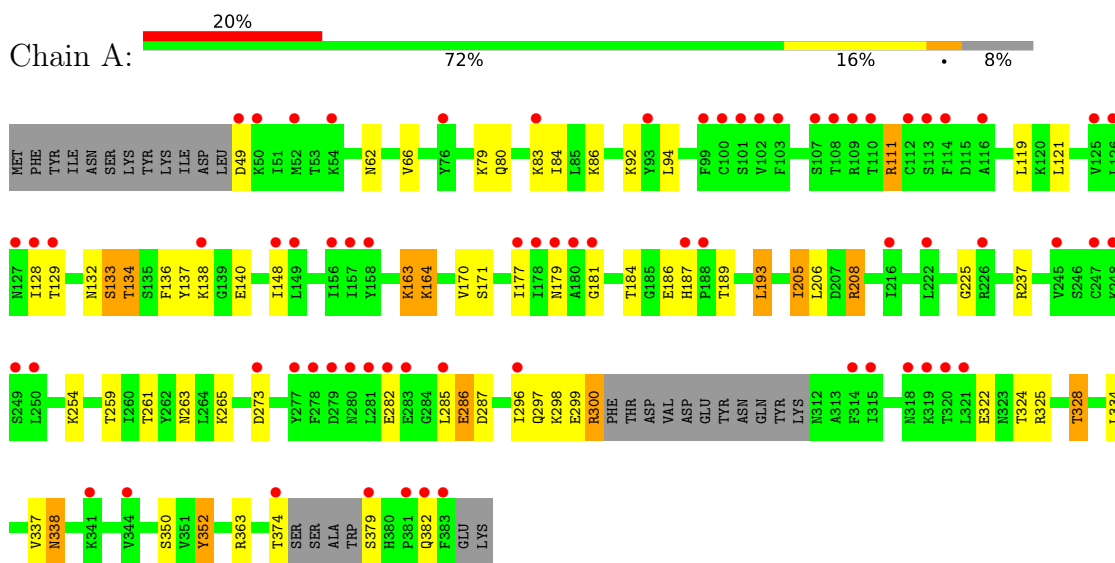
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	8	Total O 8 8	0	0
5	B	14	Total O 14 14	0	0
5	C	4	Total O 4 4	0	0

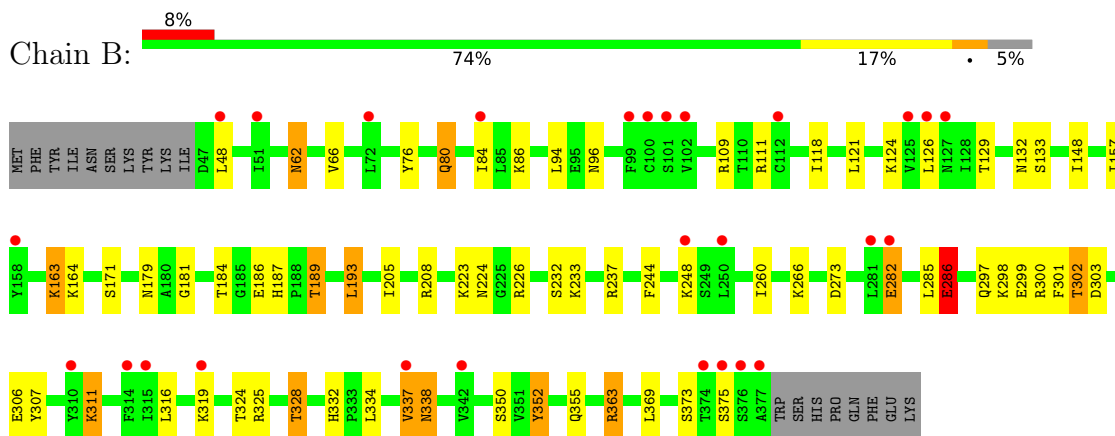
3 Residue-property plots [i](#)

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

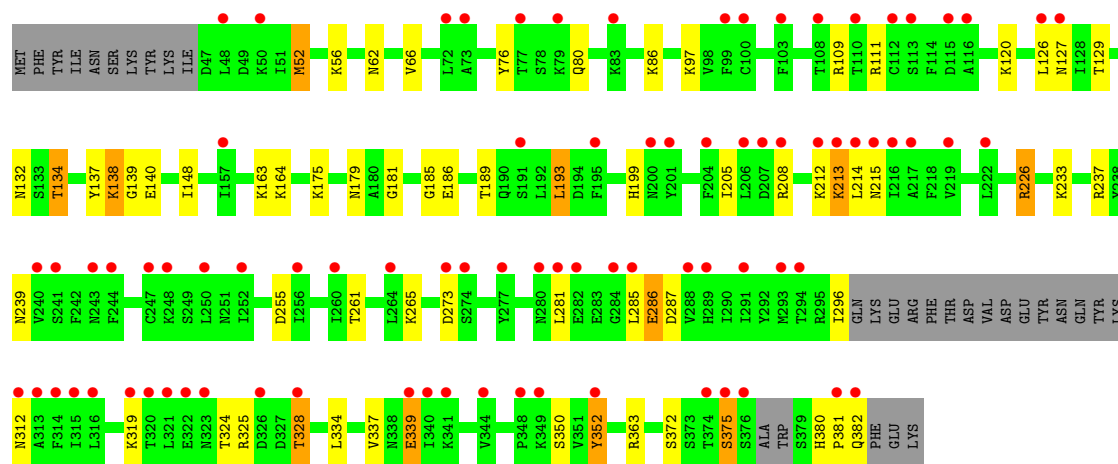


- Molecule 1: Aspartate carbamoyltransferase



- Molecule 1: Aspartate carbamoyltransferase





4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	119.26Å 90.02Å 136.94Å 90.00° 108.87° 90.00°	Depositor
Resolution (Å)	45.60 – 2.55 45.56 – 2.55	Depositor EDS
% Data completeness (in resolution range)	98.0 (45.60-2.55) 95.8 (45.56-2.55)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.45 (at 2.54Å)	Xtrriage
Refinement program	REFMAC 5.8.0267, REFMAC 5.8.0267	Depositor
R, R_{free}	0.199 , 0.244 0.206 , 0.241	Depositor DCC
R_{free} test set	2157 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	67.7	Xtrriage
Anisotropy	0.029	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	15800	wwPDB-VP
Average B, all atoms (Å ²)	81.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.36% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0/2631	0.95	1/3551 (0.0%)
1	B	0.83	1/2723 (0.0%)	1.02	2/3679 (0.1%)
1	C	0.76	0/2609	0.92	0/3524
All	All	0.79	1/7963 (0.0%)	0.96	3/10754 (0.0%)

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	A	0	1
1	C	0	1
All	All	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	244	PHE	C-O	5.03	1.32	1.23

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	363	ARG	NE-CZ-NH1	-13.27	113.67	120.30
1	B	363	ARG	NE-CZ-NH2	10.45	125.52	120.30
1	A	111	ARG	CG-CD-NE	-5.32	100.62	111.80

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	128	ILE	Peptide
1	C	139	GLY	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	2585	2604	2595	44	0
1	B	2675	2681	2675	42	0
1	C	2564	2580	2571	35	0
2	A	12	16	16	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
4	B	25	22	0	0	0
5	A	8	0	0	0	0
5	B	14	0	0	0	0
5	C	4	0	0	0	0
All	All	7897	7903	7857	112	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 (112) 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:299:GLU:OE2	1:A:299:GLU:N	2.06	0.89
1:A:382:GLN:HA	1:A:382:GLN:OE1	1.77	0.84
1:B:307:TYR:CE2	1:B:311:LYS:HD2	2.20	0.77
1:A:299:GLU:O	1:A:300:ARG:HB3	1.85	0.77
1:A:285:LEU:O	1:A:286:GLU:O	2.04	0.76
1:B:285:LEU:O	1:B:286:GLU:O	2.04	0.75
1:C:285:LEU:O	1:C:286:GLU:O	2.06	0.72
1:A:140:GLU:OE2	1:C:109:ARG:NH1	2.24	0.70
1:B:325:ARG:O	1:B:328:THR:HG22	1.91	0.70
1:B:62:ASN:ND2	1:B:186:GLU:OE1	2.22	0.69
1:C:325:ARG:O	1:C:328:THR:HG22	1.93	0.68
1:C:205:ILE:HD12	1:C:214:LEU:HD13	1.79	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:325:ARG:O	1:A:328:THR:HG22	1.97	0.65
1:A:133:SER:O	1:A:136:PHE:O	2.15	0.64
1:B:118:ILE:HD11	1:B:157:ILE:CD1	2.30	0.62
1:A:208:ARG:NH1	1:A:237:ARG:O	2.33	0.62
1:B:193:LEU:C	1:B:193:LEU:HD12	2.21	0.62
1:A:296:ILE:HD12	1:A:296:ILE:N	2.16	0.61
1:C:337:VAL:HG22	1:C:339:GLU:OE1	2.01	0.60
1:B:163:LYS:HB3	1:B:184:THR:HG23	1.84	0.59
1:C:193:LEU:C	1:C:193:LEU:HD12	2.22	0.59
1:B:332:HIS:H	1:B:355:GLN:HE22	1.50	0.59
1:B:109:ARG:NH1	1:C:140:GLU:OE2	2.36	0.59
1:A:259:THR:O	1:A:263:ASN:ND2	2.35	0.58
1:A:334:LEU:HD13	1:B:148:ILE:HD11	1.84	0.58
1:C:137:TYR:O	1:C:138:LYS:O	2.21	0.58
1:A:62:ASN:HD22	1:A:186:GLU:HG2	1.69	0.57
1:B:224:ASN:HB3	1:B:300:ARG:HD2	1.86	0.57
1:C:208:ARG:NH1	1:C:237:ARG:O	2.34	0.57
1:C:350:SER:HB2	1:C:352:TYR:CE1	2.40	0.56
1:B:337:VAL:O	1:B:338:ASN:HB2	2.05	0.56
1:A:193:LEU:HD12	1:A:193:LEU:C	2.25	0.56
1:B:62:ASN:HB3	1:B:186:GLU:HG2	1.88	0.55
1:B:334:LEU:HD13	1:C:148:ILE:HD11	1.88	0.55
1:B:282:GLU:H	1:B:282:GLU:CD	2.10	0.55
1:C:261:THR:O	1:C:265:LYS:HG3	2.07	0.55
1:A:261:THR:O	1:A:265:LYS:HG3	2.07	0.54
1:A:299:GLU:O	1:A:300:ARG:CB	2.56	0.53
1:B:324:THR:CB	1:B:328:THR:HG21	2.39	0.53
1:A:92:LYS:HD2	1:B:96:ASN:OD1	2.10	0.52
1:B:324:THR:HB	1:B:328:THR:HG21	1.91	0.52
1:C:66:VAL:O	1:C:237:ARG:NH2	2.39	0.52
1:C:185:GLY:HA3	1:C:226:ARG:HG2	1.92	0.52
1:A:282:GLU:H	1:A:282:GLU:CD	2.13	0.52
1:B:111:ARG:NH1	1:C:127:ASN:O	2.41	0.52
1:A:132:ASN:O	1:A:134:THR:N	2.43	0.51
1:C:324:THR:HB	1:C:328:THR:HG21	1.92	0.51
1:C:324:THR:CB	1:C:328:THR:HG21	2.40	0.51
1:A:350:SER:HB2	1:A:352:TYR:CE1	2.46	0.50
1:B:303:ASP:OD2	1:B:303:ASP:N	2.42	0.50
1:A:286:GLU:HG3	1:A:287:ASP:N	2.27	0.50
1:A:382:GLN:OE1	1:A:382:GLN:CA	2.51	0.50
1:C:380:HIS:HB3	1:C:381:PRO:HD2	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:163:LYS:HB3	1:B:184:THR:CG2	2.43	0.49
1:B:350:SER:HB2	1:B:352:TYR:CE1	2.48	0.49
1:B:301:PHE:O	1:B:302:THR:C	2.51	0.48
1:A:324:THR:CB	1:A:328:THR:HG21	2.44	0.48
1:A:163:LYS:HB3	1:A:184:THR:HG23	1.96	0.48
1:B:118:ILE:HD11	1:B:157:ILE:HD12	1.96	0.48
1:B:282:GLU:CD	1:B:282:GLU:N	2.67	0.48
1:A:66:VAL:O	1:A:237:ARG:NH2	2.38	0.48
1:A:79:LYS:HG3	1:A:83:LYS:HE2	1.96	0.47
1:A:119:LEU:HD22	1:B:124:LYS:HD3	1.96	0.47
1:A:324:THR:OG1	1:A:328:THR:HG21	2.13	0.47
1:B:324:THR:OG1	1:B:328:THR:HG21	2.14	0.47
1:B:80:GLN:NE2	1:B:80:GLN:HA	2.30	0.47
1:A:282:GLU:CD	1:A:282:GLU:N	2.68	0.47
1:A:62:ASN:ND2	1:A:186:GLU:HG2	2.29	0.46
1:A:337:VAL:CG2	1:A:338:ASN:H	2.29	0.46
1:A:137:TYR:O	1:A:138:LYS:C	2.54	0.46
1:B:76:TYR:O	1:B:80:GLN:HG2	2.16	0.46
1:C:324:THR:OG1	1:C:328:THR:HG21	2.15	0.46
1:B:66:VAL:O	1:B:237:ARG:NH2	2.41	0.46
1:C:372:SER:HB3	1:C:375:SER:HB3	1.98	0.46
1:B:48:LEU:HD11	1:B:369:LEU:HD21	1.98	0.45
1:C:80:GLN:NE2	1:C:382:GLN:OE1	2.50	0.45
1:C:296:ILE:HG22	1:C:296:ILE:O	2.15	0.45
1:B:80:GLN:HA	1:B:80:GLN:HE21	1.81	0.45
1:A:163:LYS:HG3	1:A:164:LYS:HE2	1.99	0.45
1:C:62:ASN:HD22	1:C:186:GLU:HG2	1.82	0.44
1:C:52:MET:HE1	1:C:380:HIS:HE1	1.83	0.44
1:B:94:LEU:HB3	1:B:121:LEU:HB3	1.99	0.44
1:C:76:TYR:O	1:C:80:GLN:HG2	2.18	0.44
1:B:232:SER:HB3	1:B:260:ILE:HD11	1.99	0.44
1:B:297:GLN:NE2	1:B:299:GLU:OE2	2.51	0.43
1:A:170:VAL:HA	1:A:177:ILE:HD12	2.01	0.43
1:A:324:THR:HB	1:A:328:THR:HG21	1.99	0.43
1:C:137:TYR:O	1:C:138:LYS:C	2.56	0.43
1:C:281:LEU:HG	1:C:285:LEU:HD22	1.99	0.43
1:A:148:ILE:HD13	1:C:109:ARG:HH11	1.84	0.43
1:B:189:THR:HB	1:B:363:ARG:NH2	2.33	0.43
1:B:189:THR:HB	1:B:363:ARG:HH21	1.84	0.43
1:A:163:LYS:HB3	1:A:184:THR:CG2	2.49	0.42
1:C:286:GLU:HG3	1:C:287:ASP:H	1.85	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:337:VAL:CG2	1:A:338:ASN:N	2.82	0.42
1:A:94:LEU:HB3	1:A:121:LEU:HB3	2.01	0.42
1:A:179:ASN:ND2	1:A:181:GLY:H	2.18	0.42
1:A:337:VAL:HG23	1:A:338:ASN:N	2.34	0.42
1:A:205:ILE:HD12	1:A:206:LEU:H	1.85	0.41
1:C:175:LYS:HA	1:C:175:LYS:HD3	1.92	0.41
1:A:189:THR:HB	1:A:363:ARG:NH2	2.35	0.41
1:B:80:GLN:O	1:B:84:ILE:HG13	2.21	0.41
1:B:337:VAL:O	1:B:338:ASN:CB	2.67	0.41
1:C:213:LYS:HD3	1:C:239:ASN:OD1	2.21	0.41
1:B:302:THR:HG23	1:B:306:GLU:OE2	2.21	0.41
1:C:179:ASN:ND2	1:C:181:GLY:H	2.19	0.41
1:C:132:ASN:ND2	1:C:134:THR:HG23	2.36	0.41
1:B:179:ASN:ND2	1:B:181:GLY:H	2.19	0.40
1:B:316:LEU:HD12	1:B:316:LEU:HA	1.90	0.40
1:C:189:THR:HB	1:C:363:ARG:NH2	2.36	0.40
1:A:80:GLN:O	1:A:84:ILE:HG13	2.21	0.40
1:A:148:ILE:HD11	1:C:334:LEU:HD13	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	314/349 (90%)	295 (94%)	16 (5%)	3 (1%)	15	22
1	B	329/349 (94%)	312 (95%)	14 (4%)	3 (1%)	17	24
1	C	313/349 (90%)	287 (92%)	22 (7%)	4 (1%)	12	16
All	All	956/1047 (91%)	894 (94%)	52 (5%)	10 (1%)	15	22

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	133	SER
1	A	286	GLU
1	B	286	GLU
1	C	138	LYS
1	C	286	GLU
1	B	338	ASN
1	C	375	SER
1	C	339	GLU
1	A	225	GLY
1	B	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	300/328 (92%)	277 (92%)	23 (8%)	13	16
1	B	310/328 (94%)	279 (90%)	31 (10%)	7	8
1	C	299/328 (91%)	275 (92%)	24 (8%)	12	15
All	All	909/984 (92%)	831 (91%)	78 (9%)	10	13

All (78) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	ASP
1	A	86	LYS
1	A	111	ARG
1	A	129	THR
1	A	134	THR
1	A	163	LYS
1	A	164	LYS
1	A	171	SER
1	A	187	HIS
1	A	193	LEU
1	A	205	ILE
1	A	208	ARG
1	A	254	LYS

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Mol	Chain	Res	Type
1	A	273	ASP
1	A	297	GLN
1	A	298	LYS
1	A	300	ARG
1	A	322	GLU
1	A	328	THR
1	A	338	ASN
1	A	352	TYR
1	A	374	THR
1	A	379	SER
1	B	62	ASN
1	B	80	GLN
1	B	86	LYS
1	B	126	LEU
1	B	129	THR
1	B	132	ASN
1	B	133	SER
1	B	163	LYS
1	B	164	LYS
1	B	171	SER
1	B	187	HIS
1	B	189	THR
1	B	193	LEU
1	B	205	ILE
1	B	208	ARG
1	B	223	LYS
1	B	226	ARG
1	B	233	LYS
1	B	248	LYS
1	B	266	LYS
1	B	273	ASP
1	B	282	GLU
1	B	286	GLU
1	B	298	LYS
1	B	302	THR
1	B	311	LYS
1	B	319	LYS
1	B	328	THR
1	B	352	TYR
1	B	373	SER
1	B	375	SER
1	C	52	MET

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Mol	Chain	Res	Type
1	C	56	LYS
1	C	86	LYS
1	C	97	LYS
1	C	111	ARG
1	C	120	LYS
1	C	126	LEU
1	C	129	THR
1	C	134	THR
1	C	163	LYS
1	C	164	LYS
1	C	193	LEU
1	C	199	HIS
1	C	212	LYS
1	C	213	LYS
1	C	215	ASN
1	C	226	ARG
1	C	233	LYS
1	C	255	ASP
1	C	273	ASP
1	C	312	ASN
1	C	319	LYS
1	C	328	THR
1	C	352	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	87	ASN
1	A	165	ASN
1	A	179	ASN
1	A	243	ASN
1	A	289	HIS
1	A	323	ASN
1	A	338	ASN
1	B	80	GLN
1	B	165	ASN
1	B	179	ASN
1	B	211	ASN
1	B	243	ASN
1	B	289	HIS
1	B	312	ASN
1	B	338	ASN

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Mol	Chain	Res	Type
1	B	355	GLN
1	C	132	ASN
1	C	165	ASN
1	C	179	ASN
1	C	211	ASN
1	C	224	ASN
1	C	243	ASN
1	C	280	ASN
1	C	289	HIS
1	C	380	HIS

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](#)

5 ligands are modelled in this entry.

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	$\# Z > 2$
3	SO4	B	402	-	4,4,4	0.55	0	6,6,6	0.44	0
3	SO4	A	403	-	4,4,4	0.31	0	6,6,6	0.17	0
2	GOL	A	402	-	5,5,5	0.32	0	5,5,5	0.43	0
4	EIZ	B	401	-	23,26,26	0.78	0	26,36,36	1.04	2 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GOL	A	401	-	5,5,5	0.17	0	5,5,5	0.29	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	GOL	A	401	-	-	4/4/4/4	-
2	GOL	A	402	-	-	4/4/4/4	-
4	EIZ	B	401	-	-	6/17/21/21	0/2/2/2

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	401	EIZ	O14-C16-C18	3.09	119.42	107.20
4	B	401	EIZ	C16-O14-C13	2.06	124.16	120.99

There are no chirality outliers.

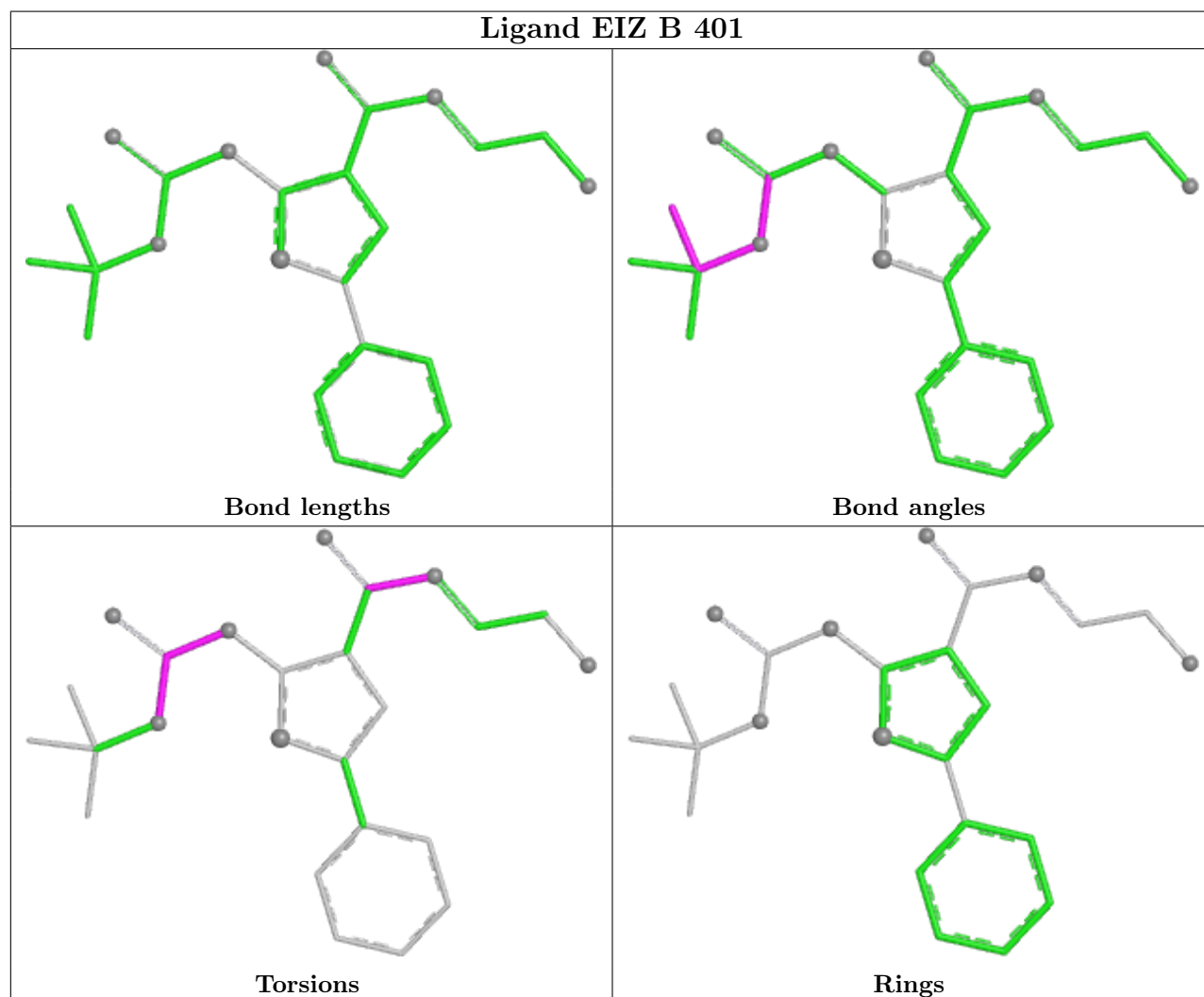
All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	GOL	C1-C2-C3-O3
2	A	402	GOL	O1-C1-C2-O2
2	A	402	GOL	O1-C1-C2-C3
2	A	402	GOL	O2-C2-C3-O3
4	B	401	EIZ	O14-C13-N7-C2
4	B	401	EIZ	O15-C13-N7-C2
4	B	401	EIZ	N7-C13-O14-C16
4	B	401	EIZ	O15-C13-O14-C16
4	B	401	EIZ	O22-C20-N21-C23
4	B	401	EIZ	C3-C20-N21-C23
2	A	401	GOL	O1-C1-C2-C3
2	A	402	GOL	C1-C2-C3-O3
2	A	401	GOL	O1-C1-C2-O2
2	A	401	GOL	O2-C2-C3-O3

There are no ring outliers.

No monomer is involved in short contacts.

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

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, 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	320/349 (91%)	1.31	69 (21%) 0 0	46, 78, 112, 136	0
1	B	331/349 (94%)	0.89	27 (8%) 11 14	45, 69, 103, 150	0
1	C	319/349 (91%)	1.51	83 (26%) 0 0	52, 93, 136, 159	0
All	All	970/1047 (92%)	1.23	179 (18%) 1 1	45, 78, 124, 159	0

All (179) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	284	GLY	9.0
1	B	375	SER	8.4
1	C	314	PHE	8.0
1	A	383	PHE	7.1
1	C	214	LEU	6.8
1	B	48	LEU	6.1
1	C	281	LEU	5.7
1	A	381	PRO	5.6
1	C	273	ASP	5.4
1	C	285	LEU	5.3
1	A	281	LEU	5.3
1	C	206	LEU	5.3
1	A	382	GLN	5.1
1	A	374	THR	5.1
1	A	379	SER	5.1
1	C	349	LYS	5.1
1	A	83	LYS	5.0
1	B	51	ILE	4.9
1	B	376	SER	4.8
1	C	323	ASN	4.7
1	C	50	LYS	4.7
1	A	314	PHE	4.6
1	C	375	SER	4.5

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Mol	Chain	Res	Type	RSRZ
1	C	315	ILE	4.4
1	C	326	ASP	4.4
1	C	204	PHE	4.4
1	C	222	LEU	4.4
1	A	100	CYS	4.3
1	C	48	LEU	4.2
1	C	382	GLN	4.1
1	C	201	TYR	4.1
1	C	322	GLU	4.0
1	C	208	ARG	4.0
1	C	112	CYS	3.9
1	A	108	THR	3.9
1	C	340	ILE	3.7
1	B	314	PHE	3.7
1	C	321	LEU	3.7
1	B	337	VAL	3.7
1	A	101	SER	3.6
1	C	247	CYS	3.6
1	B	374	THR	3.6
1	A	157	ILE	3.6
1	C	243	ASN	3.6
1	C	282	GLU	3.6
1	A	250	LEU	3.6
1	B	100	CYS	3.5
1	A	248	LYS	3.5
1	C	72	LEU	3.5
1	C	280	ASN	3.4
1	C	216	ILE	3.4
1	C	252	ILE	3.3
1	C	320	THR	3.3
1	C	213	LYS	3.2
1	A	280	ASN	3.2
1	C	100	CYS	3.2
1	C	352	TYR	3.2
1	B	377	ALA	3.2
1	A	50	LYS	3.2
1	C	313	ALA	3.1
1	A	52	MET	3.1
1	C	260	ILE	3.1
1	B	282	GLU	3.1
1	A	102	VAL	3.1
1	C	79	LYS	3.0

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Mol	Chain	Res	Type	RSRZ
1	C	319	LYS	3.0
1	A	127	ASN	3.0
1	A	283	GLU	3.0
1	C	217	ALA	3.0
1	B	102	VAL	2.9
1	B	315	ILE	2.9
1	A	110	THR	2.9
1	C	250	LEU	2.9
1	A	277	TYR	2.9
1	A	103	PHE	2.9
1	A	148	ILE	2.9
1	A	158	TYR	2.9
1	A	282	GLU	2.9
1	A	296	ILE	2.9
1	C	244	PHE	2.9
1	C	256	ILE	2.9
1	B	126	LEU	2.8
1	C	240	VAL	2.8
1	C	381	PRO	2.8
1	A	114	PHE	2.8
1	C	83	LYS	2.8
1	B	125	VAL	2.8
1	A	126	LEU	2.8
1	C	113	SER	2.7
1	B	248	LYS	2.7
1	A	180	ALA	2.7
1	B	250	LEU	2.7
1	C	207	ASP	2.7
1	C	248	LYS	2.7
1	A	247	CYS	2.7
1	B	319	LYS	2.7
1	C	77	THR	2.7
1	C	264	LEU	2.7
1	A	279	ASP	2.7
1	A	109	ARG	2.7
1	C	274	SER	2.6
1	A	187	HIS	2.6
1	C	288	VAL	2.6
1	A	285	LEU	2.6
1	A	112	CYS	2.6
1	C	312	ASN	2.6
1	C	344	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	84	ILE	2.6
1	B	101	SER	2.6
1	A	128	ILE	2.6
1	C	339	GLU	2.6
1	A	113	SER	2.6
1	C	108	THR	2.6
1	A	222	LEU	2.6
1	C	341	LYS	2.6
1	B	112	CYS	2.5
1	A	129	THR	2.5
1	A	156	ILE	2.5
1	B	99	PHE	2.5
1	A	319	LYS	2.5
1	C	294	THR	2.5
1	A	273	ASP	2.5
1	C	200	ASN	2.5
1	A	93	TYR	2.5
1	C	219	VAL	2.5
1	A	344	VAL	2.4
1	C	215	ASN	2.4
1	C	316	LEU	2.4
1	C	191	SER	2.4
1	A	318	ASN	2.4
1	A	179	ASN	2.4
1	A	278	PHE	2.4
1	A	320	THR	2.4
1	A	177	ILE	2.3
1	A	76	TYR	2.3
1	A	178	ILE	2.3
1	C	376	SER	2.3
1	C	348	PRO	2.3
1	A	216	ILE	2.3
1	A	107	SER	2.3
1	C	127	ASN	2.3
1	C	293	MET	2.3
1	C	212	LYS	2.3
1	A	49	ASP	2.3
1	B	158	TYR	2.3
1	A	54	LYS	2.3
1	C	291	ILE	2.3
1	A	99	PHE	2.3
1	C	116	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	188	PRO	2.2
1	B	127	ASN	2.2
1	A	245	VAL	2.2
1	A	249	SER	2.2
1	C	277	TYR	2.2
1	C	374	THR	2.2
1	A	315	ILE	2.2
1	A	181	GLY	2.2
1	A	226	ARG	2.2
1	C	241	SER	2.2
1	B	310	TYR	2.1
1	C	126	LEU	2.1
1	A	125	VAL	2.1
1	C	328	THR	2.1
1	A	138	LYS	2.1
1	A	341	LYS	2.1
1	B	72	LEU	2.1
1	C	195	PHE	2.1
1	C	110	THR	2.1
1	B	281	LEU	2.1
1	C	103	PHE	2.1
1	C	289	HIS	2.1
1	A	321	LEU	2.1
1	A	116	ALA	2.0
1	B	342	VAL	2.0
1	C	157	ILE	2.0
1	A	149	LEU	2.0
1	C	115	ASP	2.0
1	C	73	ALA	2.0
1	C	99	PHE	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 [\(i\)](#)

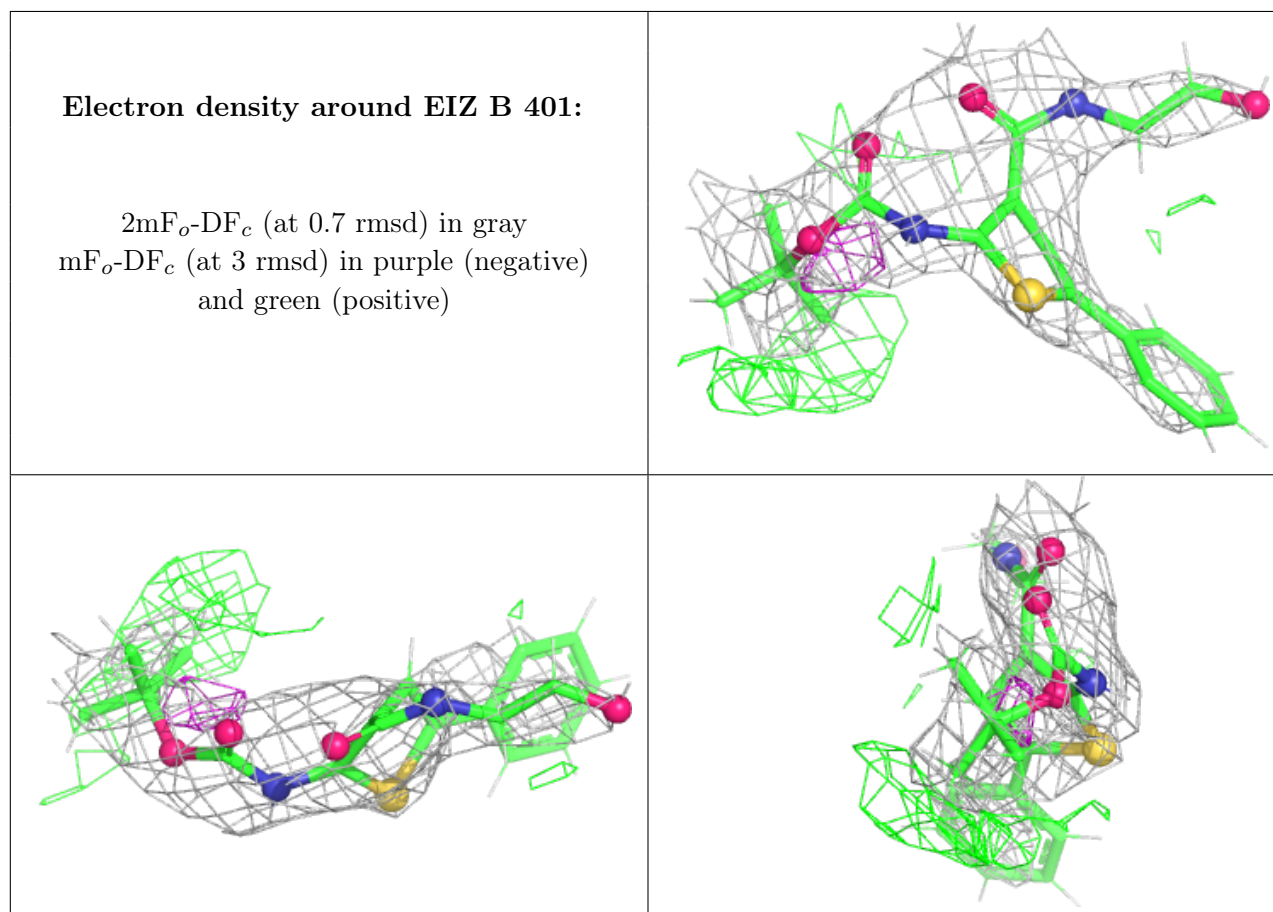
There are no monosaccharides in this entry.

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, 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	GOL	A	402	6/6	0.71	0.28	30,99,102,102	2
4	EIZ	B	401	25/25	0.75	0.33	30,116,138,140	1
2	GOL	A	401	6/6	0.81	0.18	30,107,112,112	2
3	SO4	A	403	5/5	0.92	0.14	73,94,99,107	0
3	SO4	B	402	5/5	0.94	0.21	70,71,76,80	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.